

Chapter 1

Negation in a cross-linguistic perspective

0. Chapter summary

This chapter introduces the empirical scope of our study on the expression and interpretation of negation in natural language. We start with some background notions on negation in logic and language, and continue with a discussion of more linguistic issues concerning negation at the syntax-semantics interface. We zoom in on cross-linguistic variation, both in a synchronic perspective (typology) and in a diachronic perspective (language change). Besides expressions of propositional negation, this book analyzes the form and interpretation of indefinites in the scope of negation. This raises the issue of negative polarity and its relation to negative concord. We present the main facts, criteria, and proposals developed in the literature on this topic. The chapter closes with an overview of the book. We use Optimality Theory to account for the syntax and semantics of negation in a cross-linguistic perspective. This theoretical framework is introduced in Chapter 2.

1 Negation in logic and language

The main aim of this book is to provide an account of the patterns of negation we find in natural language. The expression and interpretation of negation in natural language has long fascinated philosophers, logicians, and linguists. Horn's (1989) *Natural history of negation* opens with the following statement: "All human systems of communication contain a representation of negation. No animal communication system includes negative utterances, and consequently, none possesses a means for assigning truth value, for lying, for irony, or for coping with false or contradictory statements." A bit further on the first page, Horn states: "Despite the simplicity of the one-place connective of propositional logic ($\neg p$ is true if and only if p is not true) and of the laws of inference in which it participate (e.g. the Law of Double Negation: from $\neg\neg p$ infer p , and vice versa), the form and function of negative statements in ordinary

language are far from simple and transparent. In particular, the absolute symmetry definable between affirmative and negative propositions in logic is not reflected by a comparable symmetry in language structure and language use.” The scope of this book is more modest than Horn’s seminal study, but we will nevertheless attempt to work out some of the issues highlighted by Horn. In particular, we will be concerned with negation as a universal category of human language, with negation as the marked member of the pair <affirmation, negation>, and with cross-linguistic variation in the marking and interpretation of propositional negation and negative indefinites.

1.1 Markedness of negation

The fact that all human languages establish a distinction between affirmative and negative statements is the starting point of the investigation in Chapters 3 through 6. The relation with animal communication systems is investigated in Chapter 7, where we draw implications for language genesis from our study of negation in L2 acquisition. Modern studies on animal communication make it possible to assign a mental representation of (pre-logical) negation to certain primates. Under the view that language evolved from thought, we can connect these findings to data from early L2 acquisition, and hypothesize a stepwise evolution of negation, leading up to the truth-functional operator familiar from first-order logic. Other than in Chapter 7, we will assume the semantics of negation as defined in first-order logic, and we will use the notation \neg for negation as a truth-functional operator.

The fact that negation is a universal concept of human communication does not explain the asymmetry between affirmation and negation in natural language, as Horn observes. In first-order logic, the propositions p and $\neg p$ have the same status, and we can go back and forth between $\neg\neg p$ and p without any change in meaning. Dahl (1979: 80) states that “although the semantics of Neg is connected with quite a few intricate problems, it still seems possible to give a relatively uncontroversial characterization of Neg in semantic terms. We thus formulate as a necessary condition for something to be called Neg that it be a means for converting a sentence S_1 into another sentence S_2 such that S_2 is true whenever S_1 is false, and vice versa.” Dahl’s definition of negation as a linguistic operator operating on truth values introduces an asymmetry between affirmation and negation. His definition is inspired by the

observation that in natural language, negative sentences (1b, c) typically involve expressions not present in affirmative sentences (1a). Double negation sentences multiply the markings, and have a more complex structure than plain affirmative sentences (1d).

- (1) a. Colyn believes that Phil plays chess.
- b. Colyn believes that Phil does not play chess.
- c. Colyn does not believe that Phil plays chess.
- d. Colyn does not believe that Phil does not play chess.

In first-order logic, sentences like (1a) and (1d) are expected to have the same truth conditions. In linguistics, the double negation of (1d) is known as the rhetorical figure of *litotes*. Negation in (1d) is truth-functional, but comes with a special communicative effect not present in (1a). Pragmatic accounts of *litotes* are found in Horn (1989, 2001), Van der Wouden (1994, 1997), and Blutner (2004). Postal (2000, 2004) is also concerned with syntactic and prosodic features of double negation in English. In this book, we focus on the truth-functional effects of single and double negation. However, we should always be aware of the fact that special prosody and syntactic restrictions, coupled with non truth-functional aspects of meaning are an integrative part of the semantics of double negation readings like (1d).

As far as the expression of single negation meanings is concerned, we accept Horn's generalization that all natural languages have an expression for propositional negation. In all languages, this leads to a formal contrast between affirmation (1a) and negation (1b, c). Dahl (1979) takes negation to be a universal category of natural language. Inspired by Saussure, the Prague linguistic school developed a notion of markedness in order to deal with such asymmetries (Jakobson 1939). In a binary opposition, the unmarked term tends to be formally less complex (often with zero realization). Greenberg (1966) already observed that negation typically receives an overt expression, while affirmation usually has zero expression. Givón (1979) argues that negative structures are syntactically more constrained than their affirmative counterparts. The question arises whether we are just dealing with a morphosyntactic asymmetry, or whether the formal asymmetry is mirrored in a functional (semantic) asymmetry. A semantic asymmetry is not supported by the standard interpretation of negation in (two-valued) first-order logic. However, Horn (1989: 161 sqq) cites

psycholinguistic evidence concerning the acquisition of negation in L1 acquisition, and processing difficulties with negation as suggestive evidence in favor of the semantic markedness of negation. Haspelmath (2006) takes frequency asymmetries (rarity of meanings) to be the source of structural asymmetries. In Chapter 3, we will argue that the relative infrequency of negative statements as compared to their affirmative counterparts make it possible to derive the formal markedness of negation in a bi-directional evolutionary OT model. We take markedness to be a relative notion in the sense that we always talk about the marked and unmarked members of a pair. Negation is the marked member of the pair <affirmation, negation>, but single negation is the unmarked member of the pair <single negation, double negation>. This explains the highly marked character of sentences like (1d), which will play a role in the argumentation developed in Chapter 6.

1.2 Sentence negation

There is little controversy about the characterization of sentences like those in (1b-d) as negative. However, as Horn (1989: 31 sqq) reminds us, it is not always easy to draw the line between affirmative and negative sentences. Consider the pairs of examples in (2) and (3).

- (2) a. Mary did not manage to secure her job.
 b. Mary failed to secure her job.
- (3) a. Colyn is not happy.
 b. Colyn is unhappy.

The different forms in (2) and (3) can be truthful descriptions of the same situation with slightly different nuances of meaning. This highlights the impossibility of characterizing (extra-linguistic) situations as either positive or negative. Even if we strictly restrict ourselves to negative sentences (linguistic expressions) and negative meanings (semantic representations in terms of a particular formalism such as first-order logic), it is not easy to settle the issue of whether sentences like (2b) and (3b) are affirmative or negative in nature.

Certain verbs contribute an inherent negative meaning. *Fail* in (2b) patterns with *deny*, *refuse*, *reject*, *dissuade*, *doubt* in this respect. Horn (1989: p. 522 sqq) treats inherent negation as pragmatically more complex, because it relies on propositions evoked in earlier discourse. The phenomenon of inherent negation, illustrated in (2b) is outside the scope of this study.

Klima (1964) provides some diagnostics that come in useful in the distinction between sentence negation and constituent negation relevant to (3). The (a) examples in (4) and (5) pass the test for sentential negation; the (b) sentences contain constituent negation.

(4) *either* vs. *too* tags:

- a. Mary isn't happy, and John isn't happy either.
- b. Mary is unhappy, and John is unhappy { *either/too }.

(5) positive vs. negative tag questions:

- a. It isn't possible to solve that problem, is it?
- b. It is impossible to solve that problem, { #is it/isn't it }?

Additional tests have been proposed in the literature. Horn (1989: 185) warns that the tests sometimes give conflicting results, so uncertainties remain. We will assume here that the distinction between sentence negation (3a) and constituent negation (3b) can be drawn. We briefly come back to affixal negation like *un-* (3b) in Chapter 6 (Section 1), where we show that the semantic and syntactic status of adjectives like *unhappy* explains their interaction with negation particles such as *not* and negative indefinites like *nobody* in double negation as well as negative concord languages. Other than that, this book leaves inherent and constituent negation aside, and concentrates on sentence negation, as illustrated in (1), (2a) and (3a).

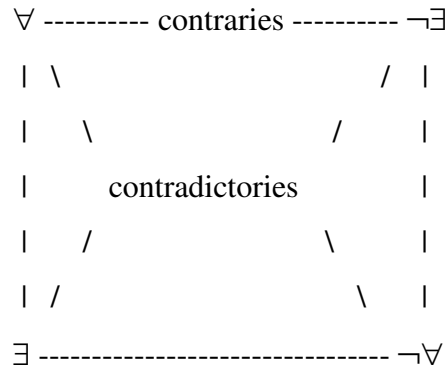
1.3 Square of oppositions

Since Aristotle, it is customary to distinguish types of oppositions, and Horn (1989: Chapter 1) discusses them extensively. Contrariety and contradiction both come into play in the study of negation. Contrariety is a relation between two opposites, e.g. *good* vs. *bad*. Contraries cannot both be true, but both can be false. For instance,

nothing can be good and bad at the same time, along the same dimension, but something can be neither good nor bad. Contradiction is a relation between members of a pair such that it is necessary for the one to be true and the other false. This phenomenon is known as the Law of the excluded middle. Negation and affirmation are contradictions in this sense. The notions of contradiction and contrariety come into play in the square of oppositions for the first-order quantifiers exemplified in (6).

- (6)
- a. All students are happy.
 - b. No students are happy.
 - c. Some student is happy.
 - d. Not all students are happy.

Figure 1: Square of oppositions for first-order quantifiers



The pairs $\forall/\neg\forall$ and $\exists/\neg\exists$ are contradictories, because in any state of affairs, one member of each must be true, and the other false. Propositions are opposed as contraries when both the affirmation and the denial are universal. \forall and $\neg\exists$ are contraries, as indicated in Figure 1. In our study, the contradiction between \exists and $\neg\exists$ will be central to the discussion of the status of indefinites under negation (Sections 3 and 4 below), because there is no agreement on the lexical semantics of negative indefinites in the literature. In fact, all four corners of the square of oppositions in Figure 1 have been explored as the possible lexical semantic representation of negative indefinites in some analysis or other. Fortunately, there is no disagreement

about the truth conditions at the sentence level. The literature agrees that propositions involving indefinites under negation are universal in nature (involving $\forall\neg$ or $\neg\exists$), as opposed to their affirmative, existential counterparts (involving \exists).

2. Negation in typology and diachronic linguistics

In English, sentence negation is frequently realized by a negative particle (1b, c), (2a), (3a). In other languages, we also find the expression of sentence negation by a negative verb. Payne (1985) distinguishes between the negative verbs in (7a) and the auxiliary negative verbs in (7b).¹

- (7) a. Na'e 'ikai ke 'alu 'a Siale [Tongan]
 ASP SN ASP go ABS Charlie
 'Charlie did not go.'
- b. Bi dukuwūn-ma ə-cə-w duku-ra [Evenki]
 I SN-PAST-1SG letter-OBJ write-PART

In (7a), the aspectual particle *na'e* bearing on the negative verb *'ikai* represents a complete and non-continuing (simple past) action. The lexical verb *'alu* behaves like a complement clause verb. In (7b), the negative verb behaves like an auxiliary followed by the participle form of the main verb. The negative verb stem *ə-* inflects for tense and mood. Payne (1985) cites quite a few languages that use a negative verb. At the same time, he points out that the majority of natural languages use some kind of negative particle to express propositional negation. In this book, we will not take negative verbs as in (7) into account, but focus on negation particles and negative indefinites. Compare Mitchell (2006) for a recent study of negative verbs in Finno-Ugric languages. In this section, we discuss negation particles. The study of negative indefinites is closely intertwined with the issue of negative polarity (Section 3) and negative concord (Section 4).

¹ Throughout this book, SN is used to gloss the marker of sentential negation, in order to avoid any confusion with Neg-expressions, used as the technical term to refer to negative indefinites (cf. Section 4 below, and Chapter 4).

2.1 Preverbal and post-verbal negation

Syntacticians and typologists have extensively studied the position of the negation marker in the sentence. Greenberg (1966), Dahl (1979) and Dryer (1988, 2006) are well-known examples of such studies. The main issue discussed in the literature concerns the position of negation with respect to the verb. In (8) and (9), I give examples of negation in preverbal and post-verbal position respectively:²

- (8) a. Maria *non* parla molto. [Italian]
 Maria SN talks much.
 ‘Maria doesn’t talk much.’
- b. *Nid* oedd Sioned yn gweithio. [formal Welsh]
 SN be.IMPf.3SG Sioned PROG work
 ‘Sioned was not working.’
- c. ʔəli *ma:* ra:ħ lidda: ʔirə [Baghdad Arabic]
 Ali SN went to the office
 ‘Ali didn’t go to the office.’
- d. A vaga koŋ ba bene [Koromfe]
 ART dog.SG det.NONHUMAN.SG SN come.PAST
 ‘The dog did not come.’
- e. Mary does *not* talk much.
- (9) a. Maria a parla *nen* tant. [Piedmontese]
 Maria CL talks SN much.
 ‘Maria doesn’t talk much.’
- b. Maria spricht *nicht* viel. [German]
 Maria talks SN much.
 ‘Maria doesn’t talk much.’

² The Romance examples are from Zanuttini (1991, 1996). The Baghdad Arabic example is from Payne (1985). The Welsh example is from Borsley and Jones (2005). The Koromfe example and the Gbaya Kaka example are from Dryer (2006). Koromfe is a Niger-Congo language spoken in Burkina-Fasso and Mali; Gbaya Kaka is a Niger-Congo language spoken in Cameroon.

- c. Maria praat *niet* veel. [Dutch]
 Maria talks SN much.
 ‘Maria doesn’t talk much.’
- d. Mi-zək wi ndɔŋ na [Gbayà Kaka]
 ISG-see person that SN
 ‘I do not see those people.’

In most languages, negation systematically either precedes or follows the verb. English exemplifies a complex situation in which negation follows the auxiliary (3a), but precedes the main verb. This motivates the construction of *do*-support in sentences like (1b, c) and (2a). Dryer (1988) presents a systematic study of the placement of the marker of sentential negation in relation to the three main clausal elements of subject (S), object (O) and verb (V) in a worldwide sample of 345 languages. His results indicate that SOV languages are most commonly either SOVNeg or SONegV. NegSOV and SNegOV languages are infrequent. SVO languages are most commonly SNegVO, and V-initial languages are overwhelmingly NegV (i.e. NegVSO or NegVOS). The patterns of negation in relation to the full S, V and O system of the language are quite intriguing, but a full study of the placement of negation with respect to these three elements is outside the scope of this book. We concentrate on the position of the negative particle in relation to the verb, because this factor turns out to have important implications for the syntax-semantics interface.

There is an overall tendency for the negative marker to precede the verb. Out of 325 languages in the sample, Dryer (1988) finds that 227 (70%) place the negation marker before the verb. The patterns of preverbal (8) and post-verbal negation (9) were first described by Jespersen (1917). Jespersen identifies a strong tendency “to place the negative first, or at any rate as soon as possible, very often immediately before the particular word to be negated (generally the verb)” (Jespersen 1914, p. 4). Horn (1989: 292-293) dubs the term *NegFirst* for this tendency. *NegFirst* is motivated by communicative efficiency, i.e. to “put the negative word or element as early as possible, so as to leave no doubt in the mind of the hearer as to the purport of what is said” (Jespersen 1924, 297), quoted by Horn (1989: 293). Although many languages have a preverbal marker of sentential negation, the examples in (9) indicate that *NegFirst* is not an absolute rule. In the OT system developed in Chapter 3, we will

posit NegFirst as a violable constraint that interacts with other constraints governing word order in the language. We also discuss an opposing force coming from information structure that favors a position of negation late in the sentence. The OT grammar of a language establishes a balance between these opposing tendencies in terms of the constraint ranking.

2.2 Discontinuous negation

The patterns in (8) and (9) represent cases in which a language expresses propositional negation by means of a single negative marker. In a small number of languages we find so-called discontinuous negation. In such languages, negation is expressed by two ‘bits’ of form, which appear in two different positions in the sentence, as illustrated in (10):³

- (10) a. *Ne bið he na geriht.* [Old English]
 SN is he SN righted
 ‘He is not/never set right (=forgiven)’
- b. *Elle ne vient pas.* [written French]
 She SN comes SN.
- c. *Ni soniodd Sioned ddim am y digwyddiad.* [formal Welsh]
 SN mention.PAST.3SG Sioned SN about the event
 ‘Sioned did not talk about the event.’
- d. *Doedd Gwyn ddim yn cysgu.* [informal Welsh]
 NEG.be.IMPF.3SG Gwyn SN PROG sleep
 ‘Gwyn was not sleeping.’

Even though there are two markers in the syntax, there is only one negation in the semantics, that is, all the sentences in (10) express a proposition of the form $\neg p$, with p an atomic proposition. However, negation is expressed by two ‘bits’ of form, one preceding the verb, the other following it, which is why we refer to it as discontinuous negation. The analysis of discontinuous negation raises problems for the principle of compositionality of meaning. This foundational principle states that the meaning of a

³ Sentences exemplifying discontinuous negation combine two (often different) markers of sentential negation in one sentence. In such cases, SN appears twice in the gloss.

complex whole is a function of the meaning of its composing parts. If a sentence contains two expressions contributing negation, the question arises how to derive the single negation meaning of the sentences. The compositionality problem surfaces with negative indefinites as well. We discuss it in more detail in Section 4 below.

Example (10a) is from Mazzon (2004: 27), who indicates that discontinuous negation was a rather unstable phenomenon in the late Old English and Early Middle English period. The written French example in (10b) illustrates the bleaching of preverbal *ne* to a co-negative, where the expressive force of negation is borne by the post-verbal negator *pas* (cf. Godard 2004 and references therein). Formal Welsh reflects an older stage of the language in which the post-verbal *ddim* is optional (10d). In informal Welsh, the preverbal particle has disappeared, but it survives in incorporated form on some verbs, such as *oedd-doedd* (10e). Although the verb appears in a negative form, it is unable to express semantic negation, and the presence of the post-verbal adverb *ddim* is obligatory (Borsley and Jones 2005).

Typologically speaking, we do not find discontinuous negation in many languages, and when we find it, it is usually not very stable in a diachronic sense (Haspelmath 1997). Modern English does not have a discontinuous negation anymore. In spoken French, preverbal *ne* is frequently dropped. In colloquial Welsh, the special negative form of the verb is limited to a small number of lexical verbs. We will argue that discontinuous negation is rare because it is uneconomical. Syntactically, discontinuous negation is of course rather costly: why use two markers to express a single negation, if one could do the job? Economy plays an important role in our analysis, but there are factors overruling economy in certain configurations. Jespersen (1917) argues that discontinuous negation is a phase in a diachronic process in which preverbal negation is gradually replaced by post-verbal negation. This process is commonly referred to as the ‘Jespersen cycle’.

2.3 The Jespersen cycle

Jespersen formulates the diachronic pattern as follows: “The history of negative expressions in various languages makes us witness the following curious fluctuation: the original negative adverb is first weakened, then found insufficient and therefore strengthened, generally through some additional word, and this in turn may be felt as the negative proper and may then in course of time be subject to the same

development as the original word’ (Jespersen 1917: 4), quoted by Horn (1989: 452). A few pages later, Jespersen adds: “Now, when the negative begins a sentence, it is on account of that very position more liable than elsewhere to fall out, by the phenomenon for which I venture to coin the term of *prosiopesis* (the opposite of what has been termed of old *aposiopesis*): the speaker begins to articulate, or thinks he begins to articulate, but produces no audible sound (either for want of expiration, or because he does not put his vocal chords in the proper position) till one or two syllables after the beginning of what he intended to say. (...) The interplay of these tendencies – weakening and strengthening and protraction – will be seen to lead to curiously similar, though in some respects different developments in Latin with its continuation in French, in Scandinavian and in English” (Jespersen 1917: 6).

The trajectory of the Jespersen cycle is well documented for English (Horn 1989, Mazzon 2004), French (Bréal 1900, Horn 1989, Godard 2004), and Dutch (Hoeksema 1997, Zeijlstra 2004). Although Borsley and Jones (2005) do not describe it in these terms, it is traceable for Welsh in their book. Horn (1989: 455) summarizes the English and French development as follows:

Old French	Jeo <i>ne</i> dis	Old English	Ic <i>ne</i> secge
	I SN say		I SN say
Modern French	Je <i>ne</i> dis <i>pas</i>	Middle English	Ic <i>ne</i> seye <i>not</i>
(written/standard)	I SN say SN		I SN say SN
Modern French	Je dis <i>pas</i>	Early Modern	I say <i>not</i>
(colloquial)	I say SN	English	I say SN
		Modern English	I don’t say
			I do SN say

The preverbal negation *ne* in Old French is reinforced by the post-verbal marker *pas*, which leads to the discontinuous negation *ne..pas* in modern written French. The discontinuous negation is currently giving away to a single post-verbal negation in spoken French, even in the higher registers (Ashby 1981, 2001). In English, we find a similar development from the Old English preverbal negation *ne* via the discontinuous pattern in Middle English to the post-verbal negation *not* in Early Modern English. Postverbal *not*, which originates from *nawiht/nogh/nahtet* ‘nothing’, has taken over the negative force in this phase. The *do*-support construction we find in Modern

English signals a return to the preverbal position of negation, and supports Jespersen's view that the diachronic process is cyclic. Chapter 3 provides an analysis of the Jespersen cycle in an optimality-theoretic model. In this approach, we can explain why economy is overruled in certain grammars.

In logic as well as linguistics, the analysis of sentence negation is closely intertwined with the treatment of quantifiers. If negation affects an indefinite in argument (11a) or adjunct position (11b, c), negation may be incorporated into the indefinite in languages like English.

- (11) a. No one came.
 $\neg \exists x \text{ Came}(x)$
- b. It never rains here.
 $\neg \exists t \text{ Rain}(t)$
- c. The book was nowhere to be found.
 $\neg \exists l \text{ Be-Found}(b, l)$

Of course, the functional architecture of the clause is quite different from that of the nominal domain, so from a syntactic perspective, it may come as a surprise that the propositional negation may be realized on a pronoun like *no one*, *never*. However, this book takes sentences involving *not* and sentences involving *no one* as variants on the expression of truth-functional negation. Besides issues concerning the position and interpretation of the marker of sentential negation, we therefore study the status of expressions such as English *no one*, *never*, *nowhere* in (11). We characterize them as negative indefinites, and include temporal and spatial variables into the argument structure of lexical verbs in order to treat the cases in (11a-c) in the same way. The predicate-logical translations given in (11) reflect the enriched view of argument structure we adopt. In Chapter 4 we will refer to negative indefinites as Neg-expressions, and give this term a precise theoretical status. The translations provided in (11) are fairly straightforward, and it seems sensible to treat expressions like *no one* as quantifiers, and assign them the lexical semantics $\neg \exists x$. Further research reveals that the status of negative indefinites in natural language is much more complex than what the examples in (11) might suggest. The lexical semantics assigned to negative

indefinites is dependent on our views on negative polarity and negative concord, which are spelled out in Sections 3 and 4 respectively.

3. Negative polarity

Under the definition advanced by Van der Wouden (1994: 1), negative polarity items are lexical elements with a restricted distribution: they occur in negative contexts only. In this section, we discuss the status of negative polarity items as special indefinites occurring in the scope of negation, and the issues raised by the study of polarity items in natural language.

3.1 Negative polarity items as special indefinites

Many languages use a special form of the indefinite pronoun if the indefinite is in the scope of negation. For propositional operators like negation or quantification, the semantic scope is defined as the proposition the operator is prefixed to. English is a prime example of a language using so-called negative polarity items in negative contexts. Compare the sentences in (12) and (13).

- | | | | |
|------|----|---|--|
| (12) | a. | I did <i>not</i> buy <i>something</i> . | $[\exists \neg, * \neg \exists]$ |
| | b. | I did <i>not</i> buy <i>anything</i> . | $[\neg \exists, * \exists \neg]$ |
| (13) | a. | <i>Nobody</i> saw <i>something</i> . | $[\exists \neg \exists, * \neg \exists \exists]$ |
| | b. | <i>Nobody</i> saw <i>anything</i> . | $[\neg \exists \exists, * \exists \neg \exists]$ |
| | c. | <i>Nobody</i> said <i>anything</i> to <i>anyone</i> . | |

Examples (12a) and (13a) are grammatical if the indefinite takes wide scope over negation or the negative quantifier, but cannot be used to express narrow scope of the indefinite. (12b) and (13b) mirror (12a) and (13a) in that *anything* obligatorily takes narrow scope with respect to negation or the negative quantifier. Support for the claim that a negative polarity item must be in the semantic scope of negation comes from pairs of sentences such as (14) (from de Swart 1998b).

- (14) a. Sue did not read a book by Chomsky.
b. Sue did not read any book by Chomsky.

(14a) is ambiguous depending on the scope of the negation operator with respect to the existential quantifier introduced by the indefinite NP. The first-order representation of the two readings of the sentence in (15) makes this explicit.

- (15) a. $\neg \exists x (\text{Book-by-Chomsky}(x) \wedge \text{Read}(x))$ Neg > \exists
b. $\exists x (\text{Book-by-Chomsky}(x) \wedge \neg \text{Read}(x))$ \exists > Neg

Expressions like English *anything* are called ‘negative polarity items’, because such items can only felicitously been used in contexts with a certain “negative” flavor, and they always take narrow scope with respect to their licenser. Items like English *something* are called ‘positive polarity items’, because they are allergic to negative contexts, and want to be interpreted outside the scope of negation. Thus, (12a) only gets the reading similar to (15b). Not all indefinites are either positive or negative polarity items: plain indefinites like English *a book* are neither, as we see in (14a). Analyses of negative and positive polarity are offered by Ladusaw (1979, 1996), Zwarts (1986, 1995, 1998), Van der Wouden (1994, 1997), Szabolcsi (2004) and others. In this book, we do not address the phenomenon of positive polarity, but restrict ourselves to negative polarity, and the relation between negative polarity items (NPIs) and negative indefinites (Neg-expressions).

Negative polarity items occur in a wider range of contexts than just negation.

- (16) a. If you saw *anything*, please tell the police.
b. Did *anyone* notice *anything* unusual?
c. Few people wrote down *anything*.

The examples in (16) illustrate that NPIs such as *anything* do not inherently carry a negative meaning. Rather they correspond with existential quantifiers with some additional meaning component characterized as ‘widening’ of a set of alternatives by Kadmon and Landman (1993), as indicating the bottom of a scale by Fauconnier

(1975, 1979), Krifka (1995), Israel (1996), de Swart (1998b), or as sensitive to scalar implicatures by Chierchia (2001). The truth conditions in (15) only spell out the existential import of the negative polarity item.

Negative polarity items are found in a wide range of languages. Haspelmath (1997: 193, 215) provides the following examples of negative polarity items from Basque and Swedish.

- (17) Ez dut inor ikusi. [Basque]
 Neg I:have:him anybody seen.
 ‘I haven’t seen anybody.’

- (18) Ja har inte sett någon. [Swedish]
 I have not seen anybody.
 ‘I have not seen anybody.’

In (19), we find examples of Dutch NPIs. Section 3.2 provides additional examples from Hindi. NPIs are not restricted to the class of indefinite pronouns or determiners, as the examples in (19) show.

- (19) a. He didn’t *lift a finger* to help me.
 a’. #He lifted a finger to help me.
 b. She doesn’t have a car *yet*.
 b’. *She has a car yet.
 c. Nobody had *a red cent*.
 c’. #Everybody had a red cent.
 d. Niemand *hoeft* zijn huis te verkopen. [Dutch]
 Nobody needs his house to sell
 ‘Nobody needs to sell their house.’
 d’. *Iemand hoeft zijn huis te verkopen.
 Somebody needs his house to sell

Examples (19a) and (19c) involve so-called ‘minimizers’, i.e. indications of a small quantity that functions as the bottom of the scale. The sentences have a strong idiomatic flavor. Their affirmative counterparts in (19a’) and (19c’) are not

ungrammatical, but only have a literal meaning. Examples (19b) and (19d) indicate that we also find negative polarity items in the adverbial and the verbal domain.

3.2 Issues in the study of negative polarity items

For Ladusaw (1996), the study of negative polarity items raises three important issues: the question of the licensee, the question of the licenser, and the question of the licensing relation. The term licensee refers to the lexical items used as NPIs. We have already seen that a variety of expressions can behave like an NPI. A large class of NPIs involves minimizers such as *lift a finger* and *have a red cent*, the lexical semantics of which has been studied by Fauconnier (1975, 1979), Krifka (1995), Israel (1996), and others. Other categories of NPIs have been studied by Jack Hoeksema in a large ongoing corpus research of Dutch polarity items (cf. Hoeksema 2000, 2002, Rullmann and Hoeksema 2001 and references therein). In the remainder of this section, and in this book, we will only be concerned with pronominal indefinites, such as English *anything*. The question of the licenser involves the contexts in which NPIs are felicitous. The literature has shown that a wide range of expressions license NPIs, as exemplified in (12, 13, 16). Licensers generally create a downward entailing (12, 13, 16a, c) (Ladusaw 1979, Zwarts 1986, Van der Wouden 1994, 1997) or non-veridical context (16b) (Zwarts 1995, Giannakidou 1997, 1998, 1999). Non-veridical operators such as question operators block the inference from $Op(p)$ to p , according to the definition in (20). Downward entailing operators such as *nobody*, *few students*, *at most five children* allow inferences to smaller sets, as observed in Generalized Quantifier theory (Barwise and Cooper 1981) (21).⁴

(20) An operator Op is veridical if and only if $Op(p) \rightarrow p$.

An operator is non-veridical if and only if it is not veridical.

- a. It is possible that Jane is coming. $\neg \rightarrow$ Jane is coming.
- b. Jane is not coming. $\neg \rightarrow$ Jane is coming.
- c. Is Jane coming? $\neg \rightarrow$ Jane is coming.

⁴ De Swart (1998a: Chapter 8) offers an introduction to Generalized Quantifier theory.

- (21) An operator *Op* is downward entailing if and only if *Op*(A) is true, and $A' \subseteq A$, implies that *Op*(A') is true as well.
- a. Nobody read a book. \rightarrow Nobody read a book by Chomsky.
 - b. At most five children ate vegetables. \rightarrow At most five children ate carrots.

A subset of the set of downward entailing operators has the property of anti-additivity. Anti-additivity is defined as in (22).

- (22) An operator *Op* is anti-additive if and only if *Op*(A) and *Op*(B) implies *Op*(A or B).
- a. Nobody danced and nobody sang. \leftrightarrow Nobody sang or danced.
 - b. Jane did not dance and Jane did not sing. \leftrightarrow Jane did not dance or sing.

Van der Wouden defines 'medium' negative polarity items as expressions that require an anti-additive licenser. The Dutch NPI *ook maar* is an example (23). 'Weak' NPIs such as *kunnen uitstaan* are also licensed by downward entailing operators (24).

- (23) a. *Weinig monniken zullen *ook maar* iets bereiken. [Dutch]
 Few monks will NPI something achieve
 'Few monks will achieve anything.'
- b. Geen monnik zal *ook maar* iets bereiken.
 No monk will NPI something achieve
 'No monk will achieve anything.'

- (24) a. Weinig monniken *kunnen* vader abt *uitstaan*.
 Few monks can father abbot stand
 'Few monks can stand father abbot.'
- b. Niemand *kan* de schoolmeester *uitstaan*.
 Nobody can the schoolmaster stand
 'Nobody can stand the schoolmaster.'

The contrast between (23) and (24) illustrates that negative polarity items are sensitive to different degrees of negativity, and that these degrees correspond with well-defined properties from Generalized Quantifier theory. The distinction between downward entailing and anti-additive operators plays a role in the distinction between negative polarity items and n-words, as we will see in Section 4 below.

So far, it has been established that negative polarity items need to be licensed by an operator with particular semantic properties in a particular context. However, NPIs and licensors cannot be related in just any syntactic configuration. The syntactic constraints on the licensing relation have been well studied. It is generally assumed that negative polarity items have to occur in the direct scope of their licensor. The definition of direct scope is in (25).⁵

- (25) An expression *a* has direct scope over an expression *b*, if and only if *b* is in the semantic scope of *a*, and *a* c-commands *b* in the syntactic structure.

The requirement on direct scope implies that syntax and semantics converge. The requirement on direct scope is visible in the contrasts in (26)-(29) (from de Swart 1998b).

- (26) a. Phil did not say anything to me.
b. *Anyone did not talk to me.
- (27) a. No one said anything to me.
b. *Anyone said nothing to me.
- (28) a. *Anybody didn't come.
b. Didn't anybody come?

⁵ A node *a* c-commands another node *b* in the syntactic tree if and only if every branching node dominating *a* also dominates *b*. Instead of imposing a configurational restriction on direct scope, it is also possible to define constraints on lists of argument structures in a lexicalist theory such as HPSG (cf. Sag, Wasow and Bender 2003). The result is essentially the same. I use the configurational definition here, because tree-like representations are probably familiar to the reader. I don't adopt a formal theory of syntax in this book. What I mean with 'syntactic structure' is some level of surface-oriented syntax. Here I suggest a tree-like structure in order to allow the definition of hierarchical structure and c-command. The HPSG analysis advanced in Chapter 4 relies on argument structure and feature sharing. Crucially, movement, invisible syntactic structures (either 'deep structure' or 'logical form'), or empty categories are not assumed anywhere in the analysis.

- (29) a. Phil would not give me anything.
b. *Anything Phil would not give me.

Negation c-commands the direct object, but not the subject, so (26a) is fine, but (26b) is ungrammatical. The subject c-commands the direct object, but not vice versa, so (27a) is well-formed, but (27b) is ungrammatical. Question formation in English comes with a configuration in which negation c-commands the subject in the syntactic structure, so the grammaticality of (28b) contrasts with the infelicity of (28a). Object preposing brings the NPI outside of the c-command domain of negation, so (29b) is ill-formed, while (29a) is fine.

Exceptions to the direct scope constraint in languages like English involve embedding of the NPI in a constituent that itself takes narrow scope with respect to negation, as in (30) (de Swart 1998b).

- (30) a. That he had stolen anything was never proven.
b. A doctor who knew anything about acupuncture was not available.

De Swart (1998b) offers an account of such exceptions through pragmatic reasoning involving scalar implicatures. Otherwise, the direct scope constraint is valid for English, and a wide range of other languages. However, it is not universal. In Old English, indefinites could precede the preverbal negation *ne* without a problem, as illustrated by examples (31) from Mazzon (2004: 39). Similar observations have been made for Hindi by Vasishth (2000, 2002). Vasishth demonstrates that sentences like (32) exemplify negative polarity, not negative concord, and provides an account of NPI licensing in a multimodal categorial grammar framework.

- (31) a. þæt hi æfre on *ænine* man curs *ne* settan [Old English]
that they ever on any man curse SN lay
'that they ever on any man curse not lay'
b. *Ængum ne* mæg se cræft losian.
anyone SN may his craft loose
'anyone not may the skill abandon'

- (32) a. *Koi-bhii nahĩĩ aayaa* [Hindi]
 Anybody SN came
 ‘Nobody came.’
- b. *Koi-bhii nahĩĩ khaat-aa th-aa sabzii*
 Anyone SN eat.imp.masc be.past.masc vegetables
 ‘No one used to eat vegetables.’

As we will see in Section 4 below, the direct scope requirement is used as a diagnostic to distinguish negative polarity items from n-words. The examples in (31), (32) show that this criterion is not infallible, although it often works in the languages at hand.

A full study of NPIs, their licensing conditions, and their cross-linguistic behavior is outside the scope of this book. However, the notion of negative polarity comes into play in the discussion of negative concord. This issue is addressed in Section 4.

4. Negative concord

Negative concord and negative polarity are two versions of the phenomenon of special indefinites interpreted in the scope of negation (cf. also Chapter 4). In this section, we investigate similarities and differences between the two phenomena, and discuss analyses of negative concord that have been advanced in the literature. We propose a typology of negative indefinites, and establish languages as exemplifying double negation and negative concord. Subclasses of negative concord languages are defined on the basis of their interaction with the marker of sentential negation.

4.1 Negative polarity and negative concord

Negative polarity and negative concord are closely related phenomena. The Italian example (33a) (from Haegeman and Zanuttini 1996) is a direct counterpart of the English (33b).⁶

⁶ *Nessuno* is not glossed as ‘anybody’, but as ‘nobody’, in anticipation of the analysis to be developed.

Chapter 1

- (33) a. *Non ho visto nessuno.* [Italian]
SN has seen nobody.
'I haven't seen anybody.'
- b. I haven't seen *anybody*. [English]
- c. $\neg\exists x \text{ See}(I, x)$

In the context of (33a), it is tempting to analyze *nessuno* as a negative polarity item on a par with English *anybody*. The identification with *anybody* would suggest that we assign *nessuno* an interpretation in terms of existential quantification (\exists). Function application would provide the desired truth conditions of both (33a) and (33b), spelled out in terms of the first-order logical formula (33c). However, other examples raise problems for this view. Haegemann and Zanuttini (1996) show that *nessuno* can be the sole expression of negation in the sentence (34a). Example (34b) is ungrammatical, because the licenser of *anybody* is missing. We need to use *nobody* in (34c) to translate (34a).

- (34) a. *Nessuno ha telefonato.* [Italian]
Nobody has called
'Nobody has called.'
 $\neg\exists x \text{ Call}(x)$
- b. *Anybody has called. [English]
- c. Nobody has called.

The contrast between (33) and (34) indicates that *nessuno* seems to mean 'anybody' in some contexts, and 'nobody' in others. If we combine two instances of *nessuno* in one sentence, one seems to behave like 'nobody', and the other like 'anybody' (35).

- (35) a. *Nessuno ha detto niente.* [Italian]
Nobody has said nothing.
'Nobody has said anything.'
 $\neg\exists x\exists y \text{ Say}(x,y)$
- b. *Anybody has said anything.
- c. Nobody has said anything.

d. #Nobody has said nothing.

$\neg\exists x\neg\exists y \text{ Say}(x,y)$

Example (35a) expresses a single negation, even though the combination of *nessuno* and *niente* involves two formally negative expressions, which can have negative interpretations in contexts like (34a). The English translation (34c) involves the combination of a negative indefinite and a negative polarity item. The combination of two negative polarity items in (35b) is ungrammatical, because there is no licenser for the NPIs. The combination of two negative indefinites in (35d) is not ungrammatical, but the sentence does not have the meaning conveyed by (35a): it expresses a double, rather than a single negation.

The pattern exemplified for Italian in (33)-(35) has been well described in the literature. Jespersen (1917) dubs the phenomenon double attraction, Klima (1964) calls it neg-incorporation, and Labov (1972) proposes a negative attraction rule. Most current linguistic literature uses the term negative concord for cases where multiple occurrences of negation and indefinite pronouns that appear to be negative express a single negation, and we will follow this use. The indefinite pronouns participating in negative concord are termed n-words, following Laka (1990). Negative concord is a widespread phenomenon in natural language, as Haspelmath (1997) observes. We find it in Romance, Slavic, Greek, Hungarian, non-standard English, West Flemish, Afrikaans and many other languages. The literature concerning negative concord is quite extensive, so an exhaustive list of references is hard to provide. We will come across a wide range of observations and proposals in this chapter and in the rest of the book. For starters, we will focus on the comparison between negative polarity and negative concord.

4.2 Criteria

It is sometimes difficult to distinguish between NPIs and n-words in a language. Three criteria have been advanced to separate the two classes. The first observation we make is that NPIs always need to be licensed, whereas n-words can appear in the context of another n-word or the marker of sentential negation, but they don't have to. They are 'self-licensing' in the terminology of Ladusaw (1992). We see that the n-

word is licensed by the negation marker in (33a), but not in (34a). The infelicity of (34b) shows that an NPI cannot be licensed in this configuration. In (35a), the n-word in object position is licensed by n-word in subject position, but nothing licenses the n-word in subject position. The unacceptability of (35b) indicates that NPIs are not licensed in this configuration. Recall that it would not help to insert a negation marker in (35b), for the NPI has to be in the direct scope of its licensor (cf. examples 26b and 28a in Section 3 above). Even in languages in which a marker of sentential negation is present in all sentences containing an n-word, we can use the felicitous appearance of an item in subject position to argue that it has to be an n-word, if NPIs in this language have to be in the direct scope of their licensor. (36) illustrates this for Greek.

- (36) a. KANENAN dhen idhen. [Greek]
 Nothing SN saw.1sg
 'I saw nobody.'
 b. *Kanenan dhen idhen.
 Anybody SN saw.1sg

Kanenan is an NPI that is blocked from the subject position, because it is not in the direct scope of negation (36b). Its emphatic (capitalized) counterpart KANENAN functions as an n-word that appears felicitously in subject position (36a). As pointed out in Section 3, there are some exceptions to the constraint that NPIs need to be licensed in the direct scope of their licensor, so we have to be careful, but in many languages, the presence of an item in subject position can be used to determine its status as an NPI or as an n-word.

The second criterion used to distinguish NPIs from n-words concerns fragment answers to questions (Ladusaw 1992, Vallduví 1994, Bernini and Ramat 1996, Haspelmath 1997). Their self-licensing nature makes it possible for n-words to constitute a negative answer to a question (37). NPIs cannot appear in fragment answers, because the licensor is missing.

- (37) a. Q: Qu'est-ce que tu as vu? A: Rien. [French]
 Q: What did you see? A: Nothing
 A: *Quoi que ce soit.
 A: What that it is-subj

- | | | | |
|----|-----------------------------------|--|---------|
| b. | Q: Pjon ihes?
Who did you see? | A: KANENAN
A: Nobody
A: *kanenan
A: Anybody | [Greek] |
|----|-----------------------------------|--|---------|

As Haspelmath (1997: 198) observes, this criterium is not always decisive either. In particular, it does not exclude the possibility that the n-word behaves like an NPI in contexts other than fragment answers (compare the Italian examples in 40 below). However, in the majority of cases, there is a clearcut contrast between NPIs and n-words in fragment answers.

The third and final criterium we can use to distinguish NPIs and n-words is based on the observation that N-words are strictly limited to anti-additive environments, whereas NPIs typically occur in a wider set of downward entailing or non-veridical contexts. We illustrate this with the French n-word *rien* in (38a) versus the NPI *quoi que ce soit* in (39b) (from Corblin et al. 2004).

- (38) a. S'il ne dit *rien*, il doit soumettre ses devoirs par écrit.
If he SN says nothing, he must submit his homeworks in writing
'If he says nothing, he must submit his homework in writing.'
- b. Si *quoi que ce soit* vous dérange, faites-le nous savoir.
If what that it be.SUBJ you disturbs, make it us know
'If anything at all bothers you, tell us.'

The antecedent of a conditional is a downward entailing environment (Von Stechow 1999) in which the NPI *quoi que ce soit* is licensed, and is interpreted as an existential quantifier (38b) (cf. Section 3 above). However, if we put the n-word *rien* in this environment, we see that it behaves like a negative quantifier rather than an existentially quantified indefinite (38a).

In the remainder of this book, we focus on the analysis of n-words, rather than negative polarity items in general. However, we briefly come back to the relations between negative polarity and negative concord in Chapter 8 (Section 3.3).

4.3 The quantificational status of n-words

The data presented in Sections 4.1 and 4.1 highlight the difficult issue of the quantificational status of n-words. Semantic theories are founded on the principle of compositionality of meaning. The principle of compositionality of meaning defines the meaning of a complex whole as a function of the meaning of its composing parts and the way they are put together. The analysis of negative concord thus requires a lexical semantics of the n-word as well as a way to integrate the semantic contribution of the n-word into the meaning of the sentence as a whole. Suppose that we take first-order logic as our tool to describe the meaning of a natural language sentence. This provides us with the inventory of predicates, individual arguments, connectives and quantifiers, and function application as the standard mode of composition. Function application implies that constructions of predication and quantification are built up by relating expressions as functors that apply to arguments. Regular indefinites are commonly translated in terms of the existential quantifier \exists in first-order logic (39a). For negative polarity items, such as English *anything*, a representation in terms of existential quantification is also in order (39b) (cf. Section 3).

- (39) a. Someone came in late.
 $\exists x \text{ Came-Late}(x)$
 b. Nobody said anything.
 $\neg \exists x \exists y \text{ Say}(x,y)$

For n-words, a compositional interpretation in first-order logic is less straightforward. Consider the patterns in (33)-(35) again, repeated here in (40).

- (40) a. *Non ho visto nessuno.* [Italian]
 SN has seen nobody.
 'I haven't seen anybody.'
 $\neg \exists x \text{ See}(I, x)$

- b. *Nessuno* ha telefonato. [Italian]
 Nobody has called
 ‘Nobody has called.’
 $\neg \exists x \text{ Call}(x)$
- c. *Nessuno* ha detto *niente*.
 Nobody has said nothing.
 ‘Nobody has said anything.’
 $\neg \exists x \exists y \text{ Say}(x,y)$

It is easy to spell out the truth conditions of the examples in first-order logic. However, it is hard to see what lexical semantics to assign to the pronoun in order to compositionally arrive at the semantics of the sentence as a whole. As we observed in Section 4.1 above, it seems that n-words should sometimes be translated in terms of the existential quantifier \exists (*nessuno* in 40a, and *niente* in 40c), and sometimes in terms of $\neg \exists$ (*nessuno* in 40b, 40c). Because of the relation of contradiction between these two quantifiers (cf. Figure 1 in Section 1), this is a highly problematic outcome. The question we need to address is then the following. If we interpret (40a-c) in terms of first-order logic with negation, universal/existential quantification, and function application, and we maintain the principle of compositionality of meaning, what is the lexical semantics of n-words like *nessuno* and *niente* that we need to adopt in order to derive the desired truth conditions? In principle, there are three possible answers to this question, and all three have been defended in the literature.

Laka (1990) takes n-words to denote existential quantifiers (\exists) taking narrow scope with respect to negation. This would work well for configurations like (40a), and it would explain the (infrequent, possibly archaic, but existing) existential uses of *nessuno* and *niente* licensed by downward entailing (but not anti-additive) operators in (41) (from Zanuttini 1991).

- (41) a. Ha telefonato *nessuno*? [Italian]
 Has called nobody
 ‘Did anybody call?’

- b. Dubito che venga *nessuno*.
 Doubt.1.sg that comes nobody
 ‘I doubt that anyone will come.’

The drawback of the proposal is that we need special syntactic assumptions in order to extend the treatment of *nessuno* and *niente* in terms of existential quantification to sentences like (40b) or fragment answers like (37). Typically, such assumptions involve postulating an implicit negation operator. Such an implicit operator would be syntactically covert, but semantically potent, and contribute the truth-functional connective \neg . Laka (1990) locates such an implicit negation operator in a special functional projection, labelled ΣP . Recent versions of the same idea have exploited the feature checking theory of minimalist syntax (Zeijlstra 2004). Note that his implementations also rely on a covert negation operator to provide the interpretable negation feature needed to check the uninterpretable negation feature of the n-word in languages like Italian (cf. Chapter 4, Section 4).

Giannakidou (2000, 2006) takes Greek n-words to denote universal quantifiers taking wide scope with respect to negation. Under this analysis, the truth conditions of (40a) involve $\forall x \neg V(x)$, which is of course logically equivalent to $\neg \exists x V(x)$. This analysis is not meant to give an account for the existential uses of Romance n-words illustrated in (41), for such examples are not found in Greek. Even if we ignore such polarity uses of n-words, and restrict ourselves to negative concord constructions, we observe that the analysis is problematic for two reasons. First, the analysis might work for Greek, but an extension to languages like Italian would have to appeal to an implicit negation operator or to lexical ambiguities in order to provide a unified analysis of examples (40a-c). Giannakidou (2006) defends the view that n-words in natural language come in different types, so she is willing to assign *KANENAN* and *nessuno* a different lexical semantics. In the analysis defended in this book, all n-words get the same lexical semantics. In our view, a unified semantics of n-words across languages provides a more explanatory account of negative concord.

Second, Giannakidou (2000, 2006) defends the view that the fact that n-words are interpreted negatively in the absence of overt negation does not prove that they are negative. She takes elided material to be responsible for the negative meaning. Thus,

in response to the question ‘Who arrived?’, Giannakidou spells out the full answer as in (42), where strikethrough indicated the elided material of the fragment answer.

- (42) KANENAS ~~*(then) irthe~~.
nobody SN arrived.3SG

The negative meaning in elliptical fragments then arises not as an inherent contribution of the n-word, but rather as the result of their being associated with negation at the level at which ellipsis is resolved. If ellipsis is resolved in the syntax, this route is closed to us, because we adopt a surface oriented syntax. A semantic approach to ellipsis does not yield the right results, according to Watanabe (2004). As Watanabe (2004: 567) points out, what is problematic is a negative open proposition taking an affirmative open proposition as its antecedent for the purpose of ellipsis. Watanabe shows that the system of negation in Japanese is closely related to that of Greek. In relation to the Japanese examples in (43), Watanabe points out that Giannakidou’s analysis would predict that the representation of the fragment answer in (43b) extends to the one in (43c). Of course, that is not the case, and the answer should be read as in (43d).

- (43) a. Nani-o mita no? [Japanese]
what-ACC saw Q
‘What did you see?’
b. Nani-mo ~~mi-nak-atta~~.
Nothing see-SN-PAST
‘Nothing’
c. Hebi-o ~~mi-nak-atta~~.
Snake-ACC saw-SN-PAST
‘I didn’t see a snake’
d. Hebi-o mita.
snake-ACC saw
‘I saw a snake.’

Even if the problem of (43c,d) can somehow be solved under Giannakidou’s approach, the ellipsis analysis leaves it unclear how we maintain the contrast between

NPIs and n-words in fragment answers like (37). That is, if the n-word *KANENAN* in (37b) can take a negative proposition as its antecedent, along the lines of (42), why could its NPI counterpart *kanenan* not do the same (pace requirements on the NPI being in the c-command domain of the negation marker in the full answer)?

According to Watanabe, the nonnegative analysis comes to a dead end here, and the fragment answers show that we are left only with the possibility that negative concord items are inherently negative, whereas negative polarity items are not.

One possible way out of the conclusion would be to postulate that some languages can express negation covertly, while others have to always realize it overtly. This view seems to underly several of the approaches discussed here. The ambiguities discussed in Section 4.5 below make it hard to maintain this view, for the distinction between double negation and negative concord languages is not strict, and intermediate cases are possible. Even if we could parametrize the languages according to their capacity to realize negation covertly, and deal with the intermediate cases and with the problems raised by negative polarity items in some way, this solution raises conceptual problems. As a semanticist, I find it impossible to defend the view that a truth-functional operator like \neg remains implicit, because the distinction between affirmation and negation would be blurred. A parametrization approach is not in line with the view that negation is marked, and therefore universally more complex in form. The view of negation as the marker member of the pair <affirmation, negation> has been outlined in Section 1 above, and will be elaborated in Chapter 3. In this book, we adopt a surface oriented syntax without hidden levels of representation and covert operators. This means that we cannot adopt a lexical semantics of n-words in terms of existential or universal quantification, as proposed by Laka (1990) or Giannakidou (2000, 2006). With Ladusaw (1991) and Watanabe (2004), we conclude that n-words are inherently negative.

An alternative analysis formulated in first-order logic, which respects first-order logic function application, but does not assume an implicit negation operator is the ambiguity thesis. Van der Wouden and Zwarts (1993), Corblin (1996), and Herburger (2001) offer versions of an account under which n-words are underspecified or ambiguous, and denote \exists if embedded under negation or a negative quantifier and $\neg\exists$ if unembedded. The ambiguity thesis is attractive because of its lack of hidden operators. From a more general perspective, it seems unusual to

assume an expression to have two meanings that contradict each other, though. The ambiguity thesis suffers from lack of independent evidence, and testability (cf. Giannakidou 1997: 166-168 and de Swart and Sag 2002 for critical discussion). It guarantees the desired truth conditions, but its explanatory force seems rather limited.

The common core of the three approaches presented so far is that they strictly only use the tools of first-order predicate logic. If we are not satisfied with the explanatory force of these proposals, we have to look for alternatives. Alternative analyses would go beyond first-order logic (or standard generalized quantifier theory) in one way or another, and expand our inventory of semantic tools. The key would be to propose minimal or independently motivated extensions of first-order logic, which would pay off by offering a higher explanatory value. Two analyses exploring such ideas were developed around the same time. The analysis we adopt in this book inherits features of both of them.

A highly influential proposal was made by Ladusaw (1992). Ladusaw (1992) proposes to treat n-words as self-licensing negative polarity items. Thus, in the absence of a trigger (37, 40b, c), n-words such as *nessuno*, *niente* license themselves, but regular NPIs such as *anybody* (34b, 35b, 37) do not. Technically, the n-word contributes an existential quantifier \exists to the truth conditions of the sentence. The negative force of the n-word *nessuno* is located in a negative feature that is a regular NPI like *anything* lacks. All negative features contributed by sentential negation and n-words percolate up the tree, and get discharged at the top, leading to a single, wide scope negation \neg that has all the existential quantifiers contributed by the n-word(s) in its scope. The extra tool we need in this analysis is a feature percolation and a feature interpretation mechanism, which Ladusaw borrows from the grammatical framework of GPSG (Gazdar et al. 1985). Ladusaw's analysis has been widely adopted, because it highlights the nature of negative concord as an agreement phenomenon: even though negation is expressed in different places in the syntax, it is interpreted only once. What the analysis in this book inherits from Ladusaw's analysis is the nature of n-words as inherently negative.

Zanuttini (1991) and Haegeman and Zanuttini (1996) also emphasize the nature of negative concord as an agreement phenomenon, but in their analysis, n-words denote $\forall\neg$. They define an operation of factorization which reinterprets a sequence of quantifiers $\forall x_1\neg\forall x_2\neg\dots\forall\neg x_n$ as a new sequence $\forall x_1, x_2\dots x_n \neg$.

According to May (1989), factorization fails to respect compositionality, because part of the semantic contribution of the composing elements is simply erased. As an alternative, he defines an absorption operation which interprets a sequence of negative indefinites $NO_{x_1}, \dots NO_{x_n}$ as a polyadic quantifier complex $NO_{x_1 \dots x_n}$ (cf. also Van Benthem 1989, Keenan and Westerahl 1997). May's analysis has also been criticized for its lack of compositionality (e.g. Corblin 1996). Note that absorption requires a mode of composition different from function application, so it does not respect first-order (Fregean) compositionality. However, absorption is embedded in a more general theory of polyadic quantification (May 1989, Van Benthem 1989), so it is one of a series of operations in natural language that goes beyond standard generalized quantifier theory. If we accept the set of operations defined in polyadic generalized quantifier theory as permissible combinatoric rules, May's analysis is compositional in a higher order theory of meaning. This view is defended by de Swart and Sag (2002), and constitutes the foundation of the interpretation of negative concord used in this book.

As pointed out by Corblin (1996), almost all analyses of negative concord exclusively focus on deriving a single negation reading from a sequence of n-words, and the analyses developed by Ladusaw and Zanuttini/May are no exception. Corblin observes that such analyses do not do justice to the observation that, in certain languages at least, we find ambiguities between single and double negation readings in certain contexts with sentences involving two negative indefinites. Corblin's French examples are in (44). Corblin and Derzhanski (1997) make similar claims about the Bulgarian example in (45).

- (44) a. Personne n'aime personne [French]
 nobody SN loves nobody
 = No one loves anyone. [NC]
 = Everyone loves someone. [DN]
- a. Personne n'est l'enfant de personne.
 nobody SN is the child of nobody
 = No one is the child of anyone. [NC]
 = Everyone is the child of someone. [DN]

- (45) Nikoj ne običa nikogo [Bulgarian]
 nobody.NOM SN loves nobody.ACC
 = No one loves anyone. [NC]
 = Everyone loves someone. [DN]

The existence of double negation readings in (44) and (45) led Corblin (1996) to defend the ambiguity thesis. Corblin formulates a construction rule for negative quantifiers in a DRT framework, which introduces a negation and an indefinite in the scope of negation. If a new quantifier shows up when the construction rule has already applied, we can optionally just apply the second half of the rule. This is equivalent to a shift of the n-word to an existential quantifier. The formulation in terms of a construction rule which optionally applies in a context already containing a negative quantifier strongly suggests that the ambiguity between the single and the double negation reading of examples like (44) and (45) is in the construction, rather than the lexicon. What we inherit from Corblin's analysis is the emphasis on a grammatical approach to negative concord, and the need to take double negation readings into account.

4.4 A polyadic quantifier analysis of double negation and negative concord

De Swart and Sag (2002) propose an analysis of double negation and negative concord in the framework of polyadic quantifier theory which builds on the ideas advanced by Zanuttini, van Benthem and May. The analysis focuses on the derivation of the single as well as the double negation reading of sentences like (44) and (45). Polyadic quantifier theory is an elaboration of standard generalized quantifier theory which deals with interpretations of sequences of quantifiers that cannot be derived by function application. If we just combine NPs by function application, we obtain an iteration of quantifiers, corresponding to the scopal order of the NPs. Iteration of quantifiers leaves a variety of cases unaccounted for. It does not give us the bound reading of the reflexive in (46a), the reading in which the books vary with the students in (46b), the cumulative reading of (46c), or the pair-list reading of (46d).

- (46) a. Every student likes himself.
 b. Every students bought a different book.

- c. Five hundred companies own three thousand computers.
- d. Who loves who?

What the cases illustrated in (46) have in common is that a bottom-up interpretation of the sentence in standard generalized quantifier theory fails, because the lower quantifier depends on the higher quantifier for its meaning. Note that it may not be impossible to represent the truth conditions of the sentence in first-order logic, as (46a) illustrates. What is at stake is the derivation of the intended interpretations in a compositional way, namely by formulating the different modes of composition for a sequence of quantifiers. A number of rules for the interpretation of sequences of quantifiers are formulated by Keenan (1987), May (1989), Van Benthem (1989), Keenan and Westerståhl (1997). In so far as polyadic quantifier theory is motivated by the need to account for a range of constructions that cannot be handled by iteration, Déprez (2000, 2002) and de Swart and Sag (2002) consider it legitimate to use this framework to account for negative concord. Déprez relies on cumulativity to derive the single negation reading of negative concord constructions. De Swart and Sag (2002) follow May (1989) and Van Benthem (1989) in treating negative concord as an instance of absorption or resumption of negative quantifiers. Informally, Keenan and Westerståhl (1997) define the resumption of a standard quantifier to be the polyadic quantifier which results from application of the original quantifier to k -tuples (pairs, triples, etc), instead of individuals. The binary resumption of a quantifier Q denoted by an NP should be the quantifier Q' given by the following rule.

- Binary resumption

$$Q'_{E^{A \times B}}(R) = Q_{E^2}^{A \times B}(R)$$

Where A and B are subsets of the universe of discourse E , and $A \times B$ and R are subsets of E^2 , i.e. sets of pairs of entities in the universe E .

Suppose we treat n -words like Italian *nessuno*, *niente* as expressions lexically denoting a negative quantifier $\neg \exists x$. This leads to the generalized quantifier representation in NO_E^{hum} for *nessuno* or *niente*, with NO being the quantifier interpreted on the universe of discourse E , restricted to the subset of humans. The semantics of NO is standard: in set-theoretic terms, it denotes the empty intersection. If

we apply the rule of binary resumption to the sequence of n-words in (40c), repeated here as (47a), we would obtain the structure in (47b), which has the truth conditions spelled out in (47c) in first-order logic.

- (47) a. *Nessuno* ha detto *niente*. [Italian]
 Nobody has said nothing.
 ‘Nobody has said anything.’
 b. $\text{NO}_{\text{E2}}^{\text{hum} \times \text{thing}}(\text{SAY})$
 c. $\neg \exists x \exists y \text{ Say}(x, y)$

The resumptive quantifier in (47b) ranges over sets of pairs of humans and things. The empty intersection with the set of pairs in the denotation of *say* requires there to be no pair of a person and a thing that is member of the denotation of *say*. Quantification over pairs is equivalent to the first-order representation in (47c). Even though the truth conditions of the sentence can be written in first-order logic, the only way we can obtain a compositional interpretation of the sentence based on the lexical semantics $\neg \exists x$ of the n-word is to adopt an interpretation in terms of polyadic quantification.

The resumptive interpretation accounts for negative concord in the same spirit as Ladusaw (1992) did, namely by viewing the two occurrences of the negative indefinite as an instance of agreement. Technically, resumption pairs up the two negative indefinites to be interpreted as two variables bound by a single negative quantifier. This is of course similar to the proposals made by Zanuttini (1991) and Haegeman and Zanuttini (1996).

The ambiguity of examples like (44) and (45) can now be handled by positing two ways by means of which a sequence of two negative quantifiers can be interpreted: by iteration or by resumption. If we interpret (44a), repeated here as (48a) as involving the iteration of two negative quantifiers, we obtain the generalized quantifier representation in (48b), with the truth conditions in terms of double negation spelled out in (48c). If we interpret the same sentence by means of resumption, we obtain the generalized quantifier representation in (49b), with the truth conditions corresponding with the single negation reading in (49c).

- (48) a. *Personne n'aime personne* [French]
 nobody SN loves nobody
 = Everyone loves someone. [DN]
- b. $\text{NO}(\text{HUM}, \{x \mid \text{NO}(\text{HUM}, \{y \mid \text{LOVE}(x,y)\})\})$
- c. $\neg \exists x \neg \exists y \text{ Love}(x,y)$
- (49) a. *Personne n'aime personne* [French]
 nobody SN loves nobody
 = No one loves anyone. [NC]
- b. $\text{NO}_{\text{E2}}^{\text{hum} \times \text{hum}}(\text{LOVE})$
- c. $\neg \exists x \exists y \text{ Love}(x,y)$

The iteration of quantifiers in (48) requires there to be an empty intersection between the set of persons, and the set of individuals that love no one. This is equivalent to the first-order representation in (48c). The resumptive interpretation in (49b) excludes all pairs of humans from the denotation of the love relation. This is equivalent to the first-order formula in (49c). The treatment of negative indefinites proposed by de Swart and Sag (2002) relies on a unified lexical semantics of n-words like *nessuno*, *niente* and negative quantifiers like English *nobody*, *nothing*. In Chapter 4, we will use the label Neg-expression as the overall term for these two classes of negative indefinites. The difference between a single and a double negation reading is not located in the lexicon, but in the grammar. In principle, two rules of interpretation can be applied to a sequence of two negative quantifiers: iteration or resumption. The application of iteration leads to a double negation reading, the application of resumption to a single negation reading.

4.5 A typology of negative indefinites

The ambiguity of examples like (44), spelled out in (48) and (49) is real, and constitutes a problem for most analyses of negative concord which exclusively focus on deriving the single negation reading. At the same time, it is quite clear that the double negation reading of these sentences is highly marked, and that most instances of a sequence of two n-words in French or Bulgarian lead to a single negation reading.

An important question raised by the analysis proposed by de Swart and Sag (2002) is why certain languages are predominantly negative concord languages (French, other Romance languages, Slavic, Greek, Afrikaans, etc.), whereas other languages almost always interpret a sequence of negative indefinites in terms of double negation (standard English, Dutch, German, Swedish, etc. The contrast is illustrated in (35) above, and repeated here as (50).

- (50) a. *Nessuno ha detto niente.* [Italian]
 Nobody has said nothing.
 ‘Nobody has said anything.’
 $\neg\exists x\exists y \text{ Say}(x,y)$
- b. Nobody said nothing. [English]
 $\neg\exists x\neg\exists y \text{ Say}(x,y)$

If both iteration and resumption are freely available as the interpretation of a sequence of negative indefinites, we would expect both examples in (50) to be ambiguous, but in fact they are not. This question of preferred interpretations is not addressed by de Swart and Sag (2002), but constitutes the main focus of Chapter 4. The approach we adopt in this book allows us to distinguish two classes of languages in terms of the Optimality Theoretic grammar they adopt.

A language exemplifies negative concord if it has a highly ranked constraint in the syntax that forces the proliferation of special ‘negative’ forms which reflect that the indefinite is in the scope of negation. Haspelmath (1997: 231), building on Tanaka (1994), claims that the use of n-words is functionally motivated by the desire to mark the focus of negation, that is, the participants that are affected by the negation. In order to guarantee that the proliferation of negative indefinites does not lead to multiplication of negation in the semantics, the syntactic constraint favoring the use of n-words must be balanced by a semantic constraint avoiding multiplication of negation in the semantics. If iteration is blocked by such an economy constraint, the resumptive reading will be dominant, leading to the desired single negation reading. We find this ranking in Romance, Greek, Slavic, and many other negative concord languages. Standard English, standard Dutch, standard German, Swedish, etc. are so-called double negation languages in which a sequence of negative indefinites typically

leads to a double negation reading. In such languages, the syntactic constraint favoring the proliferation of negative forms is ranked in a fairly low position, whereas the constraint favoring a first-order interpretation in terms of iteration of quantifiers is ranked in a high position in the semantics.

Chapter 4 works out the OT grammars that provide the typology. Chapter 6 returns to the ambiguities discussed in Section 4.3, and shows how they can be accounted for in a stochastic extension of the OT analysis. The phenomena of double negation and negative concord are thus treated at the syntax-semantics interface where they belong. The OT analysis is built on top of the polyadic quantifier analysis outlined in Section 4.4, so it should be viewed as an elaboration of the earlier proposal along a typological dimension.

5. Negation and negative indefinites

Section 2 of this chapter focused on the marker of sentential negation. Section 4 focused on n-words participating in negative concord. In this section, we bring the two issues together, in anticipation of the full discussion in Chapter 5. Den Besten (1986) and Haspelmath (1997) distinguish three types of negative concord systems. Here we use the labels strict negative concord, non-strict negative concord and negative spread introduced by Giannakidou (1997, 1998) to describe them. In strict NC varieties, the presence of the marker of sentential negation is obligatory. Greek, Hungarian, Rumanian and Slavic exemplify strict negative concord. The examples in (51) are from Haspelmath (1997: 201), the examples in (52) from Corblin and Tovenia (2003), the examples in (53) from Giannakidou (2006).

- (51) a. Nikt nie przyszedł. [Polish]
 nobody SN came.
 ‘Nobody came.’
 b. Nie widziałam nikogo.
 SN saw nobody.
 ‘I saw nobody.’

- (52) a. Nimeni *(nu) a venit. [Rumanian]
 nobody *(SN) has come.
 ‘Nobody came’
 b. *(Nu) a venit nimeni.
 *(SN) has come nobody.
 ‘Nobody came’
- (53) a. KANENAS *(dhen) ipe TIPOTA. [Greek]
 nobody *(SN) said.3sg nothing
 ‘Nobody said anything.’
 b. O Petros *(dhen) idhe TIPOTA.
 the Peter *(SN) saw.3SG nothing
 ‘Peter didn’t see anything.’

In contrast to the examples of strict negative concord in (51)-(53), we observe that Spanish, Italian and European Portuguese exemplify non-strict negative concord. In (54a) and (55a), we see that a post-verbal n-word requires the presence of a preverbal marker of sentential negation. However, when the n-word is in preverbal position, the negation marker is not used in the expression of a single negation reading (54b), (55b).

- (54) a. Mario *(non) ha parlato di *niente* con *nessuno*. [Italian]
 Mario *(SN) has talked about *nothing* to *nobody*.
 b. *Nessuno* (*?non) ha parlato con *nessuno*.
Nobody (*?SN) has talked with *nobody*.
- (55) a. *(No) he visto a *nadie*. [Spanish]
 *(SN) has seen nobody
 ‘He hasn’t seen anybody.’
 b. *Nadie* (*?no) ha dicho *nada*.
 Nobody (*?SN) has said nothing
 ‘Nobody said anything.’

If the negative concord relation is established exclusively with n-words, we see the phenomenon of negative spread, the expression of a single negation by means of a sequence of negative indefinites, without the support of a marker of sentential negation. The examples (54b) and (55b) exemplify negative spread in a non-strict negative concord language. Systematic negative spread is exemplified by spoken French (56a). The combination of an n-word with the marker of sentential negation *pas* always leads to double negation readings (56b).

- (56) a. Personne a rien dit. [Spoken French]
 Nobody has nothing said
 ‘Nobody said anything.’
 b. Il est pas venu pour rien.
 He is SN come for nothing
 ≠ He didn’t come anything. [NC]
 = ‘He didn’t come for nothing.’ [DN]

In the remainder of this book, I will reserve the term negative spread for languages like spoken French, in which the marker of sentential negation is always incompatible with n-words in the expression of a single negation reading.

Giannakidou (2006) concludes that the empirical richness of the different negative concord systems make it impossible to assign a unified semantics to n-words. In her analysis, the quantificational status of n-words in strict and non strict negative concord languages is crucially different. In this book, we pursue a different approach. As outlined in section 4.4 above, we uniformly treat all n-words as expressions denoting a negative quantifier ($\neg\exists$). A resumptive interpretation strategy derives the single negation reading of a sequence of negative indefinites. One might object that this approach is suitable for negative spread, but doesn't account for strict and non-strict negative concord languages, in which the marker of sentential negation plays a crucial role. Such an objection would be mistaken. Under the polyadic quantifier analysis developed by de Swart and Sag (2002), the marker of sentential negation is semantically redundant in environments where n-words establish negative concord. A sequence of n-words builds a complex negative quantifier binding all the variables contributed by the n-words. Given that the negation marker is a propositional operator

which does not contribute any variables, it is absorbed in this complex without adding anything to the semantics. Given that it is semantically redundant, economy reasons dictate its absence. This is indeed what we observe in negative spread, but economy is overruled in strict and non-strict negative concord systems. According to de Swart and Sag (2002), the semantic redundancy of the marker of sentential negation implies that it is free to play a syntactic role as a scope marker. Chapter 5 explores the syntactic constraints governing the use of the marker of sentential negation in languages exemplifying strict and non-strict negative concord. It turns out that strict negative concord languages such as Greek, Slavic, Hungarian, etc. use a marker of sentential negation in all sentences containing an n-word in order to underline the negative character of the sentence, and guarantee clausal scope of negation. The phenomenon of NegFirst that plays a role in the placement of the negation particle (cf. Section 2 above) turns out to be crucial to explain the preverbal/post-verbal asymmetry in non-strict negative concord languages, such as Spanish and Italian. In the absence of faithfulness constraints driving the use of the negation marker for scope marking purposes, the negation marker is outside the system of negative concord for economy reasons, and we are left with just negative spread, as in spoken French.

Chapter 6 (Section 4) takes another look at the interaction of n-words and the negation marker. The double negation readings arising with the combination of an n-word and *pas* in spoken French, exemplified in (56b) will be shown to be part of a systematic pattern in which double negation readings arise when economy is overruled. The negation marker is not needed in (56b) in order to express a single negation reading. For economy reasons, it should therefore be left out. If it is inserted anyway, its presence needs to be justified for interpretive reasons. We will show that the combination of a syntactically marked expression with a semantically marked interpretation can be accounted for in a weak bidirectional OT framework. Double negation readings do not arise in the interaction of the negation marker and n-words in strict negative concord languages with a single negation marker, as observed by Giannakidou (2006). In our analysis, this is the result of the negation marker being licensed as a scope marker, which leaves no room for weak bidirectionality. However, double negation readings do arise in strict negative concord languages with discontinuous negation, in non-strict negative concord languages and in languages exemplifying negative spread, as we will see in Chapter 6.

5. Outline of the book

This section presents a brief outline of the book, with reference to the upcoming chapters. The analysis of the expression and interpretation of negation in this book is formulated in the framework of Optimality Theory. An early case study of negation in Optimality Theory by Newson (1998) already suggested that cross-linguistic variation in the expression of negation can be accounted for in terms of different rankings of constraints. Newson's paper mostly deals with English and Hungarian, and his analysis relies on specific syntactic assumptions from the Minimalist Program. Morimoto (2001) presents an OT-LFG analysis of the placement of negation in the sentence. There are clear similarities between these early OT accounts, and the analysis developed in this book. In all proposal, the constraint rankings seek a balance between the proliferation of negative expressions in some languages, versus a ban on multiplication of negation in others. We share with Morimoto's work a concern with the placement of negation in relation to the verb. We share with Newson's work the desire to connect the formal realization of negation to its interpretation. However, the analysis developed in this book is more general than its precursors in four respects. First, it expands the empirical domain of the study to a larger number of languages, so that we get a broader typological perspective on negation in natural language. Second, this book explores not only the marker of sentential negation corresponding to *not* in English, but also negative indefinites such as *nobody* in relation to the n-words we find in negative concord languages (such as Italian *nessuno*). Third, we do not only investigate the syntax of negation and negative indefinites, but also their semantics, and the way form and meaning hang together in the syntax-semantics interface of negation. Fourth and finally, the analysis is fairly neutral with respect to the syntactic theory in which the syntactic constraints are formulated, and mostly relies on fairly general assumptions about phrase structure and word order. This means that the analysis is compatible with different grammatical frameworks.

The analysis makes two specific assumptions that are not necessarily shared by all syntactic theories. First, it is exclusively surface oriented, and does not account for semantic effects (scope, licensing, etc.) in terms of syntactic movement. Second, it does not rely on empty categories. These two assumptions are shared by grammatical theories such as HPSG and LFG, but typically not by the Minimalist Program (or Principles and Parameters). The restrictions we impose on the general format of the

grammar have important consequences for our analysis of negation. In particular, we shy away from covert negation operators (syntactically invisible, but semantically potent negations), and empty negations (syntactically visible, but semantically inactive negations). Both covert and empty negations are widely used in current analyses of negation, as we have seen in this chapter. Our analysis will be different from some of the influential proposals in the literature because of the severe restrictions we impose on the syntax. However, we believe that the limitations provide us with a more insightful perspective on cross-linguistic variation. If it is possible to provide a typology of the expression and interpretation of negation without covert and empty negations, this would provide a more economical and more explanatory theory of cross-linguistic variation.

In order to set the stage for the analysis to be developed in later chapters, Chapter 2 offers an introduction to Optimality Theory. We present the motivation for this framework as providing the grammar of individual languages, and show how it functions as a theory of linguistic variation, both in a synchronic perspective (typology) and a diachronic perspective (language change). We pay particular attention to OT syntax, OT semantics, and bidirectional OT as an account of the syntax-semantics interface.

Chapter 3 focuses on the expression and interpretation of propositional negation. The chapter takes its starting point in the markedness of negation, and derives the basic constraints of the OT system used in this book from the asymmetry between assertion and negation. The conflict between the faithfulness constraint FNeg (be faithful to negation in the input) and the markedness constraint *Neg (avoid negation) is resolved by ranking FNeg above *Neg in all languages. This derives Dahl's (1979) generalization that negation is a universal category of natural language. The chapter further discusses the different positions and realizations of negation in a typological perspective. The different systems are related to diachronic change. The Jespersen cycle is modeled as a series of constraint re-rankings.

Chapter 4 works out a bi-directional OT typology on top of the polyadic quantifier analysis developed by de Swart and Sag (2002). Double negation and negative concord languages strike a different balance between two opposing tendencies. On the one hand, there is strong motivation in favor of the marking of "negative variables" (Corblin and Tovenia 2003), which drives the use of n-words in negative concord languages. On the other hand, languages prefer (first-order) iteration

over a (second-order) resumptive interpretation, and this preference wins in double negation languages. The syntactic and semantic needs are balanced by the economy constraint *Neg.

Chapter 5 puts Chapters 3 and 4 together in a study of the interaction of negation and negative indefinites in double negation and negative concord languages. The OT analysis accounts for the different negative concord systems one finds in typology and diachrony. The ranking of constraints targeting scope marking of negation governs the use of the negation marker in strict and non-strict negative concord. Negative spread results if the economy constraint *Neg is decisive.

Chapter 6 focuses on double negation readings in negative concord languages. No negative concord is established with constituent negation or across clause boundaries. This confirms that double negation is not a conceptual problem in negative concord languages, but a grammatical phenomenon concerning sequences of negative indefinites within a single argument structure. The double negation readings that motivated the polyadic quantifier analysis are handled by a stochastic extension of the basic OT grammar. Finally, the chapter provides a weak bi-directional OT account of instances of double negation arising in the interaction of the negation marker and n-words. They are viewed as instances of the pairing up of a marked form with a marked meaning. Although the examples are rare, and sometimes conceived as marginal, their existence provides independent support for the OT analysis advanced in this book.

In Chapter 7, we discuss the L2 acquisition of negation as a test case for the OT system developed in the Chapters 3-6. Spontaneous L2 acquisition has been the object of an extensive European research project, which provides the data for the research in this chapter. We use the patterns emerging from these data to make claims about the unmarked realization of negation in language. Following the view that restricted linguistic systems, such as early L2 acquisition provide a window on language genesis, we present a proposal for the genesis of negation. Under this proposal, pre-logical negation is present from the early stages of holophrastic negation. The development of utterance structure based on information structure allows for the emergence of negation as a focus operator, with a concomitant interpretation as a truth-functional connective. The introduction of negation as an instance of semantic recursion precedes, and might very well trigger the development of syntactic recursion.

Chapter 8 summarizes the main conclusions we can draw from the research, and sketches perspectives for further research.

Chapter 2

Expressive and interpretive optimization

0. Summary of chapter

This chapter is an outline of Optimality Theory (OT) as a model of grammar. OT is a linguistic theory that is clearly embedded in a broader cognitive architecture. We explain how expressive optimization can be used as a theory of syntax, and interpretive optimization as a theory of semantics. In bidirectional OT, the two come together in a theory of the syntax-semantics interface. As far as the empirical coverage is concerned, we focus on the use of OT in typology, language change, and language learning.

1. Fundamentals of OT as a model of grammar

Prince and Smolensky (1997) explore the implications of an important principle of neural computation, optimization, for the theory of grammar. Optimization over symbolic linguistic structures provides the core of a new grammatical architecture, optimality theory. “The proposition that grammaticality equals optimality sheds light on a wide range of phenomena, from the gulf between production and comprehension in child language, to language learnability, to the fundamental questions of linguistic theory: What is it that the grammars of all languages share, and how may they differ?” (Prince and Smolensky 1997: 1604). Prince and Smolensky’s conceptualization of linguistic theory through optimization principles is embedded in a broader theory of the mind, most recently explored in Smolensky and Legendre (2006). In this work, the authors develop a cognitive architecture based in neural computation, but supporting formally explicit higher-level symbolic descriptions. According to Smolensky and Legendre (2006: 209), the basic idea is that mental representations are instantiated in the activation values of connectionist units, and when analyzed at a higher level, as distributed patterns of activity, these same representations are seen as realizations of symbolic structures. In this way, cognitive theories based on neural computation and

linguistic theories employing symbolic computation can be integrated, and strengthen each other. In this chapter, we briefly discuss the grounding of Optimality Theory (OT) in a connectionist cognitive architecture, and present the formal organization of the theory (Section 1). In Section 2, we focus on applications of the OT model in syntax. Section 3 does the same for semantics. Section 4 brings syntax and semantics together in bidirectional OT. Sections 5 and 6 discuss issues in language typology, language change, and language learning that are relevant to the concerns of this book. The discussion of the fundamentals in this section is mostly based on Smolensky and Legendre (2006: Chapter 1).

Following widely accepted views in cognitive neuroscience, Smolensky and Legendre (2006) adopt a connectionist cognitive architecture. They take the brain to be a massively parallel computer consisting of billions of processors (neurons). These processes manipulate numbers (neural activation levels). The quantitative internal interactions within the computer (the efficacy of synaptic connections between neurons) change in response to the statistical properties of the computer's experience. The study of the way complex cognitive functions are computed by the brain exploits mathematical models of neural computation known as connectionist networks. Connectionist networks are collections of simple, parallel computing elements, each of which carries a numerical activation value that it computes from the values of neighboring elements in the network. Each connection carries a numerical strength or weight. The network elements (units) influence each other's values through connections. In a typical connectionist network, input to the system is provided by imposing activation values on the input units of the network. The activation on the input units propagates along the connections until some set of activation values emerges on the output units. These activation values encode the output the system has computed from the input. Mediating between the input and output units, there may be hidden units that do not participate directly in the representation of either the input or the output. The computation performed by the network in transforming the input pattern of activity to the output pattern depends on the set of connection strengths. These weights are usually regarded as encoding the system's knowledge. Many connectionist networks perform optimization: they compute those activation values for hidden and output units that, together with the given activation values of the input units, maximize a measure of self-consistency or well-formedness, called harmony. The harmony of a network can be interpreted as the degree to which the state satisfies

a set of “soft” constraints implemented in the network’s connections. Thus, when the network achieves a state of maximal harmony, it has optimally satisfied these constraints.

In the field of cognitive science, connectionist networks are used to model a wide variety of cognitive tasks. Optimality Theory (OT) is an application of the connectionist view to language. A possible linguistic structure is evaluated by a set of well-formedness constraints, each of which defines one desirable aspect of an ideal linguistic representation. These constraints are highly general, and frequently conflicting. Typically, no structure meets all the constraints, and a mechanism is needed for deciding which constraints are most important. The well-formed or grammatical structures are the ones that optimally satisfy the constraints, taking into account differing strength or priority of constraints. In ordinal OT, the constraints are ranked in a strict domination hierarchy. This means that each constraint has complete priority over all the constraints that are lower in the hierarchy. An optimal structure may violate a given constraint C, but only if that permits the structure to better satisfy some constraint C’ ranked above C. The constraints of OT are in this sense minimally violable. Thus, OT defines grammaticality in terms of maximal harmony.

An ordinal OT grammar is a set of constraints defining the preferred characteristics of linguistic representations, priority-ranked in a strict domination hierarchy. A fundamental hypothesis of OT is that human grammars differ only in ranking, that is, in the way conflicts among constraints are solved. Given that the ranking varies across languages, it must be learnt. The constraints themselves are the same across languages – they are strictly universal. The origin of these universal constraints is very much an open question, one on which OT itself is silent. Many OT constraints are grounded in general cognitive or functional principles. In this book, we will not be committed to the view that the constraints we adopt are innate, but we do not exclude this as a possibility either. We will come back to the grounding of the constraints governing the expression and interpretation of affirmation and negation in an evolutionary perspective in Chapters 3 and 7. If the constraints are universal, grammatical knowledge is knowledge of the constraint hierarchy. Use of that knowledge then consists in determining, under various conditions, which linguistic structures optimally satisfy the constraint hierarchy. Grammatical knowledge determines the expression of a given meaning by the speaker (production) as well as the interpretation of a given expression by the hearer (comprehension). The two

directions of expressive optimization (from meaning to form) and interpretive optimization (from form to meaning) are central to this book.

Despite its embedding in a broader theory of cognitive science, the developments and applications of OT have first and foremost been centered in theoretical linguistics. This is how we will use OT in most of this book, although Chapter 7 adopts a broader perspective. The earliest applications of OT were concerned with phonology (Prince and Smolensky 1993/2004, McCarthy and Prince 1995). Applications to syntax followed quite quickly (Legendre, Raymond and Smolensky 1993, Aissen 1999, 2003, Grimshaw 1997, Sells 2001, the volumes edited by Barbosa et al. 1998 and Legendre 2001). The OT study of semantics and pragmatics took shape in work by Hendriks and de Hoop (2001), de Hoop and de Swart (2000), Blutner (2000), followed by the volume edited by Blutner and Zeevat (2003), Blutner, Hendriks and de Hoop (2006), Hendriks et al. (2006). Given that this book is concerned with the marking and interpretation of negation, we focus on expressive optimization as a theory of syntax (Section 2), interpretive optimization as a theory of semantics (Section 3), and bidirectional OT (Section 4) as a theory of the syntax-semantics interface.

2. Fundamentals of OT syntax

Smolensky and Legendre (2006: Chapter 12) characterize grammatical knowledge in OT as a system of universal violable constraints on well-formed linguistic combinations, ranked into a language-particular hierarchy. OT is a framework for stating theories of linguistic phenomena; it is not itself such a theory. In other words, OT is a theory of the structure of universal grammar, not of its content. In OT syntax, the input consists of a meaning or interpretation, and the output units are forms or expressions. A meaning is a dynamic semantic structure, typically a logical representation of predicate-argument and operator-variable structure, possibly including the discourse status of elements (such as topic or new information). A form is a sequence of words structured into syntactic constituents (phrases), possibly containing other types of syntactic information. The function GEN specifies the set of candidate expressions for a particular interpretation. GEN is constrained by a correspondence function between interpretations and forms. A correspondence

relation connects the entities of the meaning (predicates, arguments, operators, variables) with the elements that express them in the syntactic form in such a way that parts of the linguistic form are related to parts of the meaning. Wholes derive their meanings from their parts, and the way these parts are combined, although not necessarily in the strict way the Principle of Compositionality of meaning is often conceived (cf. Blutner et al. 2003). In practice, the output candidates generated by GEN are required to be made up of licit elements from the universal vocabularies of linguistic representation, respecting X-bar structure, heads/complementizer configurations, etc. (Kager 1999: 20). The grammatical expression of a particular input meaning is the candidate generated by GEN that is evaluated as the “best”, “least marked”, most harmonic, or most optimal according to the constraint ranking in the language.

A simple example involving expressive optimization is the following (from Hendriks et al. 2006). In certain languages (e.g. English), weather verbs take an expletive subject as in (1a). In other languages (e.g. Italian), a subjectless sentence is used (1b).

- | | | | |
|-----|----|----------------|-----------|
| (1) | a. | It is raining. | [English] |
| | b. | Piove. | [Italian] |
| | | Rain.3sg | |

What is the grammar that accounts for the two languages? Clearly, the two languages make a different choice with respect to the tendency of well-formed sentences of natural language to have clauses with an explicit subject, and the desire to give content to all the expressions used in the sentence. In OT, violable constraints model such tendencies. Suppose we adopt the two constraints Subject and Full-Interpretation, defined in (2).

- | | | |
|-----|----|--|
| (2) | a. | Subject: all clauses must have a subject. |
| | b. | Full-Interpretation: all constituents in the sentence must be interpreted. |

Suppose we use these constraints to build a well-formed sentence based on the input of the weather verb. The OT model views the grammar as a relation between input

and output units. Suppose we take the message “rain-here-and-now”, represented as ☔ that the speaker intends to convey as the input. Semantically, weather predicates are zero-place predicates. One-place predicates such as *sing* or *laugh* predicate singing or laughing of someone. But rain is not predicated of anything. In the absence of an argument position in the lexical semantics of the verb, the two constraints Subject and Full-Interpretation are giving conflicting instructions for the best form to use. The constraint Subject favors a sentence with an expletive subject, whereas the constraint Full-Interpretation prefers a subjectless sentence. Suppose we take two possible sentences, one with an expletive subject, one without a subject as the possible outputs provided by GEN. The difference between English and Italian can then be modeled as a difference between the importance or strength of the two constraints. In English, Subject is the dominant constraint, and a violation of Full-Interpretation is accepted. In Italian, Full-Interpretation is the dominant constraint, and a violation of Subject is accepted. The ranking and the process of optimization is modeled in a tableau. Tableaux 1 and 2 provide the English and Italian patterns with weather verbs.

Tableau 1: Weather verbs in English (production)

meaning ☔	Form	subject	full-int
	Rains	*	
☞	It rains		*

Tableau 2: Weather verbs in Italian (production)

meaning ☔	Form	subject	full-int
☞	Piove	*	
	EXPL piove		*

The top left-hand cell in the two tableaux represents the input meaning ☔. There are infinitely many ways in which the speaker could convey the meaning ☔, many of them non-linguistic (e.g. by pointing at the sky, sighing while getting out an umbrella, dancing a rain dance, etc.). We concentrate on linguistic expressions in this book.

Even so, an infinite number of options remain, some banal, others poetic, ironic, or bizarre. For simplicity, the only forms listed as possible candidates for the expression of the meaning ☂ are simple sentences using a weather verb. English and Italian use different lexical items to represent the meaning “rain”, but we will not be concerned with the lexicon here. The issue Tableaux 1 and 2 focus on concerns the choice between a sentence with an expletive subject, and a subjectless sentence. The well-formedness of the sentence depends on the ranking of the two violable constraints Subject and Full-Interpretation. The constraints are ranked across the top, going from the highest ranked constraint at the left to the lowest ranked constraint on the right. An asterisk (*) in a cell indicates a violation of the constraint. An expletive subject violates the constraint Full-Interpretation: the word *it* in *it is raining* does not have a meaning. Subjectless sentences such as *piove* violate the constraint Subject. The little hand (☞) points at the optimal candidate. According to the strict domination hierarchy, the optimal candidate is the grammatical sentence in the language at hand. Sub-optimal candidates are not simply less good, but plain ungrammatical. This is known as the principle that “the winner takes all.” The Tableaux 1 and 2 reflect that in languages like English it is more important to have a subject than to avoid meaningless words, whereas in languages like Italian, it is more important to have only meaningful words in the sentence than to have a subject. In running texts, we write the two grammars as Subject >> Full-Interpretation for English and Full-Interpretation >> Subject for Italian.

The well-formedness constraints used in OT are of two general types: markedness constraints and faithfulness constraints. Faithfulness constraints evaluate the relation between input and output. The constraint Full-Interpretation in (2b) is a faithfulness constraint: it relates parts of the form to a correspondent in the input meaning. A markedness constraint is output oriented. Markedness constraints in OT exclusively concern constraints on form. The constraint subject defined in (2a) is a markedness constraint: the requirement that clauses must have a subject is unrelated to the input meaning. The notion of markedness goes back to the Prague school of linguistics (Trubetzkoy 1931, 1939, Jakobson 1932, 1939, 1962). In later developments of linguistics, the notion of markedness was conceived as problematic for formal linguistic theory (cf. Haspelmath 2006 for an overview). In OT, markedness theory plays a central role. Marked structures are identified as those that violate a universal constraint in OT. Given that constraints are violable, and

candidates compete, OT can maintain a notion of markedness, even if we are dealing with tendencies, and degrees of markedness. As already outlined in Chapter 1, the markedness of negation with respect to affirmation is the starting point of the analysis in this book. In Chapter 3, the central faithfulness and markedness constraints concerning negation will be derived in an evolutionary OT approach. The markedness of negation carries over to the next level of complexity: Chapters 4 and 6 investigate the markedness of double negation with respect to single negation in the syntax as well as the semantics. Throughout the book, new faithfulness constraints are grounded in cognitive and functional principles, including information structure. In Chapter 7, we return to the evolutionary approach, and study the emergence of unmarked negation.

The analysis of the contrast in (1) shows that differences between languages can be explained through a different ranking of the same set of constraints. This is called typology by re-ranking. The typology of all possible human grammars is formally specified by the factorial ranking possibilities of the set of constraints. So a set of two constraints allows two possible rankings, a set of three constraints allows eight possible rankings, etc. In practice, the number of possible languages is smaller than the number of possible rankings within the factorial typology. Constraint rankings implementing markedness hierarchies may be universal, or permit only restricted re-ranking. In other cases, several different constraint rankings define the same language, because two or more constraints do not interact, so their ranking with respect to each other does not lead to a different grammar. Nevertheless, typology by re-ranking remains an important tool for the description of cross-linguistic variation. In this book, we explore the notion of typology by re-ranking in syntax and semantics, and exploit it to define classes of languages with respect to the expression and interpretation of negation.

3. Fundamentals of OT semantics

OT semantics is a mirror image of OT syntax, and spells out a process of interpretive optimization. The input is now a given form, and the output involves a set of candidate meanings. The form is again a sequence of words structured into syntactic constituents (phrases). A meaning is a dynamic semantic structure, including a logical

representation of predicate-argument and operator-variable structure, and temporal/information structure if applicable. The function INT specifies the set of candidate meanings for a particular expression. INT is constrained by a correspondence function between forms and interpretations. In this book, we take the candidates generated by INT to be constrained by standard semantic theories such as type theory, the lambda calculus, and generalized quantifier theory. The interpretation of a particular input expression is now the candidate generated by INT that is evaluated as the “best”, “least marked”, most harmonic, or most optimal according to the constraint ranking in the language at hand. Analyses in terms of interpretive optimization have been formulated for issues involving anaphora resolution of reflexives and pronouns, discourse anaphora, temporal structure, focus, and lexical semantics, cf. Hendriks & de Hoop (2001), de Hoop and de Swart (2000), Zwarts (2003, 2004), Hendriks (2005), Blutner, Hendriks and de Hoop (2006), Hendriks et al. (2006). In this section, I discuss the temporal structure of *when*-clauses (based on de Hoop and de Swart 2000) as an example of interpretive optimization.

Temporal adjunct clauses introduced by *when*, *before*, *after*, etc. come with tense and aspect. Heinämäki (1978) observes that the temporal relation established by *when* depends on the aspectual features of the main and the subordinate clause. Intervals or moments denoted by event predicates are included in the intervals referred to by durative sentences (3a), while two durative sentences overlap (3b), and two event predicates describe events happening in succession (3c).

- (3) a. Everybody was away when Jane destroyed the documents.
- b. It was raining in San Francisco when we were there.
- c. When Robert wrecked the car, Jane fixed it.

Heinämäki’s claim that two events related by *when* happen in succession (3c) has been challenged. De Swart (1999) points out that neither preposed nor postponed *when*-clauses express a succession of events in which the event described by the subordinate clause follows the main clause event, even if this is strongly suggested by world knowledge, compare (4a-d).

- (4) a. When the president asked who would support her, Robert raised his hand.
- b. Robert raised his hand when the president asked who would support her.

- c. When Robert raised his hand, the president asked who would support her.
- d. The president asked who would support her when Robert raised his hand.
- e. The president asked who would support her. Robert raised his hand.

The preposed *when*-clauses in (4a) and (4c) allow for only one reading. In both cases, the main clause event is located shortly after the event described by the subordinate clause. We strongly get the feeling that the main clause event is caused by or otherwise made possible by the subordinate clause event. The preferred reading of (4b) is the same as that of (4a). However, there is an alternative interpretation available in which Robert raises his hand just at the moment at which the president asks who would support her. Under this reading, there is no causal relation between the two actions; there is just a relation of temporal overlap. The puzzle is (4d). If two events related by *when* could describe the two events as happening in succession independently of subordination, then we would predict that we locate Robert's raising of his hand after the president's request for support, just like in the sequence of two independent sentences (4e). Even in the presence of strong rhetorical support, this reading is unavailable in (4d): we cannot establish a causal or enablement relation leading from a request for support to a raising of the hand; there is just a temporal relation between the two events. De Swart (1999) appeals to topic-focus articulation and the anaphoric nature of main clauses to explain the paradigm in (4). De Hoop and de Swart (2000) show that we get a better understanding of the relation between form and meaning if we embed the central properties of the construction in an OT analysis.

An important difference between main clauses and temporal adjunct clauses resides in their anaphoric behavior. Main clauses are anaphoric just like independent clauses. This means that their temporal anchoring is determined by the relation with the preceding discourse. Following Lascarides and Asher's (1993) claim that temporal relations are derived from the rhetorical structure of the discourse, we argue that independent clauses seek to establish a rhetorical relation with an earlier sentence in the discourse. We can capture this by means of a temporal version of the constraint DOAP proposed by Hendriks and de Hoop (2001):

- (5) Don't overlook anaphoric possibilities (DOAP): opportunities to establish a rhetorical relation must be seized.

Following DOAP, a main or independent clause β tries to establish a rhetorical relation R with a clause α which is already part of the discourse representation structure built up so far. Time adverbials, on the other hand, are presuppositional (Heinämäki 1978), which means that their location in time is taken to be determined independently of the local context. This means that time adverbials are not anaphoric, and can never fulfil the role of β in a rhetorical relation $R(\alpha, \beta)$. We construe this condition as a constraint TA on temporal adjuncts (6).

(6) TA: temporal adjuncts do not function as β in a rhetorical relation $R(\alpha, \beta)$.


Furthermore, preposed temporal clauses as in (4a, c) are topicalized, and always provide the rhetorical antecedent of the main clause. Postponed temporal clauses can be either topic or focus. Thus they provide the rhetorical antecedent of the main clause (functioning as α in $R(\alpha, \beta)$), or they establish a relation of temporal overlap in the absence of a rhetorical relation. The mirror principle in (7) relates word order, information structure, and rhetorical structure.

(7) MIRROR PRINCIPLE ($\alpha < \beta$):

$\alpha < \beta$: $R(\alpha, \beta)$: topic < focus. That is, the linear order of two syntactic constituents corresponds to the order antecedent-anaphor in a rhetorical relation, which mirrors the order topic-focus in the information structure.

Tableau 3 shows that the optimal interpretation for the input sequence of a preposed *when*-clause is the result of the satisfaction of all three constraints.

Tableau 3: preposed *when*-clause (e.g. 4a, c) (interpretation)

Form <i>when</i> -clause(e_1) < main-clause (e_2)	Meaning	ta	doap	$\alpha < \beta$
	$R(e_1, e_2)$ <i>when</i> -clause _{top} , main clause _{foc}			
	$R(e_1, e_2)$ main clause _{top} , <i>when</i> -clause _{foc}			*
	$R(e_2, e_1)$ <i>when</i> -clause _{top} , main clause _{foc}	*		*
	$R(e_2, e_1)$ main clause _{top} , <i>when</i> -clause _{foc}	*		**
	$\neg R(e_1, e_2)$ <i>when</i> -clause _{top} , main clause _{foc}		*	
	$\neg R(e_2, e_1)$ main clause _{top} , <i>when</i> -clause _{foc}		*	*

There is one interpretation in Tableau 3 that satisfies all three constraints. In this optimal interpretation, we establish a rhetorical relation (satisfaction of DOAP), with the *when*-clause as the rhetorical antecedent α (satisfaction of TA). Furthermore, the rhetorical structure satisfies both clause order and topic-focus articulation (satisfaction of $\alpha < \beta$). In the optimal interpretation of (4a), the president's request triggers Robert's raising of his hand as a natural response, whereas in (4c), Robert's raising of this hand trigger the president's request. Given that the preposed *when*-clause satisfies all three constraints, this example does not tell us anything about the ranking of the constraints. Post-poned *when*-clauses are more informative in this respect. Consider the representation in Tableau 4 for examples like (4b) and (4d).

Tableau 4: postponed *when*-clause (e.g. 4b, d) (interpretation)

Form	Meaning	ta	doap	$\alpha < \beta$
main-clause (e_2) < <i>when</i> -clause(e_1)				
	$R(e_1, e_2)$ main clause _{top} , <i>when</i> -clause _{foc}			**
\mathcal{F}	$R(e_1, e_2)$ <i>when</i> -clause _{top} , main clause _{foc}			*
	$R(e_2, e_1)$ main clause _{top} , <i>when</i> -clause _{foc}	*		
	$R(e_2, e_1)$ <i>when</i> -clause _{top} , main clause _{foc}	*		*
	$\neg R(e_1, e_2)$ <i>when</i> -clause _{top} , main clause _{foc}		*	*
\mathcal{F}	$\neg R(e_2, e_1)$ main clause _{top} , <i>when</i> -clause _{foc}		*	

Postponed *when*-clauses generally allow two interpretations, as the discussion of examples (4b) and (4d) made clear. One is the same interpretation as the construction with the preposed *when*-clause, namely $R(e_1, e_2)$, with the *when*-clause providing the topic of the construction, and the antecedent of the rhetorical relation. In Tableau 3, with the preposed *when*-clause as input, this interpretation did not violate any constraints, but in Tableau 4, with the postponed *when*-clause, the interpretation violates the MIRROR PRINCIPLE, because the linear order of the main clause and the *when*-clause does not correspond to the order antecedent-anaphor in the rhetorical relation. The MIRROR PRINCIPLE is satisfied by the third candidate, but this candidate violates TA, which is a higher ranked constraint. In the final two candidates, no rhetorical relation is established, and *when* denotes a relation of temporal overlap between two events. This constraint violates DOAP, but satisfies the other two. Note that this interpretation requires the *when*-clause to be in focus. The candidate in which no rhetorical relation is established, but the *when*-clause is interpreted as the topic,

incurs an additional violation of the MIRROR PRINCIPLE, which makes this a suboptimal candidate. The fact that the second and the last candidate both arise as optimal interpretations suggests that the constraints DOAP and $\alpha < \beta$ are equally strong, indicated by the dotted line between the two columns. The contrast between the second/last and the remaining candidates emphasizes that the grammatical candidate violates the constraints minimally, with respect to the constraint ranking. We conclude that the three constraints, under the ranking $TA \gg DOAP \ll \gg MIRROR$ PRINCIPLE explain how word order, information structure and constraints on anaphoric relations interact in the selection of the optimal interpretation of *when*-clause constructions. OT thus serves as a theory of anaphora resolution.

Two concerns have been raised with respect to OT semantics that are addressed in this section, and more in detail in the remainder of this book. The first concern is that processes such as anaphora resolution are not really part of the semantics, because the temporal and information structure of the examples in (4) relies on pragmatic principles like DOAP. The underlying claim is that hardcore semantic rules could not be subject to optimization processes, but this is possible for the anchoring of utterances to their context and situation of use. The lexical-semantic analysis Zwarts (2003, 2004) develops for the preposition *round* in English provides strong counterevidence against this idea. Zwarts adopts a formal semantic analysis of *round* in terms of the vector-space semantics developed by Winter and Zwarts (2000). However, he shows that the use of *round* in a particular context involves the interaction of the prototypical interpretation of *round* as denoting a full circle with the lexical semantics of its environment. In this interaction, the interpretation of *round* can be weakened to a half circle (8a), a quarter circle (8b), an oval (8c), or a criss-cross movement (8d), but the interpretation is always as strong as the context allows.

- (8)
- a. He went round the barrier.
 - b. The postman went round the corner.
 - c. The earth goes round the sun.
 - d. The tourists went round the city centre.

The context-dependency of *round* in examples like (8) is not reducible to pragmatics, because the outcome depends on the way lexical features of *round* interact with the

context. If principles of OT semantics are applicable in lexical semantics, especially to expressions that have a clear algebraic structure such as spatial prepositions, optimization over meanings cannot be relegated to the pragmatic module. Additional evidence that interpretive optimization is not limited to the domain of pragmatic meaning is provided by the treatment of negation in this book. If truth-conditional operators such as negation are subject to optimization, this provides strong evidence in favor of an application of OT principles to domains of hardcore semantics.

A second concern expressed about OT semantics is that we don't find cross-linguistic variation in meaning the way we find syntactic variation. The example in (1) was easy to account for in terms of re-ranking of two syntactic constraints. Pace universal markedness hierarchies, the re-ranking of constraints always leads to a new OT grammar, that should correspond to a possible language. In the examples discussed in this section, it seems hard to come up with a language that would rank the constraints in a different order. The interpretive principles involved seem to depend on universal markedness hierarchies, rather than be subject to cross-linguistic variation. If semantic constraints are always universally ranked, one of the important advantages of OT as a typological theory, accounting for cross-linguistic variation in terms of different constraint rankings seems to be lost as far as interpretive optimization is concerned. But this would be a misconception. Although semantic variation is certainly more constrained than syntactic variation, true semantic variation does exist, and the domain of negation provides an important example. Two key contrasts from Chapter 1 are here repeated under (9) and (10) (from Herburger 2001). In elliptical contexts, a negative answer must be provided by a truly negative expression, such as *nothing* in English. A negative polarity item like *anything* is not felicitous as an answer to the question in (9a), because it needs to be in construction with a licenser with particular semantic properties (negation, a negative quantifier, etc.), as argued in Chapter 1 (Section 3).

- | | | | | |
|-----|----|-----------------------|---------------|-----------|
| (9) | a. | Q: What did you see? | A: Nothing. | [English] |
| | | | A: *Anything | |
| | b. | Q: A quién viste? | A: A nadie. | [Spanish] |
| | | Q: whom saw.2SG | A: nobody | |
| | | Q: 'Who did you see?' | A: *A un alma | |
| | | | a soul | |

In Spanish, we observe the same contrast between *nadie* and the negative polarity item *a un alma* ('a soul') (9b). This suggests that expressions like *nothing* and *nadie* have the same semantics. However, the situation changes when we take sentences into account that involve two instances of expressions like *nothing* or *nadie*. In English, the combination of *nobody* with *nothing* in (10b) leads to a double negation reading, whereas the two instances of *nadie* in (10a) express a single negation.

- (10) a. *Nadie* miraba a *nadie*. [Spanish]
 Nobody looked nobody.
 'Nobody looked at anybody.'
 $\neg\exists x\exists y \text{ Look-at}(x,y)$
- b. Nobody said nothing. [English]
 $\neg\exists x\neg\exists y \text{ Say}(x,y)$

Many analyses of these contrasts have been proposed, and the most important ones have been reviewed in Chapter 1. The analysis I put forward in this book is the following. The similarities between (9) and (10) support the view that there is no lexical distinction between negative quantifiers such as English *nobody* and n-words that participate in negative concord like Spanish *nadie*. If there is no lexical difference between *nobody* and *nadie*, the contrast between (10a) and (b) must reside in the grammar. I propose three constraints governing the expression and interpretation of negation in natural language, and claim that English and Romance involve two different grammars, and crucially rank the three constraints in two different orders. The constraint ranking shows a balance between expressive and interpretive optimization, but crucially for the argumentation in this section, there is re-ranking of constraints in the semantic component as well as in the syntactic component. The typology of double negation and negative concord languages we propose in Chapter 4 is thus a true instance of semantic variation as re-ranking of interpretive constraints. The argument that optimization principles do not apply in the semantic domain because there is no re-ranking of interpretive constraints in a typology is hereby refuted. This result opens up the possibility of fruitful investigation of other phenomena in the area of cross-linguistic semantics as well.

So far, we presented unidirectional versions of OT. Expressive optimization is speaker oriented. It takes meanings as input, and selects the optimal form for the message to be expressed. Interpretive optimization is hearer oriented. It takes forms as input, and selects the optimal interpretation for the given expression. Under the view that language serves a communicative purpose, these two directions of optimization should be interlinked. After all, the speaker wants the message not only to be transferred to the hearer, but also to be understood. The optimal form is the one that is understood by the hearer to convey the message that the speaker has in mind. Communication then requires speaker and hearer to take each other's perspectives into account. Optimization over pairs of forms and meanings is the domain of bidirectional Optimality Theory. In this book, we use bidirectional OT as a model of the syntax-semantics interface.

4. Bidirectional Optimality Theory

Hendriks et al. (2006: Chapter 1) illustrates the optimization process underlying bidirectional Optimality Theory with the non-linguistic example of a dance. Imagine a situation in which women are supposed to dance with men, better female dancers are preferred to less good female dancers, and better male dancers are preferred to less good male dancers. Suppose we want to match the dancers to get the best pair, e.g. to win a dance competition. Obviously, the best pair is the pair consisting of the best female dancer and the best male dancer. For the best female dancer, the best male dancer would be the best choice, and for the best male dancer, the best female dancer would be the best choice. Strong bidirectional optimization (adapted from Blutner 2000) uses the same intuition to pair up the best form with the best meaning. The definition of strong bidirectional optimization is given in (11):

(11) Strong bidirectional optimization:

A form-meaning pair $\langle f, m \rangle$ is bidirectionally optimal iff:

- a. there is no other pair $\langle f', m \rangle$ such that $\langle f', m \rangle$ is more harmonic than $\langle f, m \rangle$.
- b. there is no other pair $\langle f, m' \rangle$ such that $\langle f, m' \rangle$ is more harmonic than $\langle f, m \rangle$.

Under this definition, we do not consider forms or meaning separately. Instead, we consider pairs consisting of forms and their corresponding meanings. A form-meaning pair is an optimal pair if there is no pair with a better form or a better meaning. Only optimal form-meaning pairs are realized in language. Such optimal pairs block all other pairs in the same competition. We find blocking in natural language in situations where a meaning can be expressed by two different forms, but one of these forms is much simpler, so the other form is blocked for this meaning. For example, there are two possible ways to realize the comparative form of *good*, namely by means of the regular form *gooder*, or the irregular form *better*. Because the irregular form *better* is preferred, the regular form *gooder* is blocked as the comparative form of *good*.

The blocking of *gooder* by *better* is an instance of total blocking: *gooder* is a non-existing form in English. We also find instances of partial blocking. Again, the underlying idea can be illustrated with the non-linguistic example of the dance. Imagine that other dancers besides the best pair are allowed to dance as well. The best dance partner for the one-but-best female dancer, as for all female dancers, would be the best male dancer. If the best male dancer already forms a pair with the best female dancer, he is no longer available to dance with someone else, though. So all imaginable pairs in which the best male dancer dances with someone else than the best female dancer are blocked. Similarly, all imaginable pairs in which the best female dancer dances with someone else than the best male dancer are blocked. In a second round of optimization, the one-but-best female dancer will end up with the one-but-best male dancer. And if even more dancing pairs are allowed to be formed, the two-but-best female dancer ends up with the two-but-best male dancer, and so on. Crucially, pairs which do not consist of either the best female dancer or the best male dancer will not be blocked, even if they constitute the best possible pair. In language, this situation can be modeled with the recursive definition of bidirectional optimality, which is called superoptimality (adapted from Blutner 2000):

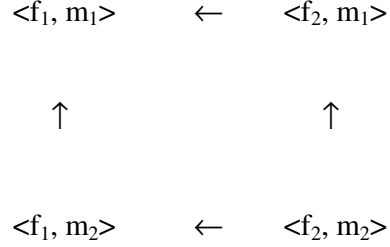
(12) Weak bidirectional optimization (adapted from Blutner 2000)

A form-meaning pair $\langle f, m \rangle$ is superoptimal iff:

- a. there is no superoptimal pair $\langle f', m \rangle$ such that $\langle f', m \rangle$ is more harmonic than $\langle f, m \rangle$.
- b. there is no superoptimal pair $\langle f, m' \rangle$ such that $\langle f, m' \rangle$ is more harmonic than $\langle f, m \rangle$.

Strong pairs are superoptimal, but not all superoptimal pairs are strong. We can illustrate the notion of superoptimality with the two forms f_1 and f_2 and the two meanings m_1 and m_2 as in Figure 1. The arrows indicate preference relations.

Figure 1: Weak bidirectional optimization



According to the preference relations in Figure 1, f_1 is always preferred over f_2 , and m_1 is always preferred over m_2 . As a result, two arrows are pointing towards the pair $\langle f_1, m_1 \rangle$, and two arrows are pointing away from the pair $\langle f_2, m_2 \rangle$. The fact that two arrows are pointing towards the pair $\langle f_1, m_1 \rangle$ indicates that this is a strongly optimal pair. In the dance example, this would be the pair consisting of the best female dancer, and the best male dancer. The pairs $\langle f_1, m_2 \rangle$ and $\langle f_2, m_1 \rangle$ lose against this strongly optimal pair, because $\langle f_1, m_1 \rangle$ has a better form for the same meaning, or a better meaning for the same form. In the dance example, these would be pairs consisting of the best female dancer with the second-best male dancer, or the best male dancer with the second-best female dancer. The pairs $\langle f_1, m_2 \rangle$ and $\langle f_2, m_1 \rangle$ are neither strong nor superoptimal pairs. Under strong bi-directional OT, the pair $\langle f_2, m_2 \rangle$ is blocked, because there are better form-meaning pairs available, as the arrows indicate. Under weak bi-directional OT, the pair $\langle f_2, m_2 \rangle$ arises as a weakly optimal (or ‘superoptimal’) form-meaning pair, because there is no superoptimal pair that has either a better form or a better meaning. In the dance example, this would be the pair consisting of the second-best female dancer, and the second-best male dancer. In Figure 1, $\langle f_2, m_2 \rangle$ is not in direct competition with the only other superoptimal pair $\langle f_1, m_1 \rangle$, because the two pairs differ in both their form and their meaning component. Figure 1 shows that weakly optimal pairs involve forms that are suboptimal in uni-directional generation, and meanings that are suboptimal in uni-

directional interpretation. As a result, superoptimality pairs up marked forms and marked meanings that would not be available otherwise.

Superoptimality is used to model Horn's division of pragmatic labor (Horn 1984). According to Horn's division of pragmatic labor, unmarked forms are used to express unmarked meanings, and marked forms are used for marked meanings. In this case, blocking is not total, but partial. In the dance example, the second-best female dancer is allowed to dance, but not with the best male dancer. In language, a suboptimal form f' is not blocked entirely, but only with respect to its use for a meaning m which is better paired up with the unmarked form f . Examples of partial blocking are discussed in Blutner (1998, 2000).

A well-known example of partial blocking is the relation between *kill* and *cause to die*. *Kill* is the shorter, less complex, thus unmarked form. *Cause to die* is the longer, more complex, thus marked form. Two closely related meanings are available for these forms, varying only in whether the action is accomplished in a direct, or an indirect way. Suppose we have two markedness constraints M1 and M2. M1 penalizes complex structure in the form, and M2 penalizes complex meanings in the interpretation. The ranking is irrelevant in this particular example. Tableau 5 spells out the possible form-meaning pairs and their violation patterns on the basis of this input. The victory sign (☞) indicates the superoptimal pairs.

Tableau 5: Weak bidirectional optimization

Input [f,m]	M1	M2
f_1 : kill, f_2 : cause to die m_1 : direct, m_2 : indirect		
[kill, direct] ☞		
[kill, indirect]		*
[cause to die, direct]	*	
[cause to die, indirect] ☞	*	*

The combination of the form *kill* and the direct meaning constitutes a strongly optimal pair, because it does not violate any constraint. The combination of *cause to die* with

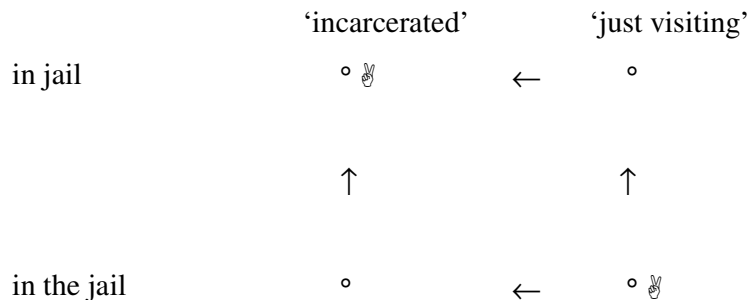
the indirect meaning comes out as a superoptimal pair. This pair violates both markedness constraints, but wins in a second round of optimization, because the competing pairs of [kill, indirect] and [cause to die, direct] lose against the strongly optimal pair [kill, direct]. Given that there are no better superoptimal pairs, the pair [cause to die, indirect] is itself a superoptimal pair.

Weak bidirectional OT is not exclusively operative in the lexicon. De Swart and Zwarts (2006) use it to model how bare singular nominals without an article get default, stereotypical, idiomatic meanings in constructions like incorporation, predication, embedding under certain prepositions, etc. In those same contexts, full nominals with an article get less idiomatic interpretations. Consider the contrast between (13a) and (b), as described by Horn (1984), Stvan (1998), Van Rooy (2004) and others.

- (13) a. George is in jail.
b. George is in the jail.

Sentence (13a) is understood as the qualification of George as a prisoner. A speaker who uses (13b) normally conveys that George is in the building described as the jail, where he may be a visitor, a priest, a volunteer, a repairman or whatever, but not a prisoner. The preference relations between the four possible form meaning pairs are indicated in Figure 2.

Figure 2: Weak bidirectional optimization over bare nominals



If we take the incarcerated meaning to be the unmarked interpretation, the pair [in jail, incarcerated] is a strongly optimal pair. The pair [in the jail, just visiting] emerges as a superoptimal pair, in a second round of optimization.

In this book, we use bidirectional OT as a model of the syntax-semantics interface. The expressive and interpretive optimization procedures in Chapter 4 are linked in such a way that the syntactic and semantic components of the analysis converge on the optimal status of form-meaning pairs. The analysis in that chapter is thus an instantiation of strong bidirectional OT. Chapter 6 shows that double negation readings in negative concord languages cannot be accounted for by exploiting the mechanism of strong bidirectional OT. A weak bidirectional OT extension of the analysis is developed for those special cases. A number of studies have argued against the recursive mechanism of weak bidirectional optimization as an online mechanism of linguistic processing (Beaver and Lee 2004, Zeevat 2000). Beaver and Lee's main objection concerns its property of recursion, which allows for an in principle infinite number of rounds of optimization. Because suboptimal candidates can become winners in a second or later round of optimization, 'in weak OT, everyone is a winner', as Beaver and Lee (2004: 126) put it. In the non-linguistic dance example, multiple rounds of optimization are unproblematic, and recursion is the right strategy if everyone is allowed to dance. But in natural language, recursion results in an overgeneration of form-meaning pairs. Blutner, Hendriks and de Hoop (2006: 149) suggest that general cognitive limitations on recursion may limit recursion in linguistic applications of superoptimality. They propose to limit bidirectional optimization to at most two rounds, in agreement with the bounds that can be observed for higher order epistemic reasoning required for playing strategic games. Following this restriction, the analysis developed in Chapter 6 involves just two rounds of bidirectional optimization.

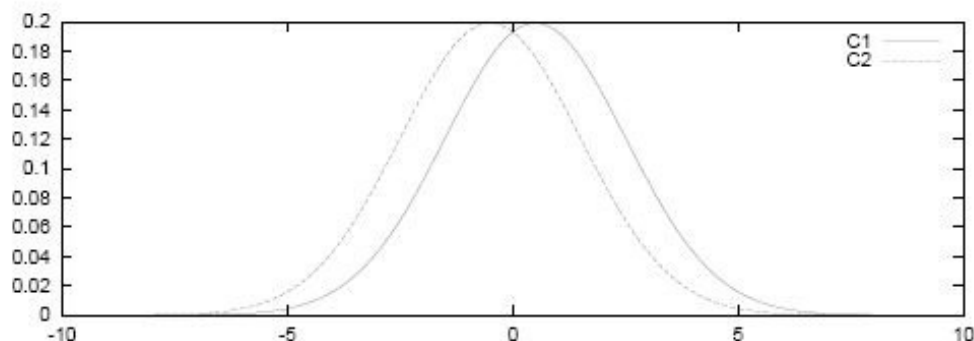
Both strong and weak bidirectional optimization are symmetric, in that they rely on the intuition that speakers take into account the hearer's perspective, and hearers the speaker's perspective. However, we also find asymmetric versions of bidirectionality. Zeevat (2000, 2006) develops an asymmetrical version of OT in which a unidirectional OT model for production forms the basic system. In comprehension, the set of candidate meanings is restricted by using results of production. The opposite view has been defended by Wilson (2001), who argues that the candidate set for production should be restricted by using results of

comprehension. Most of this book is based on a symmetric view, in which expressive and interpretive optimization are treated on a par. The only exception is the appeal to the evolutionary bidirectional learning algorithm developed by Zeevat and Jäger (2002), Jäger (2003) and Mattausch (2005, 2006), which we use in Chapter 2 to derive the marked status of negation in language. This model incorporates an asymmetric version of bidirectionality in which forms compete in the optimal recoverability of the intended meaning, but there is no similar competition among meanings. An asymmetry in the frequency distribution of marked and unmarked meanings is sufficient to obtain a stable system in which unmarked forms pair up with unmarked meanings, and marked forms pair up with marked meanings. The fact that language evolution relies on an asymmetric version of bidirectional optimization is not necessarily incompatible with a model that uses a symmetric version of the theory to model typological variation.

5. Language variation and language change in stochastic OT

We have seen so far that Optimality Theory works with a universal set of constraints, and a language-specific ranking. This allows us to account for cross-linguistic variation in terms of constraint re-ranking. A simple example is the expletive subject in English, versus the subjectless clauses we find in pro-drop languages like Italian in weather statements ('it rains/piove'). Re-ranking is also used to model diachronic change. Vincent (2000) is an early example of an OT analysis of patterns of change in the pronominal system between Latin and Romance. In Chapter 3 below, we will show how the three main phases of the Jespersen cycle (the diachronic development of negation introduced in Chapter 1) are accounted for by three rankings of three constraints in ordinal OT. Both in language variation and in language change, we find situations that can be classified as combining features from two systems or being in between two stages. Stochastic versions of OT can be used to model gradience. Clark (2004) uses stochastic OT to model patterns of syntactic change from Old to Middle English in the domain of headedness (e.g. OV structures) and the syntax of subjects. In Chapter 3, we will use stochastic OT to model intermediate phases in the Jespersen cycle.

The main difference between standard (ordinal) OT and stochastic OT involves the ranking of the constraints. According to ordinal OT, in a ranking $C_1 \gg C_2$, C_1 is always stronger, and a violation of C_2 is always allowed in order to satisfy C_1 . The ordinal ranking of standard OT is abandoned in stochastic OT, and replaced by a continuous ranking of constraints. The result is that constraints have overlapping ranges. This is illustrated in Figure 3.



Overlapping constraints (from Jäger 2003)

Figure 3

If two constraints C_1 and C_2 have overlapping ranges and there is a certain degree of ‘noise’ in the system, which slightly perturbs the ranking at every evaluation of an input, we mostly find the order $C_1 \gg C_2$ but the order $C_2 \gg C_1$ in some cases. This may effect the output, if the optimal candidate under the ranking $C_1 \gg C_2$ is some candidate A, but the optimal candidate under the ranking $C_2 \gg C_1$ is some other candidate B. The degree of overlap between the constraints governs the distribution between candidates A and B in the output. If there is total overlap, A and B will both win in about 50% of the cases. If the degree of overlap is smaller, we may find them in different distributions.

Stochastic OT emerged with the work by Boersma (1998) and Boersma and Hayes (2001). In their work, the focus is on acquiring phonological contrasts from phonetic input. Bresnan, Dingare and Manning (2001), Bresnan and Deo (2001), Bresnan et al. (2006) and Bresnan and Hay (2006) use stochastic OT to develop “gradient” grammars, modeling an overlapping range between two possible grammars, in neighboring dialects or varieties of English. Koontz-Garboden (2004) exploits stochastic OT to offer a sociolinguistic analysis of the alternation between the

imperfective and the periphrastic progressive in varieties of Spanish spoken in Latin America and the United States. In this book, we use stochastic OT to model features of negation in natural language that are outside of the scope of the ordinal OT account. In particular, we appeal to stochastic OT to model the evolution of negation in such a way that negation emerges as a universal category of natural language (Chapter 3). Furthermore, stochastic extensions of the standard ordinal OT analysis are used to account for intermediate stages in language typology and language change. As far as sentence negation is concerned, this is worked out in Chapter 3. Chapter 6 uses stochastic OT to model certain marginal cases of double negation with a sequence of negative indefinites in negative concord languages, and equally exceptional cases of doubling negative expressions with a single negation interpretation in double negation languages. Aside from these special cases, the main patterns of negation in natural language are modeled in ordinal OT.

6. Language acquisition

Within the overall perspective of an OT grammar in which grammatical well-formedness is associated with a harmony function over a connectionist network, Tesar and Smolensky (1993, 1998, 2000) formulate their ideas about (first) language acquisition. The basic assumption is that the learner develops a series of grammars getting closer and closer to the grammar of the target language he/she is acquiring. The initial state is a grammar in which all markedness constraints are ranked above all faithfulness constraints. For Tesar and Smolensky, this assumption is motivated by children's acquisition of phonology, which shows that their ability in sound production lags behind their ability in comprehension. An example is the simplified pronunciation of both /bat/ and /rat/ by a child as *ta*, whereas the child correctly understands the two words *bat* and *rat* as pronounced by an adult (Prince and Smolensky 1997). If formal structure is blocked by the high ranking of the markedness constraints, the learner may not be able to produce the adult output yet. If the markedness constraints only concern formal features operative in pronunciation, this does not block comprehension, so the mapping from the adult phonological form *bat* will map onto /bat/ rather than /rat/. Given that all candidates violate the markedness constraints in the same way, they are tied, and do not differentiate

between candidates. Obviously, the faithfulness constraints differentiate the two phonological forms, so the correct pronunciation *bat* and *rat* by an adult will be mapped onto different words by the child. Accordingly, the learning child may start to understand the language before he or she is able to produce language, when he/she has access to the relevant faithfulness constraints. The task of the learner is to rerank the constraints in the face of the learning data. When the learner's current grammar declares that the optimal output for a word is an erroneous pronunciation, constraints are minimally demoted. Constraint demotion continues until the right balance between faithfulness and markedness constraints is achieved. Re-ranking takes place in small steps, which allows for intermediate stages. The empirical study carried out by Davidson et al. (2006) lends support to the view that in the grammar of young infants (4.5 month old), markedness constraints are ranked higher than faithfulness constraints.

Studies of first language acquisition have not only been carried out in the area of phonology, but also in syntax. Legendre et al. (2002) discuss the acquisition of tense and agreement inflection in French, and present an OT analysis.

The OT model of learning as re-ranking of constraints was proposed for first language acquisition, but has been extended to situations of language contact in a study of loan words of Chinese origin that have entered the Japanese vocabulary (Itô and Mester 1995, 1999), and in an experimental study of the pronunciation of English-illegal consonant clusters by English speakers not familiar with the Polish language from which the experimental data were drawn (Davidson et al. 2006). Chapter 7 presents an extension of the views developed so far, and proposes the ranking Markedness >> Faithfulness as the initial ranking of second language acquisition, as well as language genesis.

7. Conclusion

We adopt an optimization approach to the expression and interpretation of negation because it allows us to explore the expression and interpretation of negation in natural language. Negation is a universal category of natural language, and we observe that information concerning negation can be communicated in all languages. Negation is a

basic cognitive operation, which we can model with the truth-functional connective \neg from first-order language. If we assume that knowledge of first-order logic is part of human cognition, we would seem to predict that negation and negative quantifiers behave alike across languages. From empirical research by typologists and theoretical linguists, we know that this is not the case. In Chapter 1, we saw that invisible levels of syntax have been argued to come into play in this variation. For a semanticist, it is difficult to accept that a basic truth-functional operator such as negation would be invisible in a language. Furthermore, such a view is incompatible with the markedness account of negation we develop in Chapter 3. If we want to adopt a surface-oriented syntax, we can use a model based on optimization to reconcile the universal features of human cognition with the syntactic and semantic variation we find in natural language. The key insight explored in this book is that languages make use of the same underlying mechanisms, but exploit the relation between form and meaning in different ways. Optimality theory (OT) can capture this kind of generalization, because the constraints are universal, but the ranking of the constraints is language specific. We situate the empirical phenomenon of negation in natural language at the syntax-semantics interface, and throughout the book, we will emphasize the need to optimize in two directions (from meanings to forms and from forms to meanings). In this book, we use ordinal OT, and strong bidirectional OT wherever possible. We only resort to stochastic OT or weak bidirectionality in cases where the modeling of specific empirical phenomena requires such extensions.

Chapter 3

Markedness of Negation

0. Chapter summary

This chapter explores the intuition that negation is marked with respect to both form and meaning. We establish two constraints that are motivated by the asymmetry between affirmation and negation. Using bi-directional evolutionary learning, we argue that the constraint ranking is universal, and not subject to typological variation. We only find violations of the highest ranked constraint in linguistic systems that are pathological. Once it has been established that negation must be expressed in the sentence, we can study how it is realized. We propose an account of the typological and diachronic variations in the location of negation in the sentence. In this chapter, we only discuss instances of negation realized on a marker of sentential negation. Constructions in which negation is realized by a negative indefinite and sequences of multiple negative indefinites are discussed later in Chapter 4.

1. Introduction and overview

As we saw in Chapter 1, languages generally have ways to express negation, i.e. something that corresponds to the first-order logic connective \neg . In English this would be *not*. We also know that many languages have nominal expressions negating the existence of individuals having a certain property, i.e. something that corresponds to $\neg\exists x$. In English, this would be *nobody*, *nothing*. If we assume that knowledge of first-order logic is part of human cognition, this would predict that negation and negative quantifiers behave alike across languages. From empirical research carried out by typologists and theoretical linguists, we know that this is not the case. The key issue is that languages make use of the same underlying mechanisms, but exploit the relation between form and meaning in different ways. Optimality theory (OT) can capture this kind of generalization, because it allows constraints to vary in strength

across languages. The constraints are universal but the ranking of the constraints is language specific, which accounts for typological variation.

This chapter is organized as follows. The markedness of negation, which was empirically established in Chapter 1, provides the basis for the OT system developed in Section 2 below. Negation emerges as a universal linguistic category as the result of bi-directional evolutionary learning. Section 3 discusses the only linguistic system that we have found in which negation is not expressed and not interpreted. This section is based on a study of negation in sign language users who later suffered brain damage. Section 4 reflects on the typological variation in the placement of the marker of sentential negation. Section 5 puts this variation in a diachronic perspective and proposes a reinterpretation of the well known Jespersen cycle in OT. Section 6 contains the conclusion to Chapter 3.

2. Propositional negation

The aim of this section is to determine how languages express a meaning that could be represented in first-order logic as $\neg p$, and how they interpret propositional negation. We examine this question in an OT syntax where the input is a meaning (a first-order formula), the set of candidates generated by GEN is a set of possible forms and a ranked set of violable constraints selects the optimal form for any given meaning (Section 2.1). The set-up of the system leads to negation as a universal category of natural language. We argue that this is the result of the iconicity effect in which unmarked meanings pair up with unmarked forms, and marked meanings pair up with marked forms (Horn's division of pragmatic labor) (Section 2.2). We show how the markedness of negation can be modeled in evolutionary bidirectional OT. We pair up the OT syntax with an interpretation mechanism in OT semantics, where the input is a form (a well-formed sentence), the set of candidates is a set of possible meanings (first-order formulae) and a ranked set of violable constraints selects the optimal interpretation for the given form (Section 2.3). It remains useful to maintain a system in terms of soft constraints, in view of the fact that it has been reported that negation breaks down in sign users who later suffer brain damage (see Section 3).

2.1 A faithfulness and a markedness constraint

The concept of markedness is defined in different ways. As Jacobs (1991) points out, negation is not marked in the sense that it is cross-linguistically rare. But negation is marked in the sense that the expression of negation involves special grammatical means. As a result, negative sentences are morphologically or syntactically more complex than their affirmative counterparts. The starting point of our investigation is thus the observation that negative sentences are formally and interpretationally marked compared to affirmative sentences (cf. Chapter 1). Negation is not a sentential force in the sense described by Portner and Zanuttini (2003) because it can be found in various types of clause (declarative, interrogative, exclamative). There are strong constraints on the possibility to produce negation in different speech acts, as discussed by Portner and Zanuttini (2000), Krifka (2001, 2003), but this does not necessarily mean that negation can be classed as a sentential force. Nevertheless, there are important similarities. According to Portner and Zanuttini (2003), all exclamatives share the need to represent two semantic properties in the syntax: namely that they are factive and that they denote a set of alternative propositions. The sentential force thus needs to be visible in the form. We propose to treat negation in a similar way, which requires that the syntax, in some way reflects the fact that negative sentences are distinct from affirmatives. The constraint that we propose deals with this we call FNeg (Faith negation):

◆ **FNeg**

Be faithful to negation, i.e. reflect the non-affirmative nature of the input in the output.

In OT terms, FNeg is a faithfulness constraint, i.e. a constraint that aims at a faithful reflection of input features in the output. The formulation of FNeg is neutral as to what we take to be the input and what we take to be the output, and we will see that it is relevant to semantics as well as syntax. For now, we limit ourselves to the role of FNeg in syntax; we will come back to semantics in Section 2.3 below. Within the generation perspective (OT syntax), FNeg requires negation in the meaning (input) to be reflected in the output (form). Thus, the expression of negation satisfies FNeg if


there is a formally visible reflection of negation. In OT, faithfulness constraints are usually balanced by markedness constraints. Markedness constraints are output oriented and aim at the reduction of structure in the output. The markedness constraint that plays a role in negative statements is *Neg:

◆ ***Neg**

Avoid negation in the output

Again, *Neg is neutral as to what constitutes the output, so we can apply it both in OT syntax and in OT semantics. Here we focus on the role of *Neg in syntax. *Neg is obviously in conflict with FNeg: FNeg requires a reflection in the output of negative features we find in the input, whereas *Neg blocks negation in the output. Such conflicting constraints are characteristic of OT style analyses (cf. Chapter 2 above). The conflict is resolved by the ranking of constraints in terms of strength. If we rank FaithNeg higher than *Neg, making it a stronger, more important constraint, we can derive the fact that negative meanings are formally expressed:

Tableau 1: generation of negative sentences

Meaning	Form	FaithNeg	*Neg
$\neg p$			
	S	*	
	not S		*

The input shown in Tableau 1 represents a particular meaning and the output candidates for evaluation by the grammar are the candidate forms. All our generation tableaux will be constructed in this way. The ranking FaithNeg >> *Neg reflects the generally accepted view that negative statements are cross-linguistically more marked in form than their affirmative counterparts (Payne 1985, Horn 1989, Haspelmath 1997). Which item functions as the marker of sentential negation in a language, and satisfies FNeg is a lexical matter. In English, this is *not*, in other languages, sentential

negation is lexicalized by some other word. All the sentences in (1) express a negative proposition, and contain a linguistic marker of negation (in italics), which is glossed as SN:¹

- | | | | |
|-----|----|---|-----------------|
| (1) | a. | John is <i>not</i> sick. | [English] |
| | b. | <i>Ou</i> petetai Sokrates.
SN flies Sokrates.
'Socrates doesn't fly' | [Ancient Greek] |
| | c. | On <i>ne</i> igraet.
he SN plays.
'He doesn't play.' | [Russian] |
| | d. | <i>Nid</i> oedd Sioned yn gweithio.
SN be.IMPF.3SG Sioned PROG work
'Sioned was not working.' | [formal Welsh] |
| | e. | János <i>nem</i> dohányz-ik.
János SN smoke.3SG
'János doesn't smoke.' | [Hungarian] |
| | f. | Jag kiste inte Anna.
I kissed SN Anna
'I didn't kiss Anna.' | [Swedish] |

As far as I have been able to determine, there are no languages in which *Neg outranks FNeg. So negation is, in some sense, rightfully claimed to be a universal category (Dahl 1979). The question why this is so is answered in Section 2.2. The two constraints in their order FNeg >> *Neg guarantee the introduction of a negative expression in sentences that describe a negative proposition. However, these two constraints do not say anything about the way such a negative expression is realized in natural language. So far, the form taken to express clausal negation ($\neg p$) is 'not S' as seen in Tableau 1. However, we know that the expression of clausal negation takes various forms across languages, (cf. Jespersen 1917, 1933, Dahl 1979, Payne 1985, Horn 1989, Ladusaw 1996, Bernini and Ramat 1996, and Haspelmath 1997 for overviews of the facts). Two issues emerge from the reported observations in

¹ Examples from Payne (1985)(1c), Borsley and Jones (2005)(1d), de Groot (1993)(1e) and Sells (2001).

the literature. The first concerns the position of the marker of sentential negation in the sentence, and the second the relation between the expression of clausal negation and the marking of sentential negation on an argument of the verb. The first issue will be addressed in Sections 3 and 4. The second will be deferred until Chapter 4.

2.2 Negation as a universal category of natural language

The claim that negation is a universal category of natural language is based on two assumptions. First, we take it to be a universal feature of human cognition that languages have to be able to express the meaning $\neg p$. In Chapter 7, we will argue that being able to deny, to refuse, to reject is a basic need in human interaction, so we expect negation to be part of all systems of linguistic communication from an early stage. Secondly, in Section 2.1 I assumed that there are no languages in which *Neg outranks FNeg. Once we start adding more constraints, it will become clear that FNeg is always at the top of the hierarchy. This high ranking of FNeg implies that negation is marked in both form and meaning. The syntactic markedness of negation is related to its longer form: negation is always morphologically or syntactically visible or more complex, whereas affirmation takes the ‘zero’ expression or the simpler expression. The semantic markedness of negation is related to its relative infrequency compared to affirmative meanings. If negative meanings are universally expressed and if negation is universally marked, negation emerges as a universal category in human language (Dahl 1979). I have found no evidence to dispute this claim in full, natural languages.

This outcome is potentially problematic for the OT system as OT is founded on the notion of soft constraint. This means that for any constraint, we should be able to find cases where the constraint is violated. We cannot test the status of FNeg as a soft constraint if it is never violated. In Section 3, we will see that in certain situations where language has broken down, there may be systems in which FNeg loses out to *Neg. Such restricted linguistic systems support the view that FNeg is a soft constraint. Still, we are left with the question why the potential violability of the constraint FNeg is never visible in full linguistic systems, and why FNeg is always at the top of the hierarchy in regular natural languages. This relates to the question why negation is marked in natural language, and why we have the constraints FNeg and

*Neg, rather than, say FAff and *Aff (for Faith Affirmation and Avoid Affirmation respectively). Haspelmath (2006) wants to do away with the notion of markedness altogether. He argues that frequency asymmetries will lead to a direct explanation of the observed structural asymmetries. The frequency argument would work well for the empirical phenomenon of negation, because affirmative meanings are more likely to be expressed in natural language than negative meanings.

In the remainder of this section, we appeal to the iconicity view and argue that the relative rarity of negative meanings as compared to affirmative meanings makes FNeg >> *Neg the universally preferred ranking. We model the iconicity view on the evolutionary bi-directional learning algorithm developed by Zeevat and Jäger (2002), Jäger (2003) and Mattausch (2005, 2006). The additional value of the evolutionary bidirectional OT learning algorithm resides in a precise modeling of the step from frequency to the distribution of marked and unmarked forms. Readers who want to avoid the formalism can skip ahead to the conclusion that frequency effects lead to negation being formally marked, and continue reading from Section 2.3.

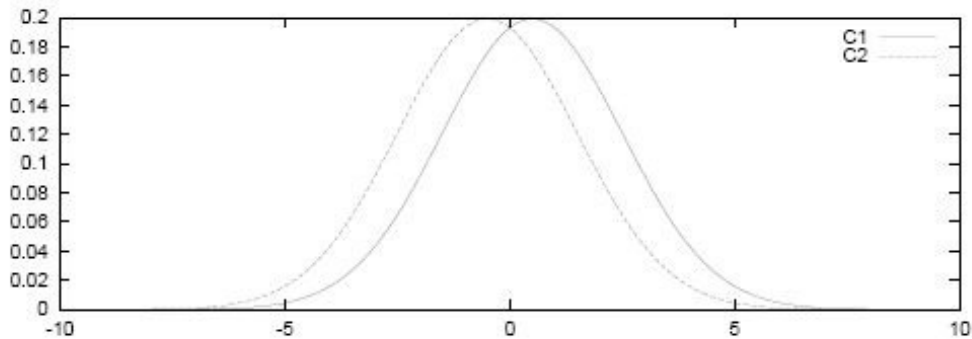
Bi-directional OT is based on the division of pragmatic labor as described by Horn (1984) which states that unmarked forms pair up with unmarked meanings, and marked forms pair up with marked meanings. Levinson also models this idea in his M-heuristics (Levinson 2000) and Blutner (2000, 2004) implements Horn's division of pragmatic labor in weak bi-directional OT. In Blutner's model, bidirectional optimality does not optimize unidirectionally over forms or meanings, but optimizes over pairs of a form f and a meaning m . (2) provides the simplest possible definition:

- (2) $\langle f, m \rangle$ is optimal iff
- a. there is no optimal pair $\langle f', m \rangle < \langle f, m \rangle$
 - b. there is no optimal pair $\langle f, m' \rangle < \langle f, m \rangle$
- where $<$ means 'better' or 'more harmonic' or 'less marked'.

In words: a form-meaning pair $\langle f, m \rangle$ is optimal if and only if we can find no optimal meaning pairs that have the same meaning but a less marked form $\langle f', m \rangle$ or that have the same form but a less marked meaning $\langle f, m' \rangle$. Zeevat and Jäger (2002) and Jäger

(2003) were the first to model markedness asymmetries in terms of evolutionary pressure. Their work is being built on by Mattausch (2005, 2006).²

The idea of bidirectional evolutionary OT hinges on three concepts: stochastic ranking of OT constraints, gradual bidirectional learning, and iterated learning over different generations. Standard Optimality Theory has an ordinal ranking. That is, in a ranking $C_1 \gg C_2$, C_1 is always stronger, and a violation of C_2 is always allowed in order to satisfy C_1 . The ordinal ranking of standard OT is abandoned in stochastic OT, and replaced by a continuous ranking of constraints (Boersma 1998). The result is that constraints have overlapping ranges. This is illustrated in Figure 1:



Overlapping constraints (from Jäger 2003)

Figure 1

If two constraints C_1 and C_2 have overlapping ranges and there is a certain degree of ‘noise’ in the system, which slightly perturbs the ranking at every evaluation of an input, we mostly find the order $C_1 \gg C_2$ but the order $C_2 \gg C_1$ in some cases.

Boersma (1998) and Boersma and Hayes (2001) combine stochastic OT with learning theory and develop the so-called Gradual Learning Algorithm. This algorithm allows the learner to develop a stochastic OT grammar based on observed linguistic behavior. Jäger (2003) proposes a bidirectional version of the gradual learning algorithm by stipulating a recoverability restriction for optimality. Forms compete in the optimal recoverability of the intended meaning. The bidirectional optimization process is

² A closely related game-theoretical version of the same idea is explored by Dekker and van Rooy (2000), Van Rooy (2004) and Jäger and van Rooy (2006), but will not be discussed here.

asymmetric, for there is no similar competition among meanings. Formally, asymmetric bidirectional optimality is defined as in seen below in (3) (Jäger 2003):

- (3) Asymmetric bidirectional optimality
- a. A form-meaning pair $\langle f, m \rangle$ is *hearer* optimal iff there is no pair $\langle f, m' \rangle$ such that $\langle f, m' \rangle < \langle f, m \rangle$, where $<$ means ‘better’, ‘more harmonic’ or ‘less marked’.
 - b. A form-meaning pair $\langle f, m \rangle$ is optimal iff:
 - either $\langle f, m \rangle$ is hearer optimal, and there is no distinct pair $\langle f', m \rangle$ such that $\langle f', m \rangle < \langle f, m \rangle$ and $\langle f', m \rangle$ is hearer optimal, or
 - no pair is hearer optimal, and there is no distinct pair pair $\langle f', m \rangle$ such that $\langle f', m \rangle < \langle f, m \rangle$.

The above formulae expressed in words are as follows: a form-meaning pair is *hearer-optimal* if and only if there is no better meaning for the same form. A form-meaning pair is optimal if and only if the pair is hearer-optimal, and there is no better form for the same meaning or, in case there is no hearer-optimal form, there is no better form for the same meaning. The introduction of hearer optimality means that the OT syntax has to take the interpretation into account while evaluating forms. Crucially, learning is also asymmetric, and has both a speaker perspective (comparison of forms) and a hearer perspective (comparison of meanings). The combination of speaker and hearer perspective with stochastic OT leads to an adjustment of the constraint values. Jäger (2003, 2006) shows how this explains the correlation between animacy, subject/object position and case marking patterns observed by Aissen (1999, 2003). Mattausch (2005, 2006) discusses the ideas underlying the bidirectional approach in more abstract terms. I will apply first present his general view, and then apply it to the case of negation.

Suppose there are two forms, one marked (m), one unmarked (u) and suppose there are two meanings, a more common meaning α and a rarer meaning β . Combining them leads to four possible form-meaning pairs: $\langle u, \alpha \rangle$, $\langle m, \alpha \rangle$, $\langle u, \beta \rangle$, $\langle m, \beta \rangle$. The question is which pairs are the optimal, most harmonic pairings of form and meaning. In order to model this situation, Mattausch proposes four bias constraints on the relation between form and meaning:

(4) Bias constraints

*m, α : the (marked) form m is not related to the meaning α .

*m, β : the (marked) form m is not related to the meaning β .

*u, α : the (unmarked) form u is not related to the meaning α .

*u, β : the (unmarked) form u is not related to the meaning β .

The constraints in (4) indicate a bias against a particular correlation between form and meaning. Furthermore, there is a general markedness constraint *Mark on forms, which avoids the use of the marked form. Adjustment of constraint values is dependent on speaker and hearer-mode. In the speaker-mode of learning, the constraint *Mark is promoted when the learner observes the use of an unmarked form, and demoted when the learner observes the use of a marked form. A bias constraint *u, α is promoted when the learner observes the use of a marked form to express the meaning α , and demoted when the learner observes the use of an unmarked form to express that meaning. A bias constraint *u, β is promoted when the learner observes the use of a marked form used to express the meaning β , and demoted when the learner observes the use of an unmarked form to express that meaning. In the hearer-mode of learning, the constraint *Mark is never promoted or demoted, for this constraint is related to forms only, not to meanings. Accordingly the constraint plays a role in the speaker-mode only. A bias constraint *u, α is promoted when the learner observes the use of an unmarked form to express the meaning β , and demoted when the learner observes the use of an unmarked form to express α . *u, β is promoted when the learner observes the use of an unmarked form to express α and demoted when the learner observes the use of an unmarked form to express β .

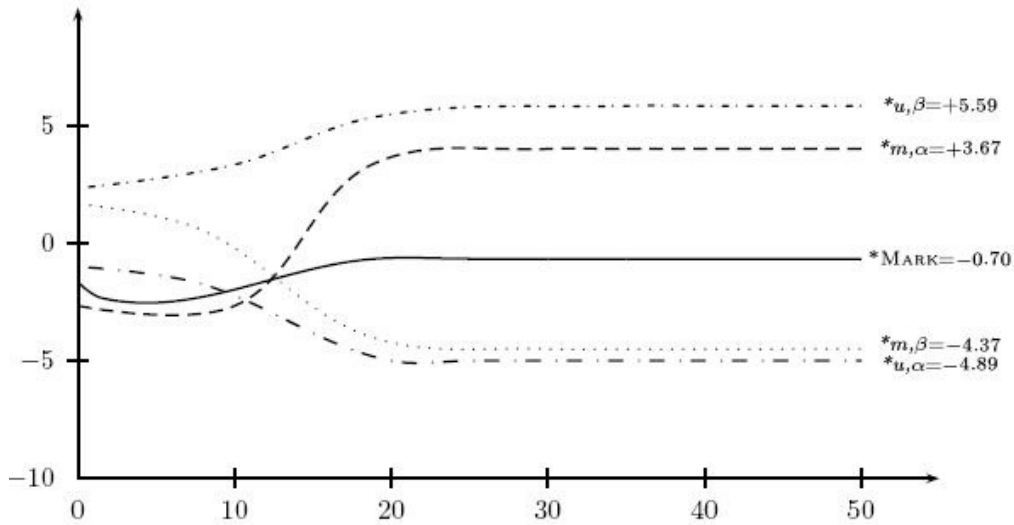
Learning is driven by frequency distributions in a corpus. Suppose that the training corpus starts with 50% marked forms, and 50% unmarked forms, to avoid any bias of the marked or the unmarked form in the initial input. Suppose, furthermore, that we have a frequent meaning α (appearing in 90% of the cases) and an infrequent meaning β (10%). Suppose frequent and infrequent meanings are evenly distributed over marked and unmarked forms, so that 45% of the unmarked forms are associated with meaning α , and 5% of the unmarked forms with meaning β , and the same

distribution of meanings α and β (45-5%) holds for the marked forms. Finally, suppose that the learner starts with a grammar in which the four bias constraints are ranked equally high. The asymmetric bidirectional learning algorithm allows the learner to develop a new grammar, based on the observed input. Because of the discrepancy between the number of α meanings and the number of β meanings in the training corpus, any form is much more likely to correlate with the meaning α than with β . In hearer-mode, this demotes $*u,\alpha$, $*m,\alpha$ and promotes $*u,\beta$ and $*m,\beta$, roughly in accordance with the frequencies of the input training corpus.

However, hearer-mode is not the only relevant factor in learning. In speaker mode, the markedness constraint $*Mark$ interacts with the bias constraints. The ranking of $*Mark$ is not determined by the hearer mode of learning, for a markedness constraint on forms is only relevant for the speaker. In speaker mode, $*Mark$ favors the use of unmarked forms for α as well as β . But given that meaning α is more frequent than meaning β , the compromise between speaker mode and hearer mode is to promote $*m,\alpha$ more than $*m,\beta$. This leads to a new frequency distribution in the corpus, in which more than half of the infrequent meanings β are expressed by marked forms. Such statistical tendencies become visible after one generation.

In an evolutionary perspective, the new generation does not return to the original training corpus, but learns from the previous generation. In order to model this intuition, Jäger (2003) and Mattausch (2005, 2006) integrate the bidirectional learning algorithm with the iterated learning model of Kirby and Hurford (1997). The iterated learning model of Kirby and Hurford (1997) is based on the idea that learners produce language according to their acquired grammar. This means that the corpus frequencies produced by the first generation learner, after adjusting his OT grammar are slightly different from the frequencies of the original training corpus. Instead of having an equal distribution of marked and unmarked forms for the meanings α and β , the corpus will now contain more instances of the rare meaning β expressed by marked forms. The second generation learner is exposed to the set of frequencies in the speech of the first-generation learner, and will reinforce the tendency to avoid marked forms for the more frequent meaning. The frequencies produced by the second-generation learner will be slightly different from those of the first-generation learner, and will constitute the input for the third generation learner. By iterating this

process over multiple generations we end up with a stable ranking of $\{ *u, \beta; *m, \alpha \}$
 $\gg *Mark \gg \{ *u, \alpha; *m, \beta \}$, as in Figure 2.



Bidirectional iterated learning (generations 1-50) (from Mattausch 2006)

Figure 2

In this way, an original training corpus with 50-50% frequencies for marked and unmarked forms, but an asymmetric distribution of meanings develops into a grammar in which the unmarked meaning is 100% associated with the unmarked form, and the marked meaning is 100% associated with the marked form. In this way, the bidirectional evolutionary OT system models the emergence of Horn's division of pragmatic labor. Given that the system is driven by frequency distributions, we take the emerging notion of markedness to fit in with Haspelmath's (2006) view.

In the recent literature, we find several applications of bi-directional OT. The typology of case marking is studied in Aissen (1999, 2003) and Jäger (2003, 2006). Adjustments of the relation between form and meaning also play a role in diachronic change and grammaticalization, as illustrated for the expression of the relation of possession in Jäger and Rosenbach (2006). Finally, applications to binding theory are developed in Mattausch (2005, 2006) and Hendriks & Spenader (2005, 2006). We can

now add the distribution of meanings of affirmation and negation across marked and unmarked forms as a new example of Horn's division of pragmatic labor.

The general, abstract pattern presented so far can be applied easily to the empirical phenomenon of negation that we are concerned with in this book. The frequent meaning α in the model is affirmation. The infrequent meaning β is negation. The semantic markedness of negation is thus directly related to its infrequency. The formal markedness of negation arises as a result of the bidirectional evolutionary OT system in the following way. We assume that the two meanings of affirmation can pair up with two possible forms, a marked and an unmarked one. In order to model the most harmonic pairing of forms and meanings, we use the following bias constraints:

(5) Bias constraints involving negation

*m,aff: the (marked) form m is not related to the meaning affirmation.

*m,neg: the (marked) form m is not related to the meaning negation.

*u,aff: the (unmarked) form u is not related to the meaning affirmation.

*u,neg: the (unmarked) form u is not related to the meaning negation.

The bias constraints interact with the markedness constraint *Mark, which penalizes marked forms. Suppose the initial corpus ranks all four bias constraints as equally strong, but the negation meaning is less frequent in the corpus than the affirmation meaning, and we know that learning is sensitive to frequency data. In hearer mode, the frequency distribution leads to a promotion of constraints related to the expression of negation (*m,neg *u,neg), and a demotion of the constraints related to the expression of affirmation (*m,aff and *u,aff). In speaker-mode, the markedness constraint *Mark favors the use of unmarked forms for affirmation as well as negation. However, because of the infrequency of the meaning of negation, *m,aff is promoted more than *m,neg. This leads to an adjustment of constraint values, accompanied by a slightly higher production of marked forms for negation after one generation. The application of the bidirectional OT learning algorithm in combination with iterated learning in an evolutionary setting reinforces the asymmetry, and the system will eventually stabilize on the ranking { *u,neg, *m,aff } >> *Mark >> { *u,aff, *m,neg }.

The bias constraints can be connected to the constraint FNeg introduced in Section 2.1 above. FNeg requires the pairing up of negative information in the input with negative information in the output. This means that FNeg correlates with *u,neg in its use in OT syntax (avoiding the use of unmarked forms for a negative meaning). As its counterpart, we could postulate a constraint labeled FAff, which would require the affirmative nature of the input to be reflected in the output. FAff would correlate with *u,aff in OT syntax. The universal ranking $\{ *u,neg, *m,aff \} \gg *Mark \gg \{ *u,aff, *m,neg \}$, which we derived as a consequence of evolutionary pressure correlates with the ranking $FNeg \gg *Mark \gg FAff$ in the OT grammar. Given that FAff becomes inoperative, and thereby ‘invisible’, if it is universally ranked below *Mark, we only need two constraints namely FNeg and *Mark, and we can postulate $FNeg \gg *Mark$ as the universal ranking of natural language grammars.

As far as its role in OT syntax is concerned, the constraint *Neg we posited in Section 2.1 above can be viewed as a sub-constraint of *Mark, aimed at the avoidance of negative forms. We conclude that the order $FNeg \gg *Neg$ we posited as the universal order of natural language grammars in Section 2.1 is derivable as an instance of $FNeg \gg *Mark$. In the end then, the universal ranking of $FNeg \gg *Neg$ is nothing other than an iconicity pattern, that is, an instance of Horn’s (1984) division of pragmatic labor or Levinson’s (2000) M-heuristics. From this perspective, it would have been highly unlikely to find languages that would rank $*Neg \gg FNeg$, for the Horn pattern is conceived as a general communicative principle, and such principles are presumably not subject to typological variation. For Haspelmath (2006), the iconicity effect is directly explained in terms of frequency asymmetries. Within the OT framework adopted in this book, the evolutionary bidirectional iterated learning algorithm is patterned as a result of speaker-hearer interaction and optimal communication. We conclude that negation constitutes a universal category of natural language, because negation is a meaning that humans need to express in their languages (Chapter 7), but less frequently than affirmation.

2.3 Negation in OT semantics

Jäger (2003), Jäger and Rosenbach (2003) and Mattausch (2005, 2006) use an asymmetric version of bidirectional optimization in which forms are disqualified as candidates if they are not optimally recoverable as the intended meaning and at least

one other form is. Such a model is stricter than a symmetric version of bidirectional optimization, in which we optimize over meanings as well as over forms (cf. Beaver and Lee 2004 for discussion of different models of bidirectional optimization). For the expression of sentential negation ($\neg p$), the stricter asymmetric model would be sufficient. After all, the negative (marked) meaning is directly recoverable from the negative (marked) form. However, in the remainder of this book, for reasons that will become clear in Chapters 4 and 6, we want to build an OT semantics that mirrors the OT syntax. That is, we want to zoom in on the competition between different meanings as possible candidate meanings for a given particular form. In particular, we want to be able to model how negative meanings arise as the optimal interpretation of negative sentences in constructions in which the meaning is not directly recoverable. This requires a symmetric model of bidirectional optimization.

In a symmetric model of bidirectional optimization, the interpretation of utterances that contain a marker of sentential negation is straightforward. In Section 2.1, we already mentioned that the two constraints FNeg and *Neg are neutral as to what they take to be the input and what the output. They were deliberately phrased in this way, so that they could be used in both OT syntax and OT semantics. FNeg is satisfied in OT semantics if a form marked as negative is mapped onto a negative meaning. *Neg is satisfied in OT semantics if the meaning representation does not involve a negation. Under the same constraint ranking FNeg >> *Neg we adopted in OT syntax, we obtain the following:

Tableau 2: Interpretation of propositional negation

Form	Meaning	FNeg	*Neg
not S			
	p	*	
\neg	$\neg p$		*

The input in Tableau 2 is a form, and the output candidates evaluated by the grammar are meanings. All interpretation tables will be set up in this way. If FNeg outranks *Neg, we obtain a negative meaning as the optimal interpretation of negative

sentences like those in (1) in Section 2.1 above. This is obviously the desired outcome.

In OT syntax, the ranking $\text{FNeg} \gg *Neg$ is universal. In OT semantics, we adopt the same view. In Section 2.2, we took the low frequency of negation and the high frequency of affirmation as the criterion for the semantic markedness of negation. Thus Table 2 shows the mapping of a marked (negative) form onto a marked (negative) meaning. The importance of OT semantics alongside OT syntax will become clear in Chapters 4 and 6 below.

3. Negation in users of sign language who have suffered brain damage

In Section 2.1, we posited the ranking $\text{FNeg} \gg *Neg$ as part of the grammar of all natural languages. The universal category of negation is thereby rooted in the OT constraint ranking. The universality of this pattern was motivated as an evolutionary stable result that fits into Horn's division of pragmatic labor (Section 2.2). Further indirect support in favor of an OT approach concerning the expression and interpretation of negation is found in studies of situations where language has broken down and in which FNeg loses out against $*Neg$. These observations do not invalidate the argumentation set up in Section 2.2., because people who suffer from brain damage encounter communicative problems that may affect the normal Horn pattern of optimization. However, a restricted linguistic system in which negation is not expressible and not interpretable indirectly supports the treatment of negation advanced here, because it shows that in extreme cases FNeg can behave like a soft constraint. Atkinson et al. (2004) offers a study on the understanding of negation by users of British sign language (BSL) with unilateral left and right hemisphere lesions (LH and RH). This section heavily relies on their insights.

People with normal hearing use a variety of linguistic and paralinguistic ways to express negation. The lateral head-shake conveys negation in many cultures, and a furrowed brow is a universal feature of a communicative display suggesting negativity in intention or emotion. Languages allow more focused aspects of negation to be expressed through lexical forms (*not, never, ...*) or affixes (*in+exact, ..*), sometimes accompanied by special morpho-syntactic structures (*he left/he didn't leave*). Both speakers and signers make use of gestures. Users of spoken language, may use facial,

manual or vocal gestures. Manual gestures can occur alongside linguistic elements. Manual gestures, may resemble the signs of sign language but they are processed independently of signs.

British Sign Language (BSL) is conveyed using both hands that function relatively independently, and this process is supported by further articulators in the face and head. The two hands generate simultaneous syntactic structure in a specific way that is not available to the users of spoken language. The face can convey important phonological, morphological and syntactic information at the same time. Negation in signed languages is achieved by a combination of manual and non-manual elements. Sign languages for which the expression of negation has been investigated are strikingly similar in this respect: a manual negation element is combined with non-manual elements and the manual sign is usually optional. That is, non-manual elements alone are often sufficient to negate a proposition (Pfau 2002, 2006). In BSL, negation is indicated by a variety of non-manual negation elements. These include one or more short lateral head shakes, a furrowed brow, narrowed eyes, and down-turned mouth, either alone or in combination. There are also lexical and affixal forms of negation, which use manual actions as well as the mandatory facial and head movements. However, facial negation is an *obligatory* feature of negation in sign language, whereas manual negation is *optional*. In this respect, BSL contrasts with spoken English, where a negative statement is always marked by a lexical or morphological feature. In sign languages, negation can occur without lexical or morphological marking, using face-head actions only. Atkinson et al. are interested in the status of face-head actions: are they part of syntactic structure, or do they involve prosody? Prosodic expression of negation is rare in spoken languages, but not impossible: in a small number of African and Austronesian languages, negation is realized through prosodic change only, primarily by a change of tone or lengthening of vowels (Dahl 1979). Given that both syntactic and phonological information can be conveyed by the face in BSL, the two options are a real issue in sign language. The study by Atkinson et al. was set up to decide between these two possible options.

The purpose of the study was to explore the extent to which adults who are either native users of BSL or acquired it at an early age, and who then suffered unilateral brain lesions, show specific anomalies in processing negation. Atkinson starts from the assumption that language perception and production is localized in the same way irrespective of whether people speak or sign. This raises the question of

whether deaf BSL users who have suffered a unilateral lesion show dissociations in their understanding of negative statements and if so, whether this varies according to the type of utterance. Atkinson's study looks at how well these patients comprehend negation expressed through face and head actions alone as compared to these actions together with manual elements (lexical or morphological).

If facial negation is a direct surface realization of syntax, then users with lesions in their left-hemisphere (LH) should show impaired negation processing along with other language processing difficulties. However, there should be no distinction between the *types* of negation display. In other words, both face-only and face-and-hands (lexical) displays would be difficult for LH lesion patients to understand because in this case the facial and manual signs are both related to syntax. Users of BSL with right hemisphere (RH) lesions should, even if they are unable to understand emotive facial expressions, be able to understand combinations of facial expression and hand movements as expressions of negation, since for sign users these movements form part of their language system and the language processing centre is located in the (undamaged) left-hemisphere LH.

If facial negation maps to surface prosodic rather than to syntactic structures, the prediction is quite different. In this case, patients with RH lesions would be expected to show spared understanding of negation that is conveyed by means of a manual (lexical) element, since this can be processed by the unimpaired language module in the LH. However, there should be impaired processing of facial negation in line with other impairments in prosody or facial expression processing in this group. For LH lesion patients, negation should be understood relatively well in comparison to their other linguistic problems since all negation in BSL, whether or not it includes a manual gesture, includes facial and head gestures. This means there should be no dissociation between manual and facial negation in BSL users who have LH lesions.

Atkinson *et al.* carried out a number of tests to investigate and compare language comprehension in the two groups of patients. In general, the RH lesion group scored within normal limits on the comprehension test of BSL. None of the individuals with RH damage displayed aphasia in conversations. However, they had problems with the pragmatic and discourse aspects of language. The individuals with LH damage scored outside normal limits on all the language tests. According to Atkinson *et al.* these findings are consistent with studies on deaf American Sign

Language users who have brain lesions : people with LH damage display sign aphasia, while those with RH damage do not.

The negation experiment that Atkinson *et al.* carried out was a comprehension test. In this task, the patients with LH or RH lesions were presented with two pictures: an image and its opposite. Investigators used BSL to communicate either a positive or a negative statement to the patients and asked them to match it to the appropriate picture. Different word classes were tested: nouns, adjectives, and verbs. Negative statements comprised a single noun, adjective or verb together with a negative face and head marker. Half of the negative items, additionally, used a lexical/manual marker. The test, therefore, compared comprehension of lexically marked (manual) and unmarked (facial) negation as a function of word class. Atkinson *et al.* found that RH lesions impaired performance more than LH lesions. Problems found in the RH group were almost entirely to do with items requiring comprehension of facially marked negation in the absence of a lexical/manual marker. All patients with RH damage were significantly worse at comprehending negation without the lexical/manual marker. There was one person with RH damage who had normal hearing, but who had learnt sign language at a young age because both parents were deaf. This provided an opportunity to test the comprehension of spoken English negation and compare it to comprehension in sign language. The test Atkinson used for spoken language mirrored the format of the BSL task. This particular patient performed perfectly on the spoken English test, but displayed the problems characteristic of RH damage in the sign language test. In general, Atkinson *et al.* found that BSL users with RH lesions are impaired with respect to reading facial negation in comparison to with manual (lexical and morphological) negation. This dissociation was not detected in the group who had LH lesions and various language difficulties. Atkinson *et al.* conclude that non-manual negation in sign language may not be a direct surface realization of syntax. They propose that some aspects of the linguistic analysis of sign language are achieved by prosodic analysis systems (analysis of face and head gestures) that are lateralized to the right hemisphere.

Producing facial negation is a problem for the BSL users with RH lesions as well (Bencie Woll, p.c. November 2005). This is caused by the neurological damage related to RH brain damage which means that these patients typically have a 'mask-like' face that does not express emotion. As a result, these BSL users do not have access to the articulator in the face in their sign production.

These results are of great relevance to our study of the universal order $\text{FNeg} \gg *Neg$. We assume that prosodic knowledge of sign language users is located in the right hemisphere. If the right hemisphere is damaged, production and comprehension in relation to the prosodic system should be entirely blocked. In OT terms, we can assume a general ranking of $*Mark \gg \text{Faith}$ in the prosodic domain, where $*Mark$ is an overall markedness constraint (blocking all structure, and all interpretation), and Faith is an overall faithfulness constraint (requiring a correlation between input and output). Under the overall ranking $*Mark \gg \text{Faith}$, no prosodic signs are produced, and none are understood: the output from the prosodic part of the system is always unmarked, independently of the input. If we take $*Neg$ to be a subconstraint of $*Mark$ (cf. Section 2.2 above), and we take FNeg to be a subconstraint of Faith , the ranking $*Neg \gg \text{FNeg}$ can be viewed as a particular instance of this general constraint ranking. If negation is part of the prosodic realization of the utterance, it will not be processed as semantic negation by the hearer. No prosodic negation is produced either under this ranking. The two directions of optimization block the expression and the comprehension of negation in the prosodic domain. This is the only situation I found in which the universality of the ranking $\text{FNeg} \gg *Neg$ is violated. Of course, brain damage also affects general human cognition. So the linguistic systems of BSL users with LH or RH-lesions may be subject to very different restrictions from those of full linguistic systems used by unimpaired human beings. In particular, the fact that they may not be able to follow the Horn patterns of division of pragmatic labor because of damage to certain parts of the brain does not lead us to expect similar patterns in full linguistic systems, spoken by people that do not suffer from brain damage. However, here we find at least one instance in which FNeg must be characterized as a soft constraint that can be demoted in the constraint hierarchy. The OT system allows us to describe both the normal and the pathological case in terms of the same constraints. This provides at least one argument to include FNeg as a soft constraint.

4. Typological variation in the placement of negation

There is a large body of literature about the syntax of negation, in all kinds of languages, in all kinds of theoretical frameworks, and in synchronic research as well as diachronic work. It is impossible for me to review this literature and do it justice

here. Instead, what I will do is describe how some of the important insights from the descriptive, typological and theoretical literature can be rephrased in OT terms, thereby shedding light on the underlying similarities of natural languages, as well as respecting the complex patterns of differences between them. Section 4.1 discusses preverbal and post-verbal negation. Section 4.2 adds discontinuous negation. Section 4.3 describes Jespersen's typology of the placement of negation in natural language in terms of the joint maximization of two constraints, as opposed to a third, weaker constraint.

4.1 Preverbal and post-verbal negation

All natural languages have ways to express propositional negation. The marker of sentential negation, glossed as SN realizes the propositional negation \neg in sentences (1) in Section 2 above. So far, we have only been concerned with the expression of negation by means of a negative particle. In sections 4 and 5, we are concerned with the position of negation in the sentence. In (6) and (7) we give examples of negation in preverbal and post-verbal position respectively:³

(6) Preverbal negation

- | | | |
|----|---------------------------------------|-----------|
| a. | Maria <i>non</i> parla molto. | [Italian] |
| | Maria SN talks much. | |
| | ‘Maria doesn’t talk much.’ | |
| b. | Juan <i>no</i> ha llamado a su madre. | [Spanish] |
| | Juan SN has called to his mother. | |
| | ‘Juan hasn’t called his mother.’ | |

³ The Romance examples are from Zanuttini (1991, 1996). The Baghdad Arabic example is from Payne (1985). The Koromfe example and the Gbaya Kaka example are from Dryer (2006). Koromfe is a Niger-Congo language spoken in Burkina-Fasso and Mali; Gbaya Kaka is a Niger-Congo language spoken in Cameroon. The Chinese example and the Tamil example are from Croft (1991). The Turkish and Japanese examples are from Morimoto (2001). Payne (1985) also discusses the possibility of realizing propositional negation by means of negative verbs, for instance in Polynesian languages or in Finnish. As pointed out in Chapter 1, the analysis in this book does not include negative verbs, but focuses on negative particles and negative indefinites.

⁵ For the examples quoted, I copy the glosses from the source, except possibly for the marker of sentential negation, which I consistently gloss as SN, even if not in the original, in order to maintain consistency in the description of the data as far as negation is concerned. In this particular case, Borsley and Jones uses NEG as the gloss for sentential negation, but I want to reserve that term for n-words, for reasons that will become clear in Chapter 4.

- | | | |
|--------|---|------------------|
| c. | ʔəli <i>ma:</i> ra:h lidda: ʔirə | [Baghdad Arabic] |
| | Ali SN went to the office | |
| | ‘Ali didn’t go to the office.’ | |
| d. | A vaga koŋ ba beɛɛ | [Koromfe] |
| | ART dog.SG det.NONHUMAN.SG SN come.PAST | |
| | ‘The dog did not come.’ | |
| e. | tā bu sǐ | [Chinese] |
| | 3SG SN die | |
| | ‘S/he refuses to die/won’t die.’ | |
| f. | János <i>nem</i> dohányz-ik. | [Hungarian] |
| | János SN smoke.3SG | |
| | ‘János doesn’t smoke.’ | |
| g. | On <i>ne</i> igraet. | [Russian] |
| | he SN plays. | |
| | ‘He doesn’t play.’ | |
| (7) a. | Maria a parla <i>nen</i> tant. | [Piedmontese] |
| | Maria CL talks SN much. | |
| | ‘Maria doesn’t talk much.’ | |
| b. | Maria spricht <i>nicht</i> viel. | [German] |
| | Maria talks SN much. | |
| | ‘Maria doesn’t talk much.’ | |
| c. | Jag kisste inte Anna. | [Swedish] |
| | I kissed SN Anna | |
| | ‘I didn’t kiss Anna.’ | |
| d. | Mi-zɔk wi ndɔŋ <i>na</i> | [Gbayá Kaka] |
| | 1SG-see person that SN | |
| | ‘I do not see those people.’ | |
| e. | naan pooka- <i>le</i> | [Tamil] |
| | I go-SN | |
| | ‘I didn’t go.’ / ‘I am not going.’ | |

- f. John elmalar-i ser-*me*-di-Ø [Turkish]
 John apples-ACC like-SN-PAST3SG
 ‘John didn’t like apples.’
- g. Taroo-wa asagohan-o tabe-*na*-katta. [Japanese]
 Taroo.TOP breakfast.ACC ate.SN.past
 ‘Taroo didn’t eat breakfast.’

The marker of sentential negation need not be an independent word, it can be an affix as in (7f, g). Preverbal negation frequently cliticizes onto the verb (as French *ne*), and can even be incorporated in the verb. Mazzon (2004: 29) reports that Old English had many commonly used verbs in which negation *ne* was incorporated: forms of *wesan* (‘to be’) (*nis/nys* beside *is*, *nere* beside *wære*, etc.), and all the forms of *nillan* (beside *willan* > *will*), *nabban* (from *habban* > *have*), *nagan* (from *agan*) and *nytan* beside *witan*. Most of these forms disappeared from later stages of the language. Borsley and Jones (2005: 49) report distinct negative forms with initial *d/t* for a number of frequent verbs in modern colloquial Welsh, and provide pairs of sentences like the following:⁵

- (8) a. Oedd Sioned yn gweithio. [colloquial Welsh]
 be.IMPF.3SG Sioned PROG work.
 ‘Sioned was working.’
- b. Doedd Sioned ddim yn gweithio.
 NEG.be.IMPF.3sg Sioned SN PROG work
 ‘Sioned was not working.’

The preverbal particle *ni(d)* that characterizes formal Welsh has disappeared from colloquial Welsh, but survives as a special negative form of the verb, at least for certain verbs.

Incorporation of negation is not only seen in verbs, but also in pronouns. In English *never* is built out of the incorporation of *ne* into *ever*. Related forms are *nobody*, *nothing*, *nowhere*, that all show the incorporated *ne*. Dutch has the pairs *iemand* - *niemand* (‘somebody’ - ‘nobody’), *ergens*-*nergens* (‘somewhere’ - ‘nowhere’). Italian has a series of negative indefinites marked with initial *n* as in

nessuno ('nobody') and *niente* ('nothing'). Similarly, Spanish has *nadie* ('nobody') and *nada* ('nothing'), Catalan has *ningú* ('nobody'), etc. Negative incorporation into indefinites will be the topic of Chapter 4 below. In this section, I will only discuss the marker of sentential negation.

Even though the examples in (1), (6)- (8) do not reflect the full range of typological variety, we can detect two important patterns. In standard Italian, Spanish, formal Welsh and Hungarian, the marker of sentential negation directly precedes the verb (6a, b), (1d, e). In Piedmontese, a dialect spoken in northern Italy, the sentential marker *nen* follows the finite verb (7a). We find the same situation in Germanic languages such as German (7b) and Dutch (7c). In English, negation follows the auxiliary, but precedes the main verb. This motivates the construction of *do*-support illustrated in (6e).

These two main tendencies have already been described by Jespersen (1917). On the one hand, there is a strong tendency “to place the negative first, or at any rate as soon as possible, very often immediately before the particular word to be negated (generally the verb)” (Jespersen 1917, p. 4). Horn (1989: 292-293) dubs the term *NegFirst* for this tendency. *NegFirst* is motivated by communicative efficiency, i.e. to “put the negative word or element as early as possible, so as to leave no doubt in the mind of the hearer as to the purport of what is said” (Jespersen 1924, 297), quoted by Horn (1989: 293). It also shows that negation is sensitive to focus. If the focus of (propositional) negation is typically the verb, a preverbal slot is the natural position for the marker of sentential negation. In Chapter 7, this will be shown to play a role in the placement of negation in early L2 acquisition. We will argue that this provides indirect support for the view that a position ‘early’ in the utterance, or ‘high’ in the structure is somehow the unmarked placement of negation. Although many languages have a preverbal marker of sentential negation, the examples in (7) indicate that *NegFirst* is not an absolute rule.⁶

NegFirst is opposed by another strong tendency, which we will here label as *FocusLast*. *FocusLast* reflects that given information comes early in the sentence, and new or significant information comes last in the sentence. *FocusLast* is not specific to

⁶ Several attempts have been made to relate the position of the marker of negation to the basic word order of S, V and O of the language. Although there are some general tendencies, Dahl (1979) and Dryer (1988) find exceptions to any strict correlation. Mazzon (2004) explicitly warns us to be cautious in this respect. Given that the placement of negation with respect to the verb seems to have the most important implications for the syntax-semantics interface, we focus on preverbal and post-verbal position, and leave the interaction with the subject and object for another occasion.

negation, but is a pragmatic strategy or an instance of information structure that mainly operates at the discourse level. In languages in which word order is not strict, principles of information structure often interact with grammatical structure. If negation is part of the new information expressed by the sentence, we would expect it to show up late, rather than early in the sentence. FocusLast for negation is then motivated by the idea that the negative force is stronger if the negator comes later in the linear order (Mazzon 2004: 97). In languages like German and Dutch, the post-verbal negation is the result of a diachronic development where post-verbal adverbials that originally served as emphasis for the negation gradually took over the negative force of the sentence, while maintaining their post-verbal position (6b,c).

We will come back to the diachronic development commonly referred to as the ‘Jespersen cycle’ in Section 4.2 below. For now, we adopt a synchronic approach in a typological perspective. Given that NegFirst and FocusLast are both strong tendencies, but not hard rules, they work best as violable constraints that can be ranked with respect to each other and to other constraints. We can then state that languages with preverbal negation have grammars in which NegFirst is a highly ranked constraint, and languages that do not have preverbal negation have grammars in which NegFirst is a low ranking constraint. Similarly, if a language has a grammar with a high ranked position for FocusLast, it can push the marker of sentential negation to a later position in the sentence.

We propose the following formulations for the two constraints in OT:

- ◆ NegFirst
Negation precedes the finite verb

- ◆ FocusLast⁷
New information comes last in the sentence

⁷ The formulation of FocusLast I provide here is very general, for I take this to be a pragmatic principle that can affect many different relations between old and new information. This is not to say that we cannot find differences within a language as to the kind of construction FocusLast applies to. Aissen (1999, 2003) uses a general markedness constraint *Case, which can be split up into different sub-constraints. In a similar way, FocusLast can work out in different ways for negation and other constructions sensitive to focus within a language. We will ignore these complexities here.

If we allow both rankings $\text{NegFirst} \gg \text{FocusLast}$ and $\text{FocusLast} \gg \text{NegFirst}$, we can propose the following tableaux for the two general positions of the marker of sentential negation:⁸

Tableau 3: Preverbal negation (Italian, Spanish, formal Welsh, ...) (first version)



Meaning	Form	NegFirst	FocusLast
$\neg p$			
	(S) SN V (O)		*
	(S) V SN (O)	*	

Tableau 4: Post-verbal negation (Piedmontese, German, Dutch, ...) (first version)

Meaning	Form	FocusLast	NegFirst
$\neg p$			
	(S) SN V (O)	*	
	(S) V SN (O)		*

Whether we find preverbal or post-verbal negation in a particular language is then due to the ranking of the two constraints FocusLast and NegFirst .

4.2 Adding discontinuous negation

In Tables 3 and 4, we limited ourselves to the competition between NegFirst and FocusLast . This set-up suggests that we have to choose between a marker of negation

⁸ FaithNeg is always the highest ranked constraint, and it is left out here so that we can concentrate our attention on candidates that realize negation at least once. In order to avoid the discussion about word order, I give the Tableaux in SVO form, but with S and O between brackets, to indicate that these could also get a different position. I am only concerned with the position of negation with respect to the verb.

in preverbal or post-verbal position. However, we also find discontinuous negations that combine a preverbal and a post-verbal expression, as in the following examples:⁹

- (9) a. *Ne bið he na geriht.* [Old English]
 SN is he SN righted
 ‘He is not/never set right (=forgiven)’
- b. *Elle ne vient pas.* [written French]
 She SN comes SN.
- c. *U n li sent nent.* [Cairese Piedmontese]
 s.cl SN him hears SN.
 ‘He can’t hear him.’
- d. *Igl bab na lavoura betg.* [Surmeiran]
 the father SN works SN
 ‘The father doesn’t work.’
- e. *Ni soniodd Sioned ddim am y digwyddiad.* [formal Welsh]
 NEG mention.PAST.3SG Sioned NEG about the event
 ‘Sioned did not talk about the event.’
- f. *Doedd Gwyn ddim yn cysgu.* [informal Welsh]
 NEG.be.IMPF.3SG Gwyn NEG PROG sleep
 ‘Gwyn was not sleeping.’
- g. *baba wo-shii nai tapa u.* [Kanakuru]
 father SN-he drink tobacco SN
 ‘My father does not smoke tobacco.’
- h. *Haar suster het nie haar verjaarsdag vergeet nie.* [Afrikaans]
 Her sister has SN her birthday forgotten SN
 ‘Her sister didn’t forget her birthday.’
- i. *Ne lenn ket Anna al levr.* [Breton]
 SN read-3 SN Anna the book
 ‘Anna does not read the book.’

⁹ The Old English example (9a) is from Mazzon (2004). The Romance examples are from Zanuttini (1991, 1994). The Kanakura example (9g) is from Dryer (2006). Kanakura is a West Chadic language spoken in Nigeria. The Afrikaans example (9h) is from Kate van Gass (p.c.), and the Breton example in (9i) from Stump (1989), quoted in Legendre (2001).

We label these cases discontinuous negation, because there is only one negation in the semantics, that is, all the sentences in (9) express a proposition of the form $\neg p$, with p an atomic proposition. However, negation is expressed by two ‘bits’ of form, one preceding the verb, the other following it. Syntactically then, we have double negation, but semantically, we have just a single negation. Example (9a) is from Mazzon (2004: 27), who indicates that discontinuous negation was a rather unstable phenomenon in the late Old English and Early Middle English period. Although discontinuous negation is frequent, it does not seem to be the rule in this period either, according to Mazzon. The written French example in (9b) illustrates the bleaching of preverbal *ne* to a syntactic negator, whereas the expressive force of negation is borne by the post-verbal negator *pas* (cf. Godard 2004 and references therein). In spoken French, *ne* is on its way out: *ne* is dropped in many cases, in favor of a system in which we only find the post-verbal negator *pas*. Examples (9c) and (9d) are from Zanuttini (1996: 5). Examples (9e) and (9f) are from Borsley and Jones (2005: 22, 26). In formal Welsh, which reflects an older stage of the language, the post-verbal *ddim* is optional (9e). In informal Welsh, the preverbal particle has disappeared, but it survives in incorporated form on some verbs, such as *oedd-doedd*, as already pointed out in (8) above. Although the verb appears in a negative form, it is unable to express semantic negation, and the presence of the post-verbal adverb *ddim* is obligatory. Negation on the verb in (9f) is then semantically bleached, in the same way as preverbal *ne* is in written French (9b).

We do not find discontinuous negation in many languages, and when we find it, it is usually not very stable in a diachronic sense. The English, French and Welsh data shown in (9) support this view. Modern English does not have a discontinuous negation anymore. In spoken French, preverbal *ne* is frequently dropped. In colloquial Welsh, the special negative form of the verb is limited to a small number of lexical verbs. Reasons of economy might explain the rarity of discontinuous negation: syntactically, discontinuous negation is of course rather costly. In terms of the constraint system adopted here, discontinuous negation arises when both NegFirst and FocusLast are satisfied, whereas in the examples in (1) and (6) either one or the other was violated. In the OT system we have adopted so far, we can account for discontinuous negation by ranking both NegFirst and FocusLast higher than *Neg

Markedness of negation

(Tableau 7). Systems with preverbal or post-verbal negation are then properly captured by the insertion of *Neg in between the constraints NegFirst and FocusLast (Tableaux 5 and 6):

Tableau 5: Preverbal negation (Italian, Spanish, formal Welsh, ...) (final version)

Meaning $\neg p$	Form	NegFirst	*Neg	FocusLast
\rightarrow	(S) SN V (O)		*	*
	(S) V SN (O)	*	*	
	(S) SN V SN (O)		**	

Tableau 6: Post-verbal negation (Piedmontese, German, Dutch, ...) (final version)

Meaning $\neg p$	Form	FocusLast	*Neg	NegFirst
	(S) SN V (O)	*	*	
\rightarrow	(S) V SN (O)		*	*
	(S) SN V SN (O)		**	

Tableau 7: Discontinuous negation (Old English, written French, colloquial Welsh, Kanakuru, ...)

Meaning $\neg p$	Form	NegFirst	FocusLast	*Neg
	(S) SN V (O)		*	*
	(S) V SN (O)	*		*
\rightarrow	(S) SN V SN (O)			**

Tableaux 5-7 indicate that *Neg is a gradable constraint that incurs one violation for every instance of a negative form. In the case of discontinuous negation, *Neg is violated twice. Grammars with a low ranking of *Neg in the OT syntax are the hallmark of negative concord systems, as we will show in Chapter 4. Discontinuous negation is then part of our understanding of the syntax and semantics of negative concord and double negation.

4.3 A typology of the placement of negation in natural language

Note that a full factorial typology would lead to six possible constraint rankings for the three constraints *Neg, NegFirst and FocusLast. However, we find only three main patterns in natural language, namely preverbal negation, post-verbal negation, and discontinuous negation. If we look more closely at the constraint rankings, we observe that each case involves the joint ranking of two constraints as higher than the third one. Note that the two highest constraints in Tableaux 5-7 are connected by a dotted line, rather than a straight line. The dotted line indicates that we cannot decide their ranking on the basis of the candidates displayed here, so we take them to be ranked equally high. The three grammars can thus be summarized as follows:

- Typology of placement of negation

preverbal negation:	{NegFirst, *Neg} >> FocusLast
discontinuous negation:	{NegFirst, FocusLast} >> *Neg
post-verbal negation:	{FocusLast, *Neg} >> NegFirst

Given that two different constraints are paired up in each case, the three constraints are not harmonically bound, and no reduction in the number of constraints is possible. However, the result of the pairing up of constraints is that the factorial typology leads to three main rankings, rather than six.

The idea behind the three-way partition in the position of negation is that all three constraints capture a fundamental and highly valued aspect of the expression of negation, namely the markedness of negation, and its preference for either a preverbal position or a focus position late in the sentence. It is impossible to satisfy all three

constraints at the same time, because they are partially conflicting. However, it is possible to maximize the satisfaction of two constraints by accepting the violation of the third one. This seems to be a better optimization strategy than a full factorial typology. The joint maximization of two constraints as opposed to a third, weaker constraint leads to three possible rankings, which correspond to the three main patterns found in natural language. Thus, our OT analysis models Jespersen's (1917) findings.

4.4 Refinements in the post-verbal domain

The basic typology corresponding with Jespersen's (1917) findings is worked out in section 4.3. In this section, we consider some more complex cases, which can be described with the help of variants of the constraint NegFirst. We focus on two cases: *do*-support in English, and discontinuous negation in Afrikaans.

It is generally admitted that negation in modern English is difficult to characterize in terms of NegFirst and FocusLast, because negation follows the auxiliary verb (10a, b), and triggers *do*-support with lexical verbs (10c, d):

- (10) a. I am not sick.
 b. He may not be available.
 c. I do not sing.
 d. Mary does not talk much.

I tend to side with Dryer (1988: 93) and Horn (1989: 456), who suggest that the construction of *do*-support might find its motivation in NegFirst. The periphrastic *do*-support construction is known to have already existed in the fifteenth century and became standard by the 17th century. As pointed out by Horn (1989: 435, 436), Shakespeare uses both the forms 'I love you not' and 'You do not love me'. In diachronic terms, *do*-support involves a restoration of a version of NegFirst (not preceding the finite verb, but preceding the main verb) after a post-verbal adverbial *not*. *Not*, which originates from *nawiht/nogh/nahtet* 'nothing', has taken over the negative force in modern English. Mazzon (2004: 75) argues that English verbs come in two classes, operators (modals and auxiliaries as in 10a, b) and non-operators

(lexical verbs as in 10c, d), so the version of NegFirst that applies here involves precedence with respect to a non-operator, i.e. the (main) lexical verb:¹¹

- ◆ NegFirst (lexical verb)
- Negation precedes the (main) lexical verb

If we use this version of NegFirst (lv), rather than the one we have used so far in the characterization of Italian, formal Welsh, and other languages that have a marker of sentential negation that precedes the finite verb, we can take English to have the grammar NegFirst (lexical verb) << >> FocusLast >> *Neg, as illustrated below in Table 8:

Tableau 8: *Do*-support in modern English negation

Meaning ¬Talk(m)	Form	NegFirst (lv)	FocusLast	*Neg
	Mary not talks much		*	*
	Mary talks not much	*		*
☞	Mary does not talk much			*

Tableau 8 illustrates that a grammar in which both (a version of) NegFirst and FocusLast rank higher than *Neg does not necessarily need discontinuous negation. The auxiliary *do* is a ‘dummy’ verb that does not carry semantic meaning, but is inserted in order to satisfy FocusLast (post-verbal position) as well as NegFirst (in the version in which negation precedes the lexical verb).

What the discussion of modern English illustrates is that NegFirst is possibly not a single constraint. Rather, it is a particular pattern that has negation ‘early’ in the sentence or ‘high’ in the hierarchical structure, and should probably be seen as a

¹¹ Neg-Raising seems to be related to NegFirst in a more general sense, cf. also Horn (1989) and Mazzon (2004: 97). NegRaising is the phenomenon that raises the sentential negation from the subordinate clause to the main clause with certain verbs of communication, cf. (ii) as opposed to (i):

(i) I think you will not find him.
(ii) I don’t think you will find him.

NegRaising leads to the expression of negation earlier on in the complex sentence. It carries special meaning effects (cf. Horn 1989: 321-359). Given that this study is restricted to simple clauses, I will not attempt to formulate rules for NegRaising in the OT system, but it would be feasible.

cluster of tightly related constraints that interact with the rest of the syntax. In most languages, one particular version of NegFirst will do for the grammar as a whole. ‘Negation precedes the finite verb’ as we first proposed seems to be the most common version, but in modern English another version of NegFirst is operative.

Further support for a reformulation of NegFirst comes from a language like Afrikaans. Section 4.3 focuses on patterns of discontinuous negation in which one bit occurs to the left of the verb, and another bit to its right. However, Afrikaans displays a pattern of discontinuous negation in which both composing parts are post-verbal, as illustrated in (11):

- (11) a. Ik het hom nie gesien nie. [Afrikaans]
 I have him SN seen SN
 ‘I have not seen him.’
 b. Vir hos was daar nie veel geld nie.
 For us was there SN much money SN
 ‘For us, there wasn’t much money.’

The pattern in (11) suggests that the first occurrence of *nie* should immediately follow the finite verb (except for clitics), and the second occurrence of *nie* should be sentence-final. We can account for the sentence-final position of *nie* with an appeal to FocusLast. The first occurrence of *nie* can be licensed by a revised version of NegFirst which requires the negation marker to precede all other post-verbal material:¹²

- ◆ **NegFirst (Afrikaans)**
 Negation must precede all post-verbal material

If we replace NegFirst with NegFirst (Afrikaans) in tableau 7, the discontinuous negation pattern illustrated in (11) falls out immediately.

In Chapter 5, we will show versions of NegFirst to be operative in varieties of colloquial Welsh with the post-verbal marker of negation *ddim*. This discussion will

¹² The constraint does not handle the exceptional case of clitics. Within OT, we can account for examples like (11a) by imposing a stronger constraint governing the position of clitics. I will not spell out such a constraint here, but the gist of it will be clear.

be postponed until Chapter 5, because the Welsh data imply that the marker of sentential negation interacts with negative indefinites. What emerges from typological studies is that the role of NegFirst pervades natural languages, even those that seem to locate the marker of negation in post-verbal position (cf. also Dryer 1988, 2006). Our findings support the view that preverbal negation in early L2 acquisition and, possibly, language genesis can be seen as evidence for the ‘emergence of the unmarked’ (cf. Chapter 7 for further discussion).

The examples above of the rankings for preverbal, post-verbal and discontinuous negation indicate that grammars strike a balance between different desirable properties, which cannot all be satisfied simultaneously. What is found to be the optimal position for negation depends on the strength of the three constraints NegFirst, FocusLast and *Neg, and may vary from one language to the next. Of course it is not a coincidence that the three basic constraint settings illustrated here correlate with the three main stages of the Jespersen cycle. We will work out the diachronic change in Section 5.

5. Reflections on the Jespersen cycle

In Section 4, we discussed the position of the marker of sentential negation in the sentence in terms of two opposing tendencies: NegFirst and FocusLast. I argued that the contrast between preverbal expression of negation in languages like Italian, formal Welsh, etc. is the result of the dominance of NegFirst, whereas the post-verbal expression of negation in languages like Piedmontese, Dutch, German illustrated the effect of FocusLast. Discontinuous negation as in written French, colloquial Welsh arises when both constraints are satisfied, and *Neg is ranked low. At this point, we can try to relate the typological observations made in Section 4.3 to the patterns of diachronic change commonly referred to as the ‘Jespersen cycle’. Section 5.1 describes the empirical patterns, and Section 5.2. provides the OT analysis.

5.1 Patterns of diachronic change

Jespersen formulates the diachronic pattern as follows: “The history of negative expressions in various languages makes us witness the following curious fluctuation:

the original negative adverb is first weakened, then found insufficient and therefore strengthened, generally through some additional word, and this in turn may be felt as the negative proper and may then in course of time be subject to the same development as the original word' (Jespersen 1917: 4), quoted by Horn (1989: 452). A few pages later, Jespersen adds: "Now, when the negative begins a sentence, it is on account of that very position more liable than elsewhere to fall out, by the phenomenon for which I venture to coin the term of *prosiopesis* (the opposite of what has been termed of old *aposiopesis*): the speaker begins to articulate, or thinks he begins to articulate, but produces no audible sound (either for want of expiration, or because he does not put his vocal chords in the proper position) till one or two syllables after the beginning of what he intended to say. (...) The interplay of these tendencies – weakening and strengthening and protraction – will be seen to lead to curiously similar, though in some respects different developments in Latin with its continuation in French, in Scandinavian and in English." (Jespersen 1917: 6).

The trajectory of the Jespersen cycle is well documented for English (Jespersen 1917, 1924, 1933, Horn 1989, Mazzon 2004), French (Bréal 1897, 1900, Jespersen 1917, Horn 1989, Godard 2004), and Dutch (Hoeksema 1997, Zeijlstra 2004). Although Borsley and Jones do not describe it in these terms, it is traceable for Welsh in their (2005) book.

Horn (1989: 455) summarizes the English and French development as follows:

Old French	Jeo ne dis	Old English	Ic ne secge
	I SN say		I SN say
Modern French	Je ne dis pas	Middle English	Ic ne seye not
(written/standard)	I SN say SN		I SN say SN
Modern French	Je dis pas	Early Modern	I say not
(colloquial)	I say SN	English	I say SN
		Modern English	I don't say
			I do SN say

Mazzon (2004) qualifies the development by indicating that we find overlapping patterns in different stages of English, but agrees with the overall pattern.

Zeijlstra (2004: Chapter 4) summarizes the diachronic development in Dutch as follows:

Old Dutch	Inde in uuege sundigero ne stûnt And in way sinners.GEN SN stood.3SG 'And didn't stand in the way of sinners'
EarlyMiddle Dutch (13 th century)	En laettine mi spreke niet SN let.he me speak SN 'If he doesn't let me speak'
Late Middle Dutch(16 th century, Holland)	Mine herberge ontseggic u niet My tavern take.away.I you SN 'My tavern I won't take away from you'
Modern Dutch (Netherlands)	Jan loopt niet. Jan walks SN 'Jan doesn't walk.'

In certain Dutch dialects (mostly spoken in the south of the Netherlands and in Flanders, Belgium), discontinuous negation is still extensively used, although the preverbal enclitic *en* is typically optional (cf. example 20 below, and Haegeman and Zanuttini 1996 for extensive discussion). Even in the northern dialects, there is evidence that the Jespersen cycle has not been completed. In Germanic languages, word order in main clauses is different from that in subordinate clauses: V2 only applies to main clauses. In subordinate clauses, we find an SOV pattern, with negation preceding the verb, as illustrated in (12) and (13):

- (12) a. ...omdat Mare niet lachte. [Dutch]
...because Mare SN laughed
'...because Mare didn't laugh.'
b. *...omdat Mare lachte niet.
...because Mare laughed SN
- (13) a. ...weil Hans nicht kam. [German]
...because Hans SN came.
'...because Hans didn't come.'
b. *...weil Hans kam nicht.
...because Hans came SN

The fact that negation is not allowed to follow the verb indicates that subordinate clauses respect NegFirst. The patterns in (12) and (13) can be accounted for if we assume the ranking NegFirst >> *Neg >> FocusLast for subordinate clauses in Germanic (cf. Tableau 5). Distinct grammars for main and subordinate clauses are not unusual in natural language. Borsley and Jones (2005) show that negation in subordinate clauses in colloquial Welsh follows the same patterns as that in formal Welsh. They take formal Welsh to reflect an older stage of the language. The Germanic and Welsh data support the view that subordinate clauses may go through the Jespersen cycle more slowly than main clauses.

Jespersen (1917) discusses similar diachronic patterns for Norse and German. A. Jäger (2005) describes the German development in the following terms.

Old High German (750-1050 AD)	thaz thu irrímen ni math. that you name SN can 'that you cannot name it.'
Middle High German (1050-1350 AD)	daz ich drîzic pfunt niht ennaeme. that I thirty pound SN SN-take 'that I would not take thirty pounds.'
Early New High German (1350-1650 AD)	Do wolt er nicht gen. then wanted he SN go 'He did not want to go then.'
Modern German	wenn sie nicht nach Hause kommt. if she SN to home comes 'if she does not come home.'

Old High German has a preverbal negation *ni*. Towards the end of the Old High German period, this preverbal negation is strengthened with the postverbal *niht*. Towards the end of the Middle High German period, the enclitic *en* disappears, and we end up with the post-verbal negation *nicht* familiar from Modern German.

Jespersen describes the diachronic development as a cycle, so in principle we can expect the post-verbal negator to give away to a new preverbal marker of

negation, under the pressure of NegFirst. The *do*-support construction we find in Modern English signals a return to the preverbal position of negation (cf. Section 5.3 below). Further evidence for the cyclic nature of the development is provided by the observation that certain French Creoles, spoken in Haiti, Guadeloupe, the Seychelles, have reanalyzed the post-verbal marker *pas* from standard French as a preverbal negator. The examples in (14) illustrate (from Posner 1985).

- (14) a. li pas t a ap vi_ni_ [Haitian Creole]
 him SN PAST FUT PROG come
 ‘He wouldn’t be coming.’
 b. person pa pu pik u. [Seychelles]
 nobody SN FUT prick you
 ‘Nobody is going to prick you.’

Obviously, Creole languages do not constitute a straightforward historical development of the standard language, so the sentences in (14) do not sketch the next step in the development of modern French. In fact, there may be sufficient pressure from other word order principles to block the development of a preverbal marker in modern French. However, the example in (14) illustrates that it is possible in principle to reanalyze a particular system, and shift back from a post-verbal to a preverbal marker of negation.

In terms of the OT system developed so far, we can informally describe the diachronic pattern of the Jespersen cycle as follows. NegFirst is the driving force behind the expression of negation ‘early’ in the sentence. Negation is a focus operator, and it tends to directly precede its domain of application, i.e. the verb. At the same time, this position is subject to erosion, which leads to a reinforcement of negation. Because the reinforcement of negation is emphatic, and bears focus, it occurs later in the sentence under the influence of FocusLast. This leads to negation occurring in post-verbal position. In his sketch of two opposing tendencies, Jespersen describes the two roles of negation as a focus operator, and as an element carrying important new (i.e. focused) information. By relating these opposing tendencies to the dynamics of language change, Jespersen sketches a pattern of diachronic change in which preverbal negation is first doubled with a post-verbal emphatic expression that reinforces negation, which gradually takes over the negative force of the original

negator, eventually leading to the disappearance of the preverbal marker of sentential negation. Furthermore, this process is subject to iteration. In Section 5.2 we work out the OT analysis of Jespersen's idea.

5.2 An OT analysis of the Jespersen cycle

In this section, we link the typological variations described in Section 4.1 above to the diachronic change known as the Jespersen cycle. Across a wide range of languages, we find that there are three possible positions for a marker of sentential negation: a single marker of sentential negation in preverbal position, a discontinuous negation surrounding the verb, or a marker of sentential negation in post-verbal position. The grammars we proposed for these three cases of negation were discussed in Section 4.3 and are repeated here:

- Typology of placement of negation
Preverbal negation: {NegFirst, *Neg} >> FocusLast
Discontinuous negation: {NegFirst, FocusLast} >> *Neg
Post-verbal negation: {FocusLast, *Neg} >> NegFirst

We link the three main positions of the marker of sentential negation to the three main stages of the Jespersen cycle. We take grammatical change to be gradual, and propose a step-wise change in the grammar, whereby one constraint changes position in the ranking at every stage. This leads to the following modeling of the Jespersen cycle in the OT system developed so far.

- Jespersen cycle in OT

Stage 1 (preverbal negation)

- 1.1 *Neg >> NegFirst >> FocusLast
- 1.2 NegFirst >> *Neg >> FocusLast

Stage 2 (discontinuous negation)

2.1 NegFirst >> FocusLast >> *Neg

2.2 FocusLast >> NegFirst >> *Neg

Stage 3 (post-verbal negation)

3.1 FocusLast >> *Neg >> NegFirst

3.2 *Neg >> FocusLast >> NegFirst

Given that the joint ranking of two constraints as opposed to the weaker position of the three constraints captures each of the three stages, a complete ranking for each stage always involves two possible fully ordinal rankings. The distinction between the two rankings posited for each stage is invisible in the language production. For example, the rankings in 1.1 and 1.2 both lead to the expression of negation in a preverbal position. However, at each stage, the ranking has to have shifted to the second possible ranking in order to allow the transition to the next stage by means of the shift of a single constraint. For example, the ranking in 1.2 allows the transition to the ranking in 2.1 by means of the raising of FocusLast above *Neg. In order to allow for gradual change in which the transition between two stages does not involve a revised ranking for more than one constraint, it is useful to spell out the first and second (full) rankings for each stage. Note that one change in the ranking of FocusLast and NegFirst leads back from stage 3.2 to stage 1.1. This completes the cycle, and allows the diachronic process to repeat itself, as Jespersen suggested. In general, a change in stage occurs when re-ranking affects the lower two constraints in the ranking. Re-ranking of the highest two constraints in the ranking does not affect the stage the grammar is in, because these constraints always pair up, as argued in Section 4.3 above.

5.3 Intermediate stages

If we take the patterns to be represented in full ordinal OT, we obtain three typologically established cases of preverbal, discontinuous and post-verbal negation. We can model intermediate stages by adopting a formulation of the rankings in terms of stochastic OT. Several languages have been argued to exemplify situations in between stages 1 and 2, or in between stages 2 and 3. A language that is between

stage 1 and stage 2 has an obligatory preverbal marker of negation that is optionally reinforced by post-verbal emphatic negation. Such a language would be moving away from a preverbal negation towards a system with a discontinuous negation. This seems to be the case in formal Welsh, as illustrated in (15) (data from Borsley and Jones 2005):

- (15) a. *Nid* oedd Sioned yn gweithio [formal Welsh]
 SN be.IMPF.3SG Sioned PROG work
 ‘Sioned was not working.’
- b. *Ni* soniodd Sioned *ddim* am y digwyddiad.[formal Welsh]
 NEG mention.PAST.3SG Sioned NEG about the event
 ‘Sioned did not talk about the event.’
- c. *Doedd* Gwyn *ddim* yn cysgu. [informal Welsh]
 NEG.be.IMPF.3SG Gwyn NEG PROG sleep
 ‘Gwyn was not sleeping.’
- d. *Na’th* Emrys *ddim* gweld dim byd. [informal Welsh]
 do.PAST.3SG Emrys NEG see NEG world
 ‘Emrys didn’t see anything.’

In (15a), the preverbal particle *nid* alone carries the negative force of the sentence. In (15b), *ni* is optionally reinforced by the post-verbal adverb *ddim*. The contrast between (15a) and (b) indicates that formal Welsh is moving from a preverbal negation to a discontinuous negation pattern. Discontinuous negation is well established in colloquial Welsh, with verbs that have a distinctive negative form as in (15c). In sentences that involve verbs which do not have a distinctive negative form, such as *na’th* in (15d), the presence of *ddim* is the only indication of negation. This reflects a stage 3 grammar. Note that in both (15c) and (15d), the presence of *ddim* is mandatory. Without *ddim* (15c) is ill formed, and (15d) expresses an affirmative sentence. If we assume that formal Welsh reflects an earlier stage of the language, we can see the Jespersen cycle at work in the data in (15).

In the OT system, we can model such an intermediate situation if we allow *Neg and FocusLast to have an overlapping range in the 1.2 ranking. We postulate NegFirst >> *Neg 0 FocusLast as the ranking for formal Welsh. The high ranking of NegFirst guarantees an obligatory preverbal marker of negation (*nid*). The overlap

between *Neg and FocusLast means that in some cases *Neg will win (and we only have a preverbal marker of negation), whereas in other cases FocusLast will win (and the preverbal marker is reinforced by post-verbal emphatic negation *ddim*).

Other examples of languages that are in a transitional phase between a stage 1 and a stage 2 language are Tamazight Berber (Ouali 2003), Catalan (Zeijlstra 2004: 132) and Hausa, a West Chadic language spoken in Nigeria (data from Dryer 2006):

- (16) *Ur* *ughax* (*sha*) lktaab [Tamazight Berber]
SN 1SG.bought SN book
'I didn't buy the book.'
- (17) *No* serà (*pas*) facil [Catalan]
SN be.FUT.3SG SN easy
'It won't be easy.'
- (18) a. *bàn* *san* *sūna-n-sà* *ba*. [Hausa]
SN:1SG know name-LINK-3SG SN
'I don't know his name.'
- b. *ba nà zuwà dà kai*
SN CONT come:NOMIN with 2SG
'I am not going with you.'

In all these languages, the preverbal marker of negation is mandatory, whereas the post-verbal marker is optional.

Stochastic OT can also describe transitions from stage 2 to stage 3. If we allow NegFirst and *Neg to have an overlapping range in the 2.2 ranking, we can postulate the ranking FocusLast >> NegFirst 0 *Neg for informal Welsh. Under this ranking, we can account for the co existence of verbs that have a special negative form like *doedd* (in 15c) and verbs that do not like *na'th* (in 15d). The overlapping range of constraints allows for an intermediate stage in the Jespersen cycle in which the preverbal marker of negation becomes optional, but the post-verbal marker is obligatory. This ranking also applies to modern French, where the formal version of the language requires the presence of preverbal *ne* as illustrated in (19a). In colloquial

French, it is quite common to find sentences like (19b), in which negation is exclusively expressed by means of the post-verbal adverb *pas*:

- (19) a. Je n'ai pas vu Sophie. [formal/written French]
 I SN have SN seen Sophie.
 'I have not seen Sophie.'
- b. J'ai pas vu Sophie. [colloquial French]
 I have SN seen Sophie.

Even though discontinuous negation is the norm since Classical French, occasional instances of *ne* drop date back to the 17th century. These establish *pas* as the bearer of semantic negation. Although the presence of *ne* is required by prescriptive grammars of the modern language *ne* drop is frequent (up to 80% of the time), even in the higher registers of spoken French (Ashby 1981, 2001). In the variety of French spoken in Montréal, *ne* has practically disappeared as a productive marker of negativity (Sankoff and Vincent 1977). These findings indicate that the French language is going through a transitional phase in which the discontinuous negation is losing against the post-verbal marker of negation. Formal, written French is still a stage 2 language with obligatory discontinuous negation, supported by prescriptive grammars and the highly influential Académie Française. Colloquial French is a stage 3 language, with a single, post-verbal marker of sentential negation. Spoken French in the higher registers is in the intermediate phase between a stage 2 and a stage 3 language: the use of *ne* is recommended by prescriptive grammars, but is not always realized.

In his description of the diachronic patterns of Dutch negation, Zeijlstra (2004) refers to Van der Horst and van der Wal's (1979) study of text frequencies of *en*-deletion in different constructions. Their results indicate that the use of preverbal *en* in the Dutch spoken in Holland gradually decreased between 1300 and 1600. By the end of the 17th century, the transition from a stage 2 to a stage 3 language was complete and the preverbal marker of negation had disappeared from the language. The historic data indicate a gradual process of change over a fairly long period of time, during which certain constructions were more likely to drop the preverbal marker than others. A stochastic OT analysis in terms of overlapping constraints, and interaction with construction specific constraints accounts for such an intermediate stage. In other

dialects of Dutch, this process took place later, and in Flemish dialects we still find discontinuous negation, as witnessed by the data in Haegeman and Zanuttini (1996).

- (20) Valère (*en*)-eet dienen boek *nie*. [West Flemish]
 Valère (SN) has that book SN.
 ‘Valère doesn’t have that book.’

Dryer (2006) cites Mupun as a West Chadic language in which the preverbal marker of negation is optional, and the post-verbal marker is obligatory:

- (21) (ba) kə n=se lua nyer kas [Mupun]
 (SN) PERF 1SG=eat meat bird SN
 ‘I didn’t eat the bird meat.’

We do not have diachronic data on Mupun, but it is not unlikely that a similar development is taking place in this language.

Zeijlstra (2004: 56) models the transitions between the three main stages as separate phases within the Jespersen cycle. This means he describes six phases, whereas we only look at three. According to the analysis advanced here, the intermediate phases involve an overlapping range of two constraints, which can be modeled in stochastic OT, whereas the three main phases involve a ranking that can be modeled in ordinal OT. Empirically, the results of the two analyses are the same. Of course, the theoretical assumptions underlying the two proposals are quite different. In my opinion, the dynamics of the stochastic OT modeling provides a better insight into the optionality of the post-verbal marker (in the transition from stage 1 to stage 2) and the preverbal marker (in the transition from stage 2 to stage 3) than the static phrase structure representation that Zeijlstra (2004: 175) proposes. In the OT model, the frequency effects correlate with the gradual change towards a new ordinal equilibrium. The contrast between stochastic OT and ordinal OT might indicate that intermediate stages are unstable. This is reflected in the observation that intermediate stages of the Jespersen cycle are typologically rare (cf. Haspelmath 1997). What is most relevant at this point is that it is possible to model the Jespersen cycle within the OT framework as we have developed it so far. The three main stages

are modeled as a balance between two highly ranked constraints and one weak one, and the transitions are gradual, with no more than one constraint moving over another one at any step. The OT model sketched here then provides a viable alternative to the phrase structural analyses of the position of negation currently available in the literature.

6. Conclusion

We started out this chapter by grounding the markedness of negation in an asymmetric frequency distribution between affirmative and negative speech acts. We used an evolutionary bidirectional OT to model the Horn pattern of distribution of labor. Negation rather than affirmation ends up being formally marked, because negation is more infrequent. Given that all linguistic communities feel the need to express negation, negation emerges as a universal category of natural language. The universal ranking $\text{FNeg} \gg * \text{Neg}$ might suggest that FNeg is not a violable constraint. The discussion of aphasic sign language users shows that it remains useful to maintain FNeg as part of the OT system, because the order of the constraints FNeg and $* \text{Neg}$ can be reversed in language breakdown systems. In the last two sections of this Chapter, we studied the position of sentential negation in the sentence. The interaction of three constraints leads to three main cases of typological variation: preverbal placement of negation, discontinuous negation and post-verbal negation. The typological patterns were identified with the three main stages in the Jespersen cycle. The result is an OT model of typological variation that matches the pattern of diachronic change.

Chapter 4

A typology of negative indefinites

0. Summary of chapter

Negation and negative indefinites raise problems for the principle of compositionality of meaning, because we find both double and single negation readings in natural language. De Swart and Sag (2002) solve the compositionality problem by means of a polyadic quantifier framework that allows a sequence of negative quantifiers to be interpreted in terms of iteration (double negation) or resumption (negative concord). This analysis works well for French because this language has sentences that combine two negative expressions which vary between a single and a double negation reading. However, in most other languages there is a strong bias towards either the double negation or the negative concord reading. Therefore, this chapter extends the earlier analysis with a typology of negation and negative indefinites using bi-directional optimality theory (OT). The constraints defined are universal, but their ranking varies from one language to the next. In negative concord languages, the functional motivation that favors marking of ‘negative variables’ will win. Double negation languages value first-order iteration. Languages that display ambiguities can have an overlapping range of constraints. The bi-directional set-up is essential, for syntactic and semantic variation go hand in hand.

1. Introduction and overview

As we saw in Chapter 3, languages generally have ways to express negation, i.e. something that corresponds to the first-order logic connective \neg . In English this would be *not*. We also know that many languages have nominal expressions negating the existence of individuals having a certain property, i.e. something that corresponds to $\neg\exists x$. In English, this would be *nobody*, *nothing*. If we assume that knowledge of first-order logic is part of human cognition, it would follow that negation and negative

quantifiers behave alike across languages. However, empirical research by typologists and theoretical linguists has clearly demonstrated that this is not the case. A key insight is that languages make use of the same underlying mechanisms but exploit the relation between form and meaning in different ways. Optimality theory (OT) is able to capture this generalization because it assumes that constraints vary in strength across languages. Given that the syntax and semantics are tightly connected, I adopt a bi-directional version of Optimality Theory. The bi-directional grammar calculates the optimal form for a given meaning, and the optimal meaning for a given form on the basis of a ranking of violable constraints that affect form, meaning, or both. Constraints are universal but the ranking of constraints is language specific. This accounts for typological variation.

Chapter 2 looked at the marker of sentential negation as the expression of propositional negation. In this chapter we investigate negative indefinites. Section 2 shows how negation can be attracted to other expressions in the sentence, particularly indefinites in argument or adjunct position. Section 3 extends the discussion to multiple indefinites under negation. Some languages multiply negative indefinites in argument or adjunct position, but still express a single negation. Section 4 discusses how the polyadic quantifier analysis developed by de Swart and Sag (2002) solves the compositionality problem by analyzing double negation in terms of iteration, and negative concord in terms of the resumption of a sequence of negative expressions. Section 5 uses these insights to develop a typology of double negation and negative concord languages in bi-directional OT. Section 6 discusses the implications of the bi-directional grammar for typology and language change. Section 7 concludes.

2. Negative attraction

In Chapter 3, we focused on the marker of sentential negation as the expression of propositional negation ($\neg p$ in first-order logic). From a linguistic point of view, interesting issues arise in the expression and interpretation of clausal negation in sentences involving indefinites. Here we will look at the expression of negation in sentences containing a single indefinite ($\neg \exists x$ in first-order logic). From Section 3 onwards we will look at the expression of multiple indefinites under negation ($\neg \exists x_1 \exists x_2 \dots \exists x_n$ in first-order logic).

As we established in Chapter 3, all natural languages have a marker of sentential negation. This marker need not be an independent word, it can cliticize onto the verb (as the French *ne*) or even be incorporated into the verb. Mazzon (2004: 29) reports that Old English had many verbs in which negation (*ne*) was incorporated, for example, forms of *wesan* ('to be') (*nis/nys* beside *is*, *nere* beside *wære*, etc.), and all the forms of *nillan* (beside *willan* > *will*), *nabban* (from *habban* > *have*), *nagan* (from *agan*) and *nytan* beside *witan*. Most of these forms disappear later in the language's development. Borsley and Jones (2005: 49) report distinct negative forms with initial *d/t* for a number of common verbs in modern colloquial Welsh, and provide pairs of sentences like the following:

- | | | | | | |
|-----|----|---------------------------|-------------------------------------|-------------------|---------|
| (1) | a. | Oedd
be.IMPF.3SG | Sioned yn
Sioned PROG | gweithio.
work | [Welsh] |
| | | ‘Sioned was working.’ | | | |
| | b. | Doedd
SN.be.IMPF.3sg | Sioned ddim yn
Sioned SN PROG | gweithio.
work | [Welsh] |
| | | ‘Sioned was not working.’ | | | |

The incorporation of negation does not only occur in verbs, it is also seen in indefinite pronouns and conjunctions. In English *never* is built out of the incorporation of *ne* into *ever*. Related forms are *nobody*, *nothing*, *nowhere*, *neither...nor* which all contain an incorporated *ne*. Similarly, Dutch has the pairs *iemand* - *niemand* ('somebody' - 'nobody'), *ergens*-*nergens* ('somewhere' - 'nowhere') and the negative conjunction *noch* ('neither'). Italian has *nessuno* ('nobody') and *niente* ('nothing'), Spanish has *nadie* ('nobody') and *nada* ('nothing'), Catalan has *ningú* ('nobody'), French has *ni...ni* ('neither...nor'), etc. Morphological incorporation of negation, also known as 'Neg-incorporation', is a widespread phenomenon, but it is not universal. Suppletive forms like French *pas* 'not', *jamais* 'never', *rien* 'nothing', Italian *mai* 'never' and Catalan *res* 'nothing' indicate that Neg-incorporation is not a prerequisite for the construction of forms that bear negative import. This book focuses on negative indefinites, and leaves negative conjunctions aside. See Horn (1989: 256-258), de Swart (2001b), Szabolcsi and Haddican (2004) and Doetjes (2005) for the semantics of negative conjunctions.

In the literature, several terms are used to refer to the set of pronouns we are concerned with: negative indefinites, negative quantifiers, n-words. I use the general term ‘negative indefinites’ to cover expressions like *nothing*, *niets*, *nada*, *rien*, etc. In Section 4 below, the technical term ‘Neg-expression’ is introduced. The criteria that restrict the term ‘n-word’ to negative indefinites that participate in negative concord (*nada*, *rien*, etc.) are discussed in Section 3. The term ‘negative quantifier’ can then be used for negative indefinites that do not participate in negative concord, but lead to double negation if used in a sequence (*nothing*, *niets*, etc.).

Neg-incorporation is an interesting morphological process, but I mostly want to focus on the syntax-semantics interface here. The forms *never*, *niemand*, *nessuno*, *rien*, *res*, *mai*, etc all involve an indefinite meaning in the scope of negation. Depending on the kind of analysis one adopts, they either contribute the meaning $\neg\exists$ in first-order logical terms and qualify as negative quantifiers, or they contribute the meaning \exists , but ‘agree’ in some sense with a negative element that scopes over the expression.¹ Different expressions in a series (*nobody*, *nothing*, *nowhere*, *never*) impose restrictions on the ontological domain that the variable x bound by the quantifier may belong to (x has to be human or inanimate, or a place or a time, etc). However, they share the same quantificational core. Before we enter the discussion on double negation and negative concord, it is important to address the issue of how languages express the combination of negation plus a single indefinite (i.e. \neg and \exists). In such cases, does a language use negative indefinites (i.e. negative quantifiers or n-words), or a combination of sentential negation and an indefinite (a regular indefinite or a negative polarity item)? Jespersen indicates that natural language has a strong tendency “to attract the negative notion to any word that can easily be made negative” (Jespersen 1917: 56). Following Mazzon (2004), I call this tendency Negative Attraction. Not all languages are equally susceptible to negative attraction, moreover, negative attraction may conflict with other constraints governing the realization of

¹ It is hard to be more precise at this point, for most of the claims about the meaning of expressions like *nobody*, *nessuno*, *rien*, etc. are strongly theory dependent. N-words such as *niente*, *rien* denote negative indefinites in de Swart & Sag’s (2002) system elaborated later in this chapter, but not in approaches that closely identify negative concord to negative polarity (Ladusaw 1992, van der Wouden 1997, Giannakidou 1998, 2000, Zeijlstra 2004). Cf Chapter 1 (Section 4) for further discussion. In this section, I will mostly restrict myself to examples in which the n-word/negative indefinite is the only expression in which we can locate the negative force. This should be a case on which the different analyses converge, at least in descriptive terms. A full discussion of negative concord has to wait until section 5. The interaction of negative indefinites with the marker of sentential negation is postponed until chapter 5.

negation in the sentence. Therefore, the tendency can be captured by means of a violable constraint that can be ranked with respect to others and that can be ranked according to the different languages. I adopt the following formulation of the constraint NegAttract:²

◆ **NegAttract**

Realize (clausal) negation on an indefinite in argument or adjunct position

Jespersen observes that Negative Attraction may be in conflict with a tendency for the negation to be realized pre-verbally, as illustrated by the examples in (2) and (3):

- (2) a. Nobody laughed.
b. *Anybody didn't laugh.
- (3) a. We didn't meet anybody colloquial English
b. We met nobody literary English

The pattern shown in (2) is by no means restricted to English. Section 3 discusses examples from several Romance languages and Greek. The grammaticality contrast in (2) has to do with the preverbal subject position, for the indefinite in post-verbal object position (3) allows two options. Jespersen (1917: 56) qualifies (3a) as colloquial, and (3b) as more literary English. Crucially, we consider *nobody* in (3b) to possess clausal scope, not constituent scope, so it should have the same meaning as (3a). Alternatively, it is possible to distinguish nuances of meaning between the two sentences based on the idea that negative force is stronger if the negator comes later in the linear order (Mazzon 2004: 97) as a result of the FocusLast positioning (see Chapter 3, Section 4). According to Quirk et al. (1985: 1033), sentences of type (3b) should indicate a stronger 'negativity' than (3a) because of this reason. If the difference in meaning is substantial enough, we should treat the two candidates as

² This formulation is narrower than the one found in Jespersen. Jespersen also talks about constructions in which negation is attracted to adjectives (*unhappy* versus *not happy*). The syntactic and semantic properties of affixal negation and negative indefinites are not the same, and my proposal focuses on argument structure, not on morphological operations. This motivates my narrower definition, but of course, one could adapt it to other needs. Compare Horn (1989: 273 sqq.) for extensive discussion of affixal negation. See also Chapter 1 (Section 1) and Chapter 6 (Section 1) for remarks on the relation between affixal negation, sentential negation and negative indefinites.

optimal outcomes, but for different inputs. This would imply a more discerning semantic representation than the logical representation $\neg\exists$. I will not use the claim about the ‘stronger’ negativity of (2b) in my analysis, so in this section, I treat the two candidates as competing for the same input.

In Chapter 3, we established that modern English has a high ranking of NegFirst, albeit in a modified form. The English word *not* follows the finite verb when it is an auxiliary, but negation is required to precede the lexical verb. *Do*-support as in (2a) can be used to satisfy this requirement. The definition of NegFirst (lv) is taken from Chapter 3:

◆ **NegFirst (lexical verb)**

Negation precedes the lexical verb.

NegAttract and NegFirst are constraints that involve the realization of propositional negation in the syntax. A further relevant constraint is *Neg, which has been defined as follows (cf. Chapter 3):

◆ ***Neg**

Avoid negation in the output.

*Neg avoids unnecessary proliferation of negative forms in the OT syntax. As usual, the markedness constraint *Neg is ranked below the faithfulness constraint FNeg, repeated here from Chapter 3.


◆ **FNeg**

Be faithful to negation, i.e. reflect the non-affirmative nature of the input in the output.

The universal ranking FNeg >> *Neg implies that negative sentences always incur at least one violation of *Neg. If we consider the two candidates that comprise the candidate set for indefinite subjects in modern English, as shown in Tableau 1, we observe that a negative indefinite in subject position satisfies NegFirst as well as NegAttract:

Negative indefinites

Tableau 1: Negative subjects (modern English)

Meaning $\neg\exists x \text{ Came}(x)$	Form	FNeg	*Neg	NegFirst (lv)	NegAttr
	Somebody came	*		*	*
	Nobody came		*		
	Anybody didn't come		*		*
	Nobody didn't come		**		

As the violation patterns in Tableau 1 illustrate, a negative indefinite like *nobody* counts as a negative form, i.e. it satisfies NegAttract, and it violates *Neg. A negative polarity item such as *anybody* does not count as a negative form, i.e. it does not satisfy NegAttract, and it does not violate *Neg. English does not combine *nobody* with *not*, because this candidate incurs an extra violation of *Neg. This shows that *Neg functions as an economy constraint which blocks the unnecessary proliferation of negation. In Chapter 5, we will see that many languages favor the combination of negative indefinites and the marker of sentential negation under the influence of special faithfulness constraints rising above *Neg. However, English is not such a language. We cannot decide the ranking between the three constraints from this example, because the optimal outcome satisfies both NegFirst and NegAttract.

The conflict between NegFirst (lv) and NegAttract in examples involving post-verbal indefinites such as (3a) and (b) is shown in Tableaux 2 and 3.

Tableau 2: Pre-verbal negation with post-verbal indefinites (colloquial/modern English)


Meaning $\neg\exists x \text{ Meet}(\text{we}, x)$	Form	FNeg	*Neg	NegFrst (lv)	NegAttr
	We met somebody	*		*	*
	We met nobody		*	*	
	We didn't meet anybody		*		*
	We didn't meet nobody		**		

Tableau 3: Negative attraction with post-verbal indefinites (literary/archaic English)

Meaning $\neg\exists x \text{ Meet}(\text{we}, x)$	Form	FNeg	*Neg	NegAttr	NegFirst
	We met somebody	*		*	*
☞	We met nobody		*		*
	We didn't meet anybody		*	*	
	We didn't meet nobody		**		

As a result of the high ranking of NegFirst (lv) seen in Tableau 2, *anybody* comes out as the optimal expression of an indefinite under negation. In Tableau 3, *nobody* is the optimal form, because of the high ranking of NegAttract. In both tableaux, the combination of *not* and *nobody* is ruled out as suboptimal, because this candidate incurs an extra, unmotivated violation of *Neg.

In the varieties of middle English spoken between 1500 and 1700, negation occurred in a position following the lexical verb as well as the auxiliary (cf. Mazzon 2004). In Section 5 of Chapter 3, we discussed the alternation between 'I love you not' and 'I do not love you' in Shakespearian English to illustrate the low ranking of NegFirst in this variety of English. What Jespersen describes as literary English might very well be a remnant from this period. In the grammar of literary English, we find a low ranking of NegFirst and a high ranking of NegAttract. The rise of NegFirst (lv) in standard modern English contrasts with this earlier stage of the grammar. Accordingly, we can describe the two sentences in (3) as optimal outputs under two different grammars of English, reflecting two different registers or varieties of the language.

The two varieties of English illustrated in Tableaux 2 and 3 support the view that NegAttract is a violable constraint, whose force varies from one grammar to the next. Haspelmath (1997: 206) discusses the conflict between NegFirst and NegAttract for Baghdad Arabic.

- (4) a. Saalim ma raḥ i-šuf-ni hnak. [Baghdad Arabic]
 Salim SN FUT he-see-me there
 'Salim will not see me there.'

- b. Ma-ḥad kisər il šibbač.
 SN-one broke the window
 ‘No one broke the window.’
- c. Saalim ma šaf ʔəy-waḥid hnak.
 Salim SN saw indef-one there
 ‘Salim did not see anyone there.’

The marker of sentential negation occurs in preverbal position in (4a), so NegFirst is a highly ranked constraint in Baghdad Arabic. The incorporation of negation into the indefinite in subject position in (4b) satisfies both NegFirst and NegAttract. However, (4c) shows that the grammar of Baghdad Arabic involves the ranking NegFirst >> NegAttract, for the preverbal position of negation is maintained at the expense of negative attraction.


On the other hand, NegAttract is ranked higher than NegFirst in Germanic languages such as Dutch and German.

- (5) a. Niemand is gekomen. [Dutch]
 Nobody has come
 ‘Nobody came.’
- b. #Iemand is niet gekomen. *¬∃/✓∃¬
 Somebody has not come
 ‘Somebody didn’t come.’
- (6) a. *Wij hebben niet iemand uitgenodigd.
 We have SN somebody invited
- b. Wij hebben niemand uitgenodigd.
 We have nobody invited
 ‘We didn’t invite anybody.’
- c. *Wij hebben niet ook maar iemand uitgenodigd.
 We have SN anyone invited.

According to Hoeksema (2000), Neg-Incorporation is obligatory in Dutch, but optional in English. We can account for the Dutch data if we adopt the grammar *Neg

>> NegAttract >> NegFirst for this language. (5a), and (6b) then emerge as the optimal output along the same lines as presented for literary English above:

Tableau 4 Negative attraction in post-verbal object position (Dutch)

Meaning $\neg\exists x \text{ Invite}(\text{we}, x)$	Form	FNeg	*Neg	NegAttr	NegFrst
	Wij hebben iemand uitgenodigd we have somebody invited	*		*	*
	Wij hebben niemand uitgenodigd we have nobody invited		*		*
	Wij hebben niet iemand uitgenodigd we have SN somebody invited		*	*	
	Wij hebben niet ook maar iemand uitgenodigd we have SN anyone invited		*	*	
	Wij hebben niet niemand uitgenodigd we have SN nobody invited.		**		

In English, this constraint ranking is adopted in literary, possibly somewhat archaic varieties (Tableau 3). In modern, colloquial English, a version of NegFirst has risen above *Neg, and influences the optimal outcome (Tableau 2). Dutch shows that there is nothing inherently literary about this constraint setting: negative incorporation in preverbal as well as post-verbal position is used in all varieties of the language (Tableau 4). The suboptimal status of the candidate *niet ook maar iemand* shows that the replacement of a regular indefinite with the negative polarity item *ook maar iemand* does not have any effect on the ranking in Dutch. Sometimes, it is assumed that the adjacency of *niet* and *iemand* makes negative incorporation obligatory in Dutch (cf. Haeseryn et al. 1997). Although intervening material may help to elicit examples with regular indefinites (cf. de Swart 2000), we see in Tableau 5 that this is not always sufficient, because of the high ranking of NegAttract in Dutch. Note that the combination of a marker of sentential negation and a negative indefinite as in *niet niemand* is ruled out in Tableau 4 by the economy constraint *Neg. The suboptimal

status of this candidate in Dutch is similar to the status of *not nobody* in English (Tableaux 2 and 3).

In Chapter 3, we have already seen that NegFirst is a family of constraints, rather than a single constraint. The interaction of NegFirst and NegAttract implies that different versions of NegFirst also have consequences for the use and position of negative indefinites. In Chapter 8 (Section 3.1), we will discuss some Swedish data from Sells (2000, 2001), which show complex patterns in the distribution of negative indefinites. We will argue that they arise from the interaction of NegAttract with a special version of NegFirst. Sells' observations suggest that NegFirst needs to be embedded in a more sophisticated syntactic theory than we develop in this book, but a tentative account is developed.

In sum, there are two ways to express negation taking scope over a clause that involves a negative indefinite in argument position or an adjunct. Languages can combine a marker of sentential negation with an indefinite (a regular indefinite or a negative polarity item), or use a negative indefinite (a negative quantifier or an *n*-word). In languages that use negative indefinites, the interaction of the constraint NegAttract with other constraints governing the expression and interpretation of negation becomes relevant. In particular, what we are interested in is the embedding of multiple indefinites under negation. It is clear that this can only give rise to negative concord in languages that have a high ranking of NegAttract: without a high ranking of NegAttract, no negative indefinites. However, not all languages that rank NegAttract highly in their grammar are negative concord languages. Dutch and German are examples. With multiple indefinites, a more complex situation arises which requires the introduction of new constraints. We will first provide an empirical classification (Section 3), and a theoretical account of negative concord (Section 4), before we formalize our findings in bi-directional OT (Section 5).

3. Multiple indefinites under negation: an empirical classification

Haspelmath (1997: 193-4) and Corblin and Tovenia (2003) describe how natural languages express the meaning $\neg\exists x_1\exists x_2\dots\exists x_n$. We roughly follow their classification, and distinguish three main cases: indefinites, negative polarity items, and *n*-words.

3.1 Indefinites under negation

The simplest possible forms (Case 1) that express the meaning $\neg\exists x_1\exists x_2..\exists x_n$ involve a marker of sentential negation or a negative indefinite with $n/n-1$ indefinites in its scope.³

- (7) Keiner hat etwas gesagt. [German]
 No one has something said
 ‘Nobody said anything.’
- (8) Niemand heeft iets gezien. [Dutch]
 Nobody has something seen.
 ‘Nobody saw anything.’
- (9) Bir şey duy-ma-dı-m. [Turkish]
 Something hear-SN-PAST-1SG
 ‘I didn’t hear anything.’

So what seems to be the simplest possible formal combination from a (first-order) logical point of view is actually realized in several natural languages. However, not all languages allow this straightforward expression of indefinites under negation.

3.2 Negative polarity items

The simplest possible forms (as in case 1) are blocked, because indefinites are positive polarity items (PPIs) that cannot be placed in negative contexts. In case 2, negative polarity items (NPIs) are used to express existential quantification in the scope of negation.

- (10) a. #I did not buy something. [English]
 b. I did not buy anything.

³ The Turkish example in (9) is from Haspelmath (1997: 193).

- (11) a. #Nobody saw something.
b. Nobody saw anything.
c. Nobody said anything to anyone.

Negative polarity items occur in a wider range of contexts than just negation (Chapter 1, Section 3).

- (12) a. If you saw anything, please tell the police.
b. Did anyone notice anything unusual?
c. Few people wrote down anything.

The examples in (12) illustrate that NPIs such as *anything* do not inherently carry a negative meaning. Rather they correspond with existential quantifiers with some additional meaning component (characterized as ‘widening’ of a set of alternatives by Kadmon and Landman 1993, as indicating the bottom of a scale by Fauconnier 1975, 1979, Krifka 1995, Israel 1996, de Swart 1998, or as sensitive to scalar implicatures by Chierchia 2001).

Haspelmath (1997: 193, 215) provides the following examples of negative polarity items from Basque and Swedish:

- (13) Ez dut inor ikusi. [Basque]
SN I:have:him anybody seen
‘I haven’t seen anybody.’

- (14) Ja har inte sett någon. [Swedish]
I have SN seen anybody
‘I have not seen anybody.’

Negative polarity items occur in a wide range of languages. Sometimes, the polarity item is the only way to express an existential meaning under negation. This seems to be the case in English, in contexts like (10) and (11). A tentative account of these NPIs is offered in Chapter 8 (Section 3.3).

3.3 *N-words*

The simplest forms as shown in case 1 are blocked, because indefinite pronouns are PPIs. In case 3, existential quantification in the scope of negation is expressed by means of ‘n-words’. N-words behave as negative quantifiers in isolation (15a, b), or in sentences in which they are the only expression of negation (16a, b), but express a single negative statement in combination with sentential negation (17a, b) or other n-words (18a,b,c,d).⁴

- (15) a. A: ¿Qué viste? B: Nada. [Spanish]
 A: What did you see? B: Nothing.
- b. A: Quants en vas veure? B: Cap. [Catalan]
 A: Now many did you see? B: None.
- (16) a. Nessuno mangia. [Italian]
 ‘Nobody ate.’
- b. J’ai rien vu. [colloquial French]
 I have nothing seen.
 ‘I haven’t seen anything.’
- (17) a. No vi ninguno. [Spanish]
 SN saw.1SG none
 ‘I didn’t see any.’
- b. No en vaig veure cap. [Catalan]
 SN PART saw.1SG none
 ‘I didn’t see any.’

⁴ The Catalan data in (15b), (17b), and the Spanish examples in (15a, 17a) are from Vallduví (1994). The Spanish example in (18a), as well as the Italian, and Piedmontese data in (16) and (18) are from Zanuttini (1991). I gloss French *ne*, West Flemish *en* and Afrikaans *nie* as markers of sentential negation (SN). Obviously, there are important syntactic and semantic differences between these markers, and they will be addressed in Chapter 5.

Negative indefinites

- (18) a. Nadie ha dicho nada. [Spanish]
 Nobody has said nothing
 ‘Nobody said anything.’
- b. Nessuno ha detto niente. [Italian]
 Nobody has said nothing
 ‘Nobody said anything.’
- c. Gnun a l’ha dit gnente. [Piedmontese]
 Nobody has said nothing
 ‘Nobody said anything.’
- d. Personne n’a rien dit à personne [written French]
 nobody SN has nothing said to nobody
 ‘Nobody said anything to anyone.’

Negative concord is widespread in the family of Romance languages (17, 18), but it also occurs in certain Germanic languages (19), in Slavic, Greek, and many other languages, as we will see in examples to be discussed below.⁵

- (19) a. dat Valère niemand kent. [West Flemish]
 that Valère nobody knows
 ‘that Valère doesn’t know anybody.’
- b. K’(en)-een niets nie gezien.
 I (SN) have nothing SN seen
 ‘I haven’t seen anything.’
- c. K’(en)-een an niemand niets gezeid.
 I SN have to nobody nothing said
 ‘I didn’t say anything to anyone.’
- d. und keinen andern nichd leihden wil. [Bavarian]
 and no other SN tolerate wants
 ‘and does not want to tolerate another’
- e. Hij het nooit sy broer vergeven nie. [Afrikaans]
 He has never his brother forgiven SN
 ‘He has never forgiven his brother.’

⁵ The West Flemish data are from Haegeman and Zanuttini (1996). They also quote the Bavarian data (from Bayer 1990). The Afrikaans example is from Kate van Gass (p.c.).

N-words differ from negative polarity items in three ways (Ladusaw 1992, Vallduví 1994, Bernini and Ramat 1996, Haspelmath 1997, Chapter 1, Sections 3 and 4). First, they behave as negative quantifiers in isolation (15a,b), whereas negative polarity items behave as indefinites, and contribute an existential quantifier \exists rather than a negative existential quantifier $\neg\exists$ (cf. 12). NPIs like *anything* do not mean ‘nothing’ as the elliptical answer to a question (20a) and do not occur in subject position (21a below), because they must be licensed by an operator with the right semantic properties (downward entailing or non-veridical, cf. Fauconnier 1975, 1979, Ladusaw 1979, Zwarts 1986, Van der Wouden 1997, Giannakidou 1997, 1998, etc.):⁶

(20)	a.	What did you see?	Nothing.	
			*Anything.	
b.	Qu’est-ce que tu as vu?	What did you see?	Rien.	[French]
			Nothing	
			*Quoi que ce soit.	
			What that it is-SUBJ	
c.	A quién viste?	Who did you see?	A nadie.	[Spanish]
			nobody.	
			*A un alma.	
			a soul	
d.	Qui has vist?	Who did you see?	Ningú.	[Catalan]
			Nobody.	
			*Gaire.	
			Is there any sugar left?	
e.	Pjon ihes?	Who did you see?	KANENAN	[Greek]
			Nobody	
			*kanenan	
			Anybody	
f.	Kto przyszedł?	who came?	Nikt.	[Polish]
			Nobody.	

⁶ The Spanish example in (20c) is from Herburger (2001). The Catalan example in (20d) is from Vallduví (1994). The Greek example in (20e) is from Giannakidou (1997). The Polish and Turkish examples in (20f, g) are from Haspelmath (1997: 195). This observation holds modulo the observations about inverse scope made by de Swart (1998b).

- | | | | |
|----|--------------------|-----------|-----------|
| g. | Ne duy-du-n? | *Bir şey. | [Turkish] |
| | What did you hear? | Anything | |

The contrast between negative quantifiers and negative polarity items in isolation, illustrated for English in (20a), can be repeated for negative concord languages like French (20b), Spanish (20c), Catalan (20d), and Greek (20e). The data in (20) show that n-words like *rien*, *nadie*, *ningú*, *KANENAN*, *nikt* mean ‘nothing’ as the elliptical answer to a question. The NPIs *quoi que ce soit*, *un alma*, *gaire*, *kanenan* and *bir şey* are not felicitous in elliptical contexts, because they are missing a licenser. We conclude that negative polarity items are not felicitous in isolation, not even in negative concord languages. We find similar contrasts in subject position.⁷

- | | | | |
|------|----|--|-----------|
| (21) | a. | Nobody has seen anything. | |
| | b. | *Anybody has seen nothing. | |
| | | | |
| (22) | a. | Personne n’a vu quoi que ce soit.
Nobody SN has seen anything
‘Nobody has seen anything.’ | [French] |
| | b. | *Qui que ce soit n’a rien vu.
Anybody SN has nothing seen | |
| | | | |
| (23) | a. | No funciona res.
SN functions nothing
‘Nothing works.’ | [Catalan] |
| | b. | Res (no) funciona.
Nothing (SN) works
‘Nothing works.’ | |
| | c. | No funcionen gaires coses.
SN function-3pl many things
‘There aren’t many things working.’ | |
| | d. | *Gaires coses (no) funcionen.
Many things (SN) work | |

⁷ The Catalan examples in (23) are from Vallduví (1994). The Greek data in (24) are from Giannakidou (1997).

- (24) a. KANENAN dhen idhen. [Greek]
 Nobody SN saw.1SG
 ‘I didn’t see anybody.’
 b. *KANENAN dhen idhen.
 Anybody SN saw.1SG

The English negative quantifier *nothing* (21a), and French (22a), Catalan (23a) and Greek n-words *personne*, *res* and KANENAN are possible in (preverbal) subject position, but negative polarity items like *anybody*, *quoi que ce soit*, *gaire*, *kanenan* cannot take this position in any of these languages (21b, 22b, 23d, 24b). The Catalan examples in (23) and the Greek examples in (24) support the view that this is not a subject/object asymmetry, but involves a c-command relation at the surface level between the licenser and the negative polarity item. Clearly, n-words can occur in the context of another anti-additive operator, but they do not need a licenser: they are ‘self-licensing’ in Ladusaw’s terms (1992). As a result, n-words can be used in sentences in which no other expression conveys a negative meaning (16a, b), (22a), (23b).⁸ This chapter concentrates on n-words, and does not provide an OT analysis of the generation and interpretation of NPIs. However, Chapter 8 (Section 3.3) offers some speculative remarks about the relationship of the analysis developed here with Szabolcsi’s (2004) analysis of the English NPI *any*.

Languages that use n-words express what is known as *negative concord*: a sequence of seemingly negative expressions gets a single negation reading. Negative concord (NC) raises major questions for semantics, because it seems to violate the principle of compositionality of meaning. Many existing proposals try to answer this question, e.g. Zanuttini (1991), Ladusaw (1992), Van der Wouden and Zwarts (1997), Corblin (1996), Déprez (1997, 2000), Giannakidou (2000), Herburger (2001), de Swart and Sag (2002), Corblin et al. (2004), Zeijlstra (2004), and others. Chapter 1 provides an overview of the main issues and the most important proposed solutions. The OT analysis of double negation and negative concord developed in this chapter

⁸ Obviously, this criterion is only applicable in languages that do not require the presence of a marker of sentential negation in all negative sentences. In such languages (labeled class I or strict negative concord languages in Chapter 5 below), this criterion is not falsified, but cannot be tested.

builds on the proposals made by de Swart and Sag (2002), so we will only refer to their analysis.

4. Double negation and negative concord as instances of polyadic quantification

According to Jespersen (1917: 62) “when logicians insist that ‘two negatives make an affirmative’ their rule is not corroborated by actual usage in most languages. But it would be wrong to divide languages into some that follow this rule and others that do not, for on closer inspection we find that in spite of great differences between languages in this respect, there are certain underlying principles that hold good for all languages.” The analysis of double negation and negative concord developed in this section follows the spirit of Jespersen’s analysis in that we adopt a unified analysis of the two phenomena in which double negation and negative concord involve two ways of instantiating polyadic quantification.

An important question raised in the literature concerns the lexical semantics of n-words: do they denote existential quantifiers (\exists), universal quantifiers that out-scope negation (\forall), or negative existential quantifiers ($\neg\exists$). The quantificational force of n-words was discussed in Chapter 1. A closely related issue involves the combinatorics: how do n-words work together and work with negation in the expression of a single negation at the propositional level? The main semantic claims made by de Swart and Sag (2002) are that n-words are inherently negative, and that both double negation and negative concord involve polyadic quantification. Double negation involves iteration of monadic quantifiers (function application), and is first-order definable. Negative concord is interpreted in terms of resumption, and builds a polyadic quantifier. De Swart and Sag adopt Keenan and Westerstahl’s (1997: 879) definition of binary resumption:

- The binary resumption of a type $\langle 1,1 \rangle$ quantifier Q is the quantifier Q' defined as follows:

$$Q'_{\text{E}}^{A,B}(\mathbf{R}) = Q_{\text{E}2}^{A \times B}(\mathbf{R})$$

A type $\langle 1,1 \rangle$ quantifier Q is a standard determiner (*all, some, no*, etc.) establishing a relation between two sets, subsets of the universe of discourse E . In a binary resumption, the quantifier Q occurs twice, once with A , once with B as its restrictor. The resumptive quantifier Q' ranges over pairs of individuals, with $A \times B$ as its restrictor, and the two-place relation R as its scope. Let us apply the definition to an example like (18b), repeated here as (25), in order to see how it works.

- (25) a. Nessuno ha detto niente. [Italian]
 Nobody has said nothing
 ‘Nobody said anything.’
 b. $NO_{E2}^{HUM \times INAN} (SAY)$
 c. $\neg \exists x \exists y \text{ Say}(x,y)$

In (25), we find two n-words, *nessuno* and *niente*. Both contribute the negative quantifier NO (Q), which establishes a relation between two sets. *Nessuno* ranges over human beings, and *niente* over inanimate things, so the restrictor A is HUM and the restrictor B is $INAN$. The two-place relation R is provided by the transitive verb *say*. In the context of (25), the resumptive quantifier Q' reads as $NO_{E2}^{HUM \times INAN} (SAY)$ in (25b), requiring no pair of a human and a thing to stand in the ‘say’ relation. The truth conditions of the sentence boil down to the first-order formula $\neg \exists x \exists y \text{ Say}(x,y)$ in (25c), so that there is not an individual x and a thing y such that x says y . We thus obtain a world of silence under the negative concord reading.

Following Keenan and Westerståhl, we generalize the definition of resumptive quantification to a sequence of k monadic quantifiers Q' binding just one variable each, and interpreted on the universe of discourse E , with a one-place predicate A as their restrictor, and taking a k -ary relation R as its scope.⁹

- Resumption of a k -ary quantifier.

$$Q'_E^{A1, A2, \dots, Ak} (R) = Q_{Ek}^{A1 \times A2 \times \dots \times Ak} (R).$$

⁹ Keenan and Westerståhl’s definition is slightly more complex than ours, because they want to generalize to the possibility of resumptive quantification with relational nouns. Given that we restrict ourselves to the standard examples with nouns denoting one-place predicates, we maintain the easier definition for readability.

The resumptive quantifier is a polyadic quantifier binding k variables, interpreted in the universe of discourse E^k , taking the subset $A_1 \times A_2 \times \dots \times A_k$ of E^k as its restrictor, and the k -ary predicate R as its scope. We can apply this generalized definition to an example like (18d) repeated here as (26).¹⁰

- (26) a. *Personne n’a rien dit à personne.* [written French]
 Nobody SN has nothing said to nobody
 ‘Nobody said anything to anyone.’
 b. $\text{NO}_{E^3}^{\text{HUM} \times \text{INAN} \times \text{HUM}}(\text{SAY})$
 c. $\neg \exists y \exists z R(x, y, z)$

The sequence of n-words *personne*, *rien*, *personne* provides a series of quantifiers NO, ranging over humans, things, and humans respectively. R is provided by the three-place predicate *say-to*. The resumptive quantifier reads as $\text{NO}_{E^3}^{\text{HUM} \times \text{INAN} \times \text{HUM}}(\text{SAY})$ in (26b), requiring no triple of a human, a thing and a human to stand in the ‘say-to’ relation. The truth conditions of the resumptive quantifier are equivalent to the first-order formula $\neg \exists x \exists y \exists z R(x, y, z)$, which requires there not to be an individual x , a thing y and an individual z such that x says y to z . We obtain a world of silence under the NC reading.

Keenan and Westerståhl take resumption to apply only to a sequence of quantifiers that are somehow ‘the same’. In the case of negative concord, resumption applies to a sequence of anti-additive quantifiers (‘nobody’, ‘nothing’, etc.). The marker of sentential negation and connectives like *without* are also anti-additive, so they participate in the construction of the polyadic quantifier as well. We refer to Chapter 5 for further discussion of the role of the marker of sentential negation in negative concord, and the implications for the OT analysis. Chapter 6 (Section 2) returns to subordinate clauses introduced by *without*. Quantifiers like *few*, *at most two* are monotone decreasing, but not anti-additive. They license negative polarity items, but do not participate in resumptive quantification, and do not lead to negative concord interpretations.

¹⁰ For the moment, we ignore the role of the co-negative marker *ne*, which will be analyzed in Chapter 5 (Section 6).

¹² (29) is an attested example from the internet. Italics added to highlight the multiple Neg-expressions.

The syntax-semantics interface defines how we obtain the DN and NC readings from the syntax. HPSG uses a notion of Cooper storage in which all quantifiers are collected into a store, and interpreted upon retrieval from the store (cf. Manning, Iida and Sag 1999). This mechanism is generally used to account for scope ambiguities, but de Swart and Sag (2002) extend it to polyadic quantification. All negative (anti-additive) quantifiers are collected into a so-called N-store. Interpretation upon retrieval from the store is by means of iteration of monadic quantifiers (leading to DN) or by resumption, building a polyadic quantifier (leading to NC). We will not explain the retrieval mechanism here, but refer to de Swart and Sag (2002) for a detailed description. What is crucial for us here is that the HPSG grammar does not decide between DN and NC. This is what we need for a language like French, in which both readings are available. Consider the ambiguity of the following sentence in the HPSG analysis of de Swart and Sag (2002).

(27) Personne n'aime personne. [French]

(a) Arg-St<[Store {NO_{x}^{Person(x)} }], [Store {NO_{y}^{Person(y)} }]>

Content Quants <NO_{x}^{Person(x)}, NO_{y}^{Person(y)}>

Nucleus *Love(x,y)*

Semantic interpretation: NO(HUM, {x|NO(HUM, {y|x loves y})})

In first-order logic: $\neg\exists x\neg\exists x \text{ Love}(x,y)$ [DN]

(b) Arg-St<[Store {NO_{x}^{Person(x)} }], [Store {NO_{y}^{Person(y)} }]>

Content Quants <NO_{x,y}^{Person(x), Person(y)}>

Nucleus *Love(x,y)*

Semantic interpretation: NO_{E2}^{HUM×HUM}(LOVE)

In first-order logic: $\neg\exists x\exists y \text{ Love}(x,y)$ [NC]

Note that (27a) and (b) are identical as far as the argument structure, the storing mechanism, and the relational interpretation of the word *love* is concerned. The difference resides in the interpretation of the polyadic quantifier: iteration in (27a), resumption in (27b). Although both readings of the sentence can be represented in terms of a first-order logical formula, this does not mean that resumption is dispensable. The higher order construction of a polyadic quantifier is required in order to respect the principle of compositionality of meaning.

The main insights of this analysis are the following. The HPSG grammar assumes no lexical difference between negative quantifiers and n-words, so in the rest of this book, I use the term ‘Neg-expression’ to designate both. The analysis works for n-words in argument and adjunct position alike (so *nobody*, *nothing* as well as *never*, *nowhere*). Finally, it does not involve empty elements or ‘hidden’ negations in the syntactic structure. These are major advantages to this approach.

However, this proposal has its limitations. Not all languages allow double negation and negative concord as freely as French does, although we do find it in other languages as well, as we will see in Chapter 6 (Section 3). The combination of two negative quantifiers in a language like English typically leads to a double negation reading, and resumption is only marginally available as an interpretive strategy. Languages like Spanish, Greek, Polish, and many other languages are on the other end of the spectrum. They are typical negative concord languages, which hardly ever realize the iteration version of the polyadic quantifier analysis. Unlike the French example (27), examples like (18a, b, c) in Spanish, Italian and Piedmontese are not usually conceived as ambiguous, but only display the negative concord reading.

Clearly, the HPSG analysis developed by de Swart and Sag (2002) does not predict cross-linguistic variation where it arises, as pointed out by Zeijlstra (2004: 207). However, unlike Zeijlstra, we do not take this as a decisive argument against the HPSG analysis. We have two reasons not to do so. First, resumptive readings are marginal in double negation languages, but they are not excluded, so we want a theory that can handle them. Second, double negation readings are attested for concord languages like French and Welsh, but analyses other than the HPSG analysis do not offer a proper account of the ambiguities. We will argue in Section 5 that the addition of an OT component to the HPSG analysis is sufficient to provide the analysis with a desired typological dimension.

As far as the first argument is concerned, Van Benthem (1999) assumes that the English sentence (28) has the same two readings as its French counterpart (27).

(28) Nobody loves nobody.

Not everyone I consulted finds the ambiguity of (28) easy to access, but we can find better examples. I take (29) to be proof of a resumptive reading of the sequence *nobody-nothing* in (standard) English.¹²

- (29) When *nobody* knows *nothing*, everybody is an expert. Nobody can seriously claim to be an expert on the collapse of the World Trade Center, simply because nobody had a chance to study the rubble. Everybody who has looked at the photographs and television news video knows as much about the collapse as the most knowledgeable scientists. Therefore, everybody who has viewed the photographs and video can claim to be an expert.

The first line of (29) contains a claim that is elaborated by the following sentences. The elaboration establishes the resumptive reading of the sequence *nobody-nothing* as the contextually relevant interpretation. The intended reading of the sentence is that there is no pair of an individual and a thing, such that the individual saw the thing.

Similarly, the example (30) was used as a slogan by Amnesty International in the seventies, and supports a marginal use of the resumptive reading in (standard) Dutch, another typical double negation language:

- (30) Als niemand luistert naar niemand vallen er doden in plaats van woorden.
'If nobody listens to nobody, there will be deaths, instead of words.'

The examples in (29) and (30) involve resumption of a sequence of negative quantifiers. However, the examples are infrequent, and resumption seems to be a marginal phenomenon in typical double negation languages like English and Dutch. Even if we treat the semantics of these constructions in terms of resumption, it is not clear whether the examples should be described as negative concord, or some other form of emphatic negation (cf. Van der Wouden 1994: Chapter 2, and Chapter 6, Section 3 for discussion).

As far as the second argument is concerned, we have seen the double negation readings in the French example (27). The ambiguities provide strong support for the analysis developed by de Swart and Sag (2002), which offers an attractive compositional semantics, and a syntax-semantics interface of double negation and negative concord without the need to resort to empty categories or 'hidden' negations. Even if it is not able to account for the cross-linguistic variations we find in the use of negative concord and double negation readings, this analysis has so many advantages that it is worth upholding. However, we need to find a way to enrich it with a

typological dimension. One solution is to add an OT component to the existing HPSG analysis. The OT analysis I propose in this chapter builds on the grammar proposed by de Swart and Sag (2002), but locates the cross-linguistic variation in the bi-directional OT component. De Swart and Sag informal suggestion that languages may have a ‘preference’ for one interpretation over another can now be substantiated. Their theory will be given tangible support by exploring the interaction between violable constraints that can be ranked in different ways.

5. Marking and interpretation of negation in bi-directional OT

In this section, we develop a bi-directional OT analysis of negation. We will do so in two steps. Section 5.1 defines the OT syntax, and Section 5.2 combines this syntax with an interpretive mechanism. Section 5.3 discusses double negation readings in NC languages. For now, we will focus on indefinites and Neg-expressions. The interaction with sentential negation is taken up in Chapter 5 below.

5.1 *Generation of double negation and negative concord in OT*

In Section 2, we observed that negation can be attracted to indefinites in argument position. Depending on the constraint ranking, the input meaning $\neg\exists$ can be realized by a marker of sentential negation plus an indefinite, or by a negative indefinite. The constraint driving the use of negative indefinites was called NegAttract. In Section 3, we extended the empirical scope of our study to multiple indefinites under negation, and studied the ways languages realize the meaning $\neg\exists x_1, \exists x_2, \dots \exists x_n$. Again, we observed that languages vary in their use of indefinites or negative indefinites. Of course, only languages that have negative indefinites (Neg-expressions) can be discussed in a study of double negation and negative concord languages. This is clear from the semantic analysis in terms of polyadic quantification that we adopted in Section 4. However, NegAttract is not enough to account for negative concord. In Section 2, we saw that Dutch and German are languages that have a high ranking of NegAttract, but they are not negative concord languages, as we established in Section

3. So we need another constraint that drives the use of Neg-expressions in sentences involving multiple indefinites under negation.

According to Corblin and Toven (2003: 326), natural languages frequently have linguistic means to indicate that an argument must be interpreted within the scope of negation. They refer to this as marking of ‘negative variables’. Similarly, Haspelmath (1997: 231), building on Tanaka (1994), claims that the use of n-words is functionally motivated by the desire to mark the focus of negation, that is, the participants that are affected by the negation. In terms of OT syntax, the use of n-words constitutes a case of marking an input feature in the output: the ‘negative variable’ is formally marked as such. In our OT set-up, we express this by means of a Max constraint:

◆ MaxNeg

Mark ‘negative variables’ (i.e. mark indefinites in argument or adjunct position that are interpreted in the scope of an anti-additive operator such as negation, as formally negative.)

The functional approach explains why the use of n-words is widespread among natural languages. However, we know from Section 3.1 above that the use of n-words is not universal: languages like Dutch, English, Basque, etc. do not use n-words. This suggests that MaxNeg is not a hard constraint, and its position in the constraint ranking is not the same in every language. We can account for the difference between languages with and without n-words by changing the position of MaxNeg relative to *Neg. MaxNeg and *Neg are conflicting constraints: MaxNeg wants to reflect an input feature concerning negation in the form, whereas *Neg wants to avoid negation in the form. If *Neg is ranked higher than MaxNeg, the optimal way to express the meaning $\neg\exists x_1\exists x_2\dots\exists x_n$ is by means of indefinite pronouns. If MaxNeg is ranked higher than *Neg, n-words are used to express indefinites under negation. The following tableaux reflect this for the binding of two variables:

Negative indefinites

Tableau 5: Indefinite under negation in Dutch, Turkish, etc. (production)



Meaning $\neg\exists x_1\exists x_2$	Form	FaithNeg	*Neg	MaxNeg
	indef+indef	*		**
	neg+indef		*	*
	neg + neg		**	

Tableau 6: N-word under negation in Spanish, Italian, etc. (production)

Meaning $\neg\exists x_1\exists x_2$	Form	FaithNeg	MaxNeg	*Neg
	indef+indef	*	**	
	neg+indef		*	*
	neg + neg			**

The high ranking of FaithNeg (see Chapter 3) makes it impossible to express indefinites under negation by indefinites exclusively (in the absence of a marker of sentential negation). In Tableaux 5 and 6, the candidates that we need to compare are those that somehow mark negation in the output. This invariably leads to a violation of *Neg. Two Neg-expressions are ‘worse’ than one, so the combination of two Neg-expressions incurs two violations of *Neg. The pattern of violations indicates that we treat n-words as formally negative.

As far as generation is concerned, we conclude that languages that allow indefinites under negation (e.g. Dutch, Turkish), and languages that use n-words (e.g. Romance, Slavic) differ in their ranking of the two constraints MaxNeg and *Neg. The question that immediately arises at this point concerns the interpretation of the expressions involved. A combination of a Neg-expression with a sequence of indefinites allows us to recover the meaning $\neg\exists x_1\exists x_2\dots\exists x_n$ by application of the standard rules of first-order logic. However, for languages that mark negative variables by means of n-words, the issue of the interpretation of these structures is less trivial. Remember that the term ‘Neg-expression’ generalizes over negative

quantifiers and n-words, and stands for an expression that has the lexical semantics $\neg\exists x$. Given that a sequence of two anti-additive quantifiers can be interpreted either in terms of iteration or in terms of resumption (cf. Section 4 above), we need to provide an OT semantics that determines the preference of one interpretation over another in the grammar of a language. This requires an OT semantics to be paired up with the OT syntax just developed.

5.2 Interpretation of Neg-expressions

In isolation, it is not possible to determine whether a particular expression is a negative quantifier or an n-word, because they both contribute the meaning $\neg\exists$ as the fragment answer to a question (15a, b), and in sentences where they constitute the sole expression with negative force (16a, b), (19a), (21a). Following de Swart and Sag (2002), I take this to mean that n-words and negative quantifiers have the same lexical semantics. In Tableaux 5 and 6, the term ‘Neg-expression’ is the general term for expressions that are formally marked for negation but are interpreted either as negative quantifiers or as n-words. If a sequence of Neg-expressions is interpreted in terms of resumption of anti-additive quantifiers, we obtain a single negation reading (negative concord). This is the desired interpretation for the examples in (18a-d) above, repeated here in (31).

- (31) a. Nadie ha dicho nada. [Spanish]
 Nobody has said nothing
 ‘Nobody said anything.’
- b. Nessuno ha detto niente. [Italian]
 Nobody has said nothing
 ‘Nobody said anything.’
- c. Gnun a l’ha dit gnente. [Piedmontese]
 Nobody has said nothing
 ‘Nobody said anything.’
- d. Personne n’a rien dit à personne. [French]
 Nobody SN has nothing said to nobody
 ‘Nobody said anything to anyone.’

If a sequence of two Neg-expressions is interpreted in terms of iteration, we obtain a double negation reading. This is the desired interpretation of the English examples in (32), the Dutch example in (33), and the German example in (34):¹³

- (32) a. Nobody has nothing to hide.
b. Nobody is in prison for nothing.

- (33) Het is een stad uit een opgewekt verhaal of film, waar iedereen, zelfs de schurk, beminnelijk is en warm; waar niemand veel geld heeft, maar waar iedereen rond komt; waar *niemand niets* te doen heeft, maar waar iedereen genoeg tijd over houdt; en waar een bedelaar te middernacht met een viool onder de arm naar huis keert, luid zingend, maar voor zichzelf, omdat hij er zin in heeft... [Dutch]
It is a city from a beat-up story or movie, where everyone, even the villain, is friendly and warm; where nobody has a whole lot of money, but where everyone has enough to make ends meet; where nobody has nothing to do, but where everyone has enough time left; and where a beggar goes home at midnight with a violin under his arm, singing loudly, but to himself, just because he feels like it..

- (34) Wollen wir demnächst die Firmen verantwortlich machen, die Karteikarten, Kopierstifte und Tätowiertinte hergestellt haben? Wenn alle, nun auch im Ausland, schuldig sind, war *niemand an nichts* schuld.
Is the next step to hold responsible the companies that made index cards, copying pens and tattoo inks? If all, now also those living abroad, are guilty, nobody is guilty of nothing.

The use of Neg-expressions in a generative OT system means that we run into the recoverability problem: from the expressions generated, we can derive multiple interpretations (DN and NC), not just the intended one. In the OT system developed in this chapter, recoverability is assured by the way the generation of negative sentences

¹³ The examples in (31)-(34) were found on the internet. Italics have been added to highlight the Neg-expressions; they do not indicate focus or stress.

hangs together with their interpretation. In this section, we extend the OT syntax with an OT semantics. The familiar constraints FaithNeg and *Neg are ‘double-edged’ constraints that work in the generation as well as in the interpretation perspective. In the OT semantics, FaithNeg requires a reflection of the negative form in a non-affirmative meaning. *Neg avoids a proliferation of negations in the semantics, preferring resumption over iteration. The third constraint we need is IntNeg:

◆ IntNeg

Force Iteration (i.e. interpret every Neg-expression in the input form as contributing a semantic negation at the first-order level in the output.)

MaxNeg and IntNeg both maximize the reflection of input features in the output, MaxNeg in the syntactic form, IntNeg in the semantic interpretation. As semantic constraints, both FaithNeg and IntNeg are instances of the general constraint FaithInt proposed by Zeevat (2000), and defined as a principle that forces the hearer to interpret all that the hearer has said. The three constraints together account for double negation and negative concord languages.

FaithNeg outranks all the other constraints as usual. MaxNeg is a purely syntactic constraint that does not play a role in interpretation. So the constraints that need to be ordered are *Neg and IntNeg. If *Neg is ranked higher than IntNeg in the OT semantics, a sequence of multiple Neg-expressions leads to a single negation meaning by resumption. If IntNeg is ranked higher than *Neg, a series of Neg-expressions is interpreted as multiple negation by forcing iteration. The following tableaux illustrate the two possible rankings and their optimal output:

Tableau 7: Double negation in (standard) English, (standard) Dutch, etc. (interpretation)

Form neg + neg	Meaning	FaithNeg	IntNeg	*Neg
	$\exists x_1 \exists x_2$	*	**	
	$\neg \exists x_1 \exists x_2$		*	*
\neg	$\neg \exists x_1 \neg \exists x_2$			**

Tableau 8: Negative concord in Spanish, Italian, etc. (interpretation)

Form neg + neg	Meaning	FaithNeg	*Neg	IntNeg
	$\exists x_1 \exists x_2$	*		**
\neg	$\neg \exists x_1 \exists x_2$		*	*
	$\neg \exists x_1 \neg \exists x_2$		**	

We cannot interpret a statement involving two Neg-expressions without a reflection of the non-affirmative meaning, because of the top ranking of FaithNeg. As a result, the relevant candidates we compare have at least one negation in the output, and always incur a violation of *Neg. The combination of two Neg-expressions leads to a double negation reading in languages like Dutch and English, for the constraint IntNeg is ranked higher than *Neg (Tableau 7). This ranking accounts for the double negation reading of the combination of two Neg-expressions in examples (32) - (34) above. Because *Neg outranks IntNeg (Tableau 8), single negation readings win over double negation readings in NC languages such as Spanish, Italian, Greek, Polish, etc. This ranking accounts for the negative concord reading of the combination of two Neg-expressions in examples (31) above.

Collapsing the generation and interpretation perspective, we derive the following two rankings for negative concord and double negation languages:

Bi-directional grammar

- Negative concord languages: FaithNeg >> MaxNeg >> *Neg >> IntNeg
- Double negation languages: FaithNeg >> IntNeg >> *Neg >> MaxNeg

In this bi-directional grammar, the choice between resumption and iteration in the semantics is explicitly related to the functional desirability of marking negative variables in the syntax. In negative concord languages, MaxNeg is ranked above *Neg, so that the indefinites under negation are realized as Neg-expressions. The ranking of IntNeg under *Neg implies that the multiplication of negations in the form

is absorbed in the semantics, and a single negation reading ensues. In double negation languages, IntNeg is ranked above *Neg, so every negative form is interpreted as contributing its own (first-order) negation to the semantics. MaxNeg is ranked below *Neg, so it is more important to avoid negative forms, than to mark negative variables. In both classes of languages, syntax and semantics work closely together. Thus, the bi-directional set-up is a crucial feature of the analysis.

5.3 Reflections on the bi-directional grammar

The HPSG analysis in Section 4 provided the space of possible meanings of a natural language grammar. The enrichment with the OT grammar makes it possible to encode the preference a language may have for resumption or iteration in the syntax-semantics interface. *Neg is a double-edged constraint, which plays a role in syntax as well as semantics. The ranking of *Neg in relation to the syntactic faithfulness constraint MaxNeg determines whether negative variables are marked in the syntax or not. The ranking of the semantic faithfulness constraint IntNeg with respect to *Neg determines whether neg-expressions each contribute a negation in the semantic representation. The bi-directional grammar of negation provides a balance between form and interpretation of negation in two large classes of languages. The bi-directional grammar also raises new questions.

Even if we assume that FaithNeg outranks the other constraints across all languages under consideration, we need to consider more rankings than the two orders given above. Aside from FaithNeg, we are working with three constraints, and obviously, 3 constraints permit 6 rankings, at least in principle.



- Factorial typology of three constraints

MaxNeg >> *Neg >> IntNeg	NC
MaxNeg >> IntNeg >> *Neg	unstable
IntNeg >> MaxNeg >> *Neg	unstable
*Neg >> MaxNeg >> IntNeg	unstable
*Neg >> IntNeg >> MaxNeg	unstable
IntNeg >> *Neg >> MaxNeg	DN

Negative indefinites



So far, we have established the top and the bottom ranking as reflections of a particular family of languages. What about the other four rankings? I argue that the other four rankings cannot represent stable linguistic systems, because generation and production are not well-balanced, and natural languages only adopt grammars that show a good balance between syntax and semantics. In order to substantiate this claim, we need to investigate the relation between production and interpretation under the rankings characterized as ‘unstable’. We claim that the ranking in Tableau 9 is unstable, because the meaning intended by the speaker is not recovered by the hearer.

Tableau 9: MaxNeg >> IntNeg >> *Neg (intended meaning not recovered)

Meaning	Form	MaxNeg	IntNeg	*Neg
$\neg\exists x_1\exists x_2$				
	neg + indef	*		*
	neg + neg			**
Form	Meaning	MaxNeg	IntNeg	*Neg
neg + neg				
	$\neg\exists x_1\neg\exists x_2$			**
	$\neg\exists x_1\exists x_2$		*	*

The top row in Tableau 9 shows the input of a speaker who wants to express a single negation meaning. The ranking generates two Neg-expressions as the optimal output for the single negation input. But the interpretation of two Neg-expressions leads to double, rather than single negation for the hearer. This means that the speaker’s intended meaning is not recovered by the hearer. The ranking IntNeg >> MaxNeg >> *Neg is equally unstable. Given that there is no direct interaction between the semantic constraint IntNeg and the syntactic constraint MaxNeg, the argumentation is the same. We conclude that MaxNeg and IntNeg cannot both be higher than *Neg. The ranking in Tableau 10 illustrates that MaxNeg and IntNeg cannot both be lower than *Neg either.

Tableau 10: *Neg >> IntNeg >> MaxNeg (form not motivated)

Meaning	Form	*Neg	IntNeg	MaxNeg
$\neg\exists x_1\exists x_2$				
	neg+indef	*		*
	neg+neg	**		
Form	Meaning	*Neg	IntNeg	MaxNeg
neg + neg				
	$\neg\exists x_1\neg\exists x_2$	**		
	$\neg\exists x_1\exists x_2$	*	*	

Here we have the reverse problem. An indefinite form is the optimal form for the speaker to choose in the expression of indefinites under negation. The hearer will not have a problem in interpreting this input. However, the use of two Neg-expressions also leads to a negative concord reading, even though the use of the n-word is not functionally motivated by the low ranking of MaxNeg. The same problems arise with the ranking *Neg >> MaxNeg >> IntNeg, because MaxNeg and IntNeg do not interact directly.

The conclusion must be that only rankings where MaxNeg and IntNeg are distributed on either side of *Neg reflect viable options for a linguistic system that balances generation and interpretation of negative statements. This is of course exactly the bi-directional grammar proposed earlier in Section 5.2. In sum:

- **Negative Concord:** MaxNeg >> *Neg >> IntNeg.
If you mark ‘negative variables’ (MaxNeg >> *Neg in syntax), then make sure you do not force Iteration (*Neg >> IntNeg in semantics).
- **Double Negation:** IntNeg >> *Neg >> MaxNeg.
If you force Iteration, (IntNeg >> *Neg in semantics), then make sure you do not mark ‘negative variables’ (*Neg >> MaxNeg in syntax).

Even though a set of three constraints allow six rankings in principle, we only find evidence of two of these rankings in natural language. The other four rankings lead to

unrecoverable meanings or unmotivated forms, and imply an unbalanced relation between syntax and semantics that does not match the grammar of a natural language. Given that the two directions of optimization are tied together in the bi-directional grammar, our proposal is an instance of strong bi-directional OT in the sense of Blutner (2001). Strong bi-directional OT picks out a set of form-meaning pairs such that none of them is preferred by any other form-meaning pair in either direction of optimization. Double negation and negative concord languages exemplify such a process.

6. Conclusion

This investigation of the marking and interpretation of negation illustrates how a bi-directional version of Optimality Theory offers new perspectives on the range of variation we find in natural language for the expression and meaning of negative indefinites. In this chapter, it was first established that negation can be realized by an argument or an adjunct because of the pressure of negative attraction. In the expression and interpretation of multiple negations, we find variations across languages. The semantic compositionality problems raised by negative concord are solved by the introduction of a higher order polyadic quantifier. A sequence of Neg-expressions can be interpreted in terms of iteration or resumption. The typological variation is analyzed in a bi-directional OT analysis that is added to the polyadic analysis. This leads to two classes of languages: those that have double negation and those that have negative concord. Other possible constraint rankings are unstable and cannot provide the grammar of a natural language.

The reader may observe that the ambiguities in French examples such as (27) originally motivated the polyadic analysis developed by de Swart and Sag (2002), but seem to be lost in the ordinal OT analysis developed in this chapter. We need an extension of the analysis with stochastic OT to describe resumptive readings in double negation languages, and double negation readings in negative concord languages. This issue will be addressed in Chapter 6 (Section 3). Under the assumption that the overlap between the semantic constraints is fairly small, resumption remains a marginal phenomenon in DN languages, and so does double negation in NC languages. This seems to be in accordance with the facts.

Furthermore, the reader may remember that we related typology and diachrony in our treatment of sentential negation in Chapter 3 (Sections 4 and 5), but limited ourselves to a synchronic analysis of negative indefinites. It is not so easy to develop a diachronic analysis of negative indefinites, because the developmental path frequently involves a transition from negative polarity items to n-words. This implies that we need to incorporate NPIs in our OT analysis before we can sketch the role of negative indefinites in the Jespersen cycle. Chapter 8 (Section 3) offers a tentative account, building on Szabolcsi's (2004) analysis of English *any*.

Before we can address these extensions of the analysis, we need to elaborate the basic OT model. Chapter 3 developed an analysis of sentential negation. In accordance with the polyadic analysis developed by de Swart and Sag (2002), the OT analysis developed so far relies on the interaction of Neg-expressions, rather than the marker of sentential negation to account for single and multiple negation. In Chapter 5, we will focus on the interaction of Neg-expressions with the marker of sentential negation, and confirm de Swart and Sag's view that the position and distribution of the marker of sentential negation in negative concord is relevant for syntax, but does not affect the semantics. The account of strict and non strict negative concord languages we will develop then crucially relies on the bidirectional OT grammar advanced in this chapter.

Chapter 5

Sentential negation and negative indefinites

0. Chapter summary

This chapter integrates the results on sentential negation (from Chapter 3) with the analysis of negative concord and double negation (from Chapter 4). We study the co-occurrence restrictions between sentential negation and negative indefinites in negative concord and double negation languages. Our study supports the claims made by de Swart and Sag's (2002) that, in the presence of negative indefinites the marker of sentential negation in negative concord languages is not necessary to convey negation, because it is absorbed in the resumptive quantifier. In such cases, negation serves as a scope marker. Two syntactic constraints governing the scope of negation account for the contrast between strict and non-strict negative concord languages.

1. Classification of co-occurrence restrictions

Haspelmath (1997) identifies three types of co-occurrence restrictions between negative indefinites and the marker of sentential negation. His classification is presented in Section 1. Section 2 implements the co-occurrence pattern of double negation languages in a straightforward extension of the bi-directional OT analysis set up so far. This section also discusses the problems raised by the cross-linguistic variation in the co-occurrence with the negation marker for an analysis of n-words in terms of negative polarity. The polyadic quantifier analysis developed by de Swart and Sag (2002) is shown to offer a viable alternative, because cross-linguistic variation is expected in this approach. Section 3 shows how the preverbal/post-verbal asymmetry exploits NegFirst. Section 4 introduces a new constraint in order to capture 'strict' negative concord languages in which a marker of sentential negation always accompanies an n-word. Section 5 treats Catalan and Brazilian Portuguese as a

Chapter 5

mixed type. Section 6 focuses on negation in French. Section 7 explores micro-variation in the expression of negation in Welsh. Section 8 concludes.

Haspelmath's (1997) classification serves as the starting point of our investigation, but similar distinctions have been established by den Besten (1986), Hoeksema (1996), van der Wouden (1994, 1997), Giannakidou (1997, 1998) and Zeijlstra (2004).

1.1 Type I: obligatory presence of negation marker

Haspelmath (1997: 201) distinguishes three types of co-occurrence restrictions between Neg-expressions and markers of sentential negation. The first type involves negative indefinites (NEG) that always co-occur with verbal negation (SN), independently of their position in the sentence. Examples are provided by the Polish *ni*-series (*nikt* 'nobody', *nic* 'nothing', etc.) in (1). Similar examples are found in other Slavic languages, in Greek, Rumanian (2), Hungarian (3), etc. The examples in (1) are from Haspelmath (1997: 201), the examples in (2) from Corblin and Tovená (2003), the examples in (3) from de Groot (1993):

- (1) a. Nikt nie przyszedł. [Polish]
nobody SN came.
'Nobody came.'
- b. Nie widziałam nikogo.
SN saw nobody.
'I saw nobody.'
- (2) a. Nimeni *(nu) a venit. [Rumanian]
Nobody *(SN) has come.
'Nobody came'
- b. *(Nu) a venit nimeni.
*(SN) has come nobody.
'Nobody came'

Negation and negative indefinites

- (3) a. Senki *(nem) olvas. [Hungarian]
 Nobody *(SN) read-3Sg
 ‘Nobody read.’
- b. *(Nem) jön senki.
 *(SN) come-3Sg nobody
 ‘Nobody is coming.’
- b. Sehol *(nem) lát-t-am senki-t.
 Nowhere *(SN) see-Past-1sg nobody-Acc
 ‘I did not see anybody anywhere.’

The type SNV-NEG is the most frequent type in Haspelmath’s (1997) language sample. He refers to Tanaka (1994) for evidence that this type is functionally motivated, because both the scope and the focus of negation are marked. The close connection between the verb and sentence negation is expected if Aristotle’s and Jespersen’s view of negation as predicate denial is adopted, as argued extensively in Horn (1989). The attraction of focus to indefinite arguments marks the focus. Den Besten (1986), Hoeksema (1997), van der Wouden (1997), Giannakidou (1998) and Zeijlstra (2004) refer to type I languages as ‘negative doubling’, ‘proper’ or ‘strict’ negative concord.

1.2 Type II: no co-occurrence of negative indefinites and negation marker

In this type of co-occurrence restriction, negative indefinites never co-occur with verbal negation in the expression of a single negation reading, e.g. the English *no*-series (4), the Dutch *niets* (‘nothing’), *niemand* (‘nobody’), etc (5). Co-occurrence of the marker of sentential negation with a negative indefinite invariably leads to a double negation reading (6).

- (4) a. Nobody came.
 b. I saw nobody.
- (5) a. Niemand kwam. [Dutch]
 Nobody came.
 b. Ik zag niemand.
 I saw nobody.

Chapter 5

- (6) a. Common people are not nothing.
 b. In tegenstelling tot het lege gebaar van Sun is dit niet niets [Dutch]
 ‘In contrast to the empty gesture by Sun, this is not nothing.’

According to Haspelmath (1997: 202), type II (V-NEG) is rare in cross-linguistic distribution. In his language sample, only European languages represent this type. He explains the relative rarity of type V-NEG as the result of a discrepancy between the semantics (which requires clausal scope of negation), and the surface expression of negation (which is on a participant, rather than on the verb in this type.)

Type II is the normal situation for double negation languages like English, Dutch, etc. However, the pattern is not excluded for negative concord languages, for we find similar effects in a language like French. Haspelmath does not discuss this language for this category, but if we ignore the complications that arise with the clitic *ne* and restrict our attention to spoken French, we observe that *pas* is the standard expression of sentential negation in sentences like (7). However, *pas* is not required with n-words, be they pre-verbal (8a) or post-verbal (9a) in the expression of a single negation reading. The insertion of *pas* in (8b), (9b) does not make the sentences ungrammatical, but they get a double negation reading, just like the sentences in (6).

- (7) a. Il vient pas. [spoken French]
 He comes SN.
 ‘He doesn’t come.’
 b. J’ai pas vu Pierre.
 I have SN seen Pierre.
 ‘I haven’t seen Pierre.’
- (8) a. Il est venu pour rien.
 He is come for nothing
 ‘He came for nothing.’
 b. Il est pas venu pour rien.
 He is SN come for nothing
 ≠ ‘He didn’t come for anything.’ [NC]
 = ‘He didn’t come for nothing.’ [DN]

- (9) a. *Personne est venu.*
 Nobody is come.
 ‘Nobody came.’
- c. *Personne est pas venu.*
 Nobody is SN come
 ≠ ‘Nobody came.’ [NC]
 = Nobody didn’t come. [DN]
- (10) a. *Personne a rien dit.*
 Nobody has nothing said
 = ‘Nobody said anything.’ [NC]
 = ‘Nobody said nothing.’ [DN]
- b. *Personne est le fils de personne.*
 Nobody is the son of nobody
 = ‘Nobody is the son of anybody.’ [NC]
 = ‘Nobody is the son of nobody.’ [DN]

Of course, a combination of two negative indefinites is possible, as in (10). The sentences are ambiguous (cf. Chapter 4, Section 4), but one of the possible interpretations is the single negation reading that characterizes the negative concord construction. In contrast to (10), sentences (8b) and (9b) never exhibit a single negation reading. This would be the normal situation in a DN language like English or Dutch, but it is a fairly unusual situation in a language like French, which exemplifies negative concord for sequences of Neg-expressions, as illustrated in (10). We will come back to the exceptional situation of French in Section 6 below. There, we will not only provide an analysis of the data from spoken French, but also account for the clitic *ne* in written French.

It is often assumed that if in a language Neg-expressions do not co-occur with verbal negation, they also do not co-occur with each other in the expression of a single negation reading. Haspelmath (1997: 219) emphasizes that this is not true. Spoken varieties of modern French already indicate that true type II negative concord languages exist, but, the situation in French is fairly complex, so it would help to find

Chapter 5

additional languages that display this pattern. Haspelmath mentions Occitan (data in 11 from Bernini and Ramat 1996). The West Flemish data in (12) pattern along similar lines (Haegeman and Zanuttini 1996).

- (11) a. Ai ges d'amic. [Occitan]
have.1SG nothing of friend
'I have no friend.'
- b. Degun vegué ren.
Nobody saw nothing
'Nobody saw anything.'
- (12) a. da Valère niemand kent. [West Flemish]
that Valère nobody knows
'that Valère doesn't know anybody.'
- b. K'een an niemand niets gezeid.
I-have to nobody nothing said
'I didn't say anything to anyone.'

No marker of sentential negation is required to support the post-verbal negative indefinite in sentences such as (11a) and (12a) (although such a support is optionally available in West Flemish, cf. Chapter 8, Section 3.3). Still, the sequence of Neg-expressions in (11b) and (12b) expresses a single negation reading, so the sentences exemplify negative concord. The existence of negative concord interpretations without the support of a marker of sentential negation provides strong support for the analysis defended in de Swart and Sag (2002), adopted in Chapter 4, in which negative concord is driven by negative quantifiers, rather than by sentential negation. However, as admitted by Haspelmath (1997: 218), type II languages displaying negative concord are rare.

1.3 Type III: preverbal/post-verbal asymmetry

In this type of co-occurrence restriction, we find negative indefinites (NEG) that sometimes co-occur with verbal negation (SN) and sometimes do not, e.g. the Italian, Spanish and Portuguese *n*-series.

- (13) a. *Ninguém veio.* [E. Portuguese]
 Nobody came
 b. *Não veio ninguém.*
 SN came nobody.
 ‘Nobody came.’

The general observation is that a preverbal marker of sentential negation is obligatory when the n-word is post-verbal (as in 13b), whereas no preverbal marker is present when the n-word is preverbal (as in 13a). Type III ((SN)V-NEG) is strong in Romance, but rare elsewhere (Haspelmath 1997). According to Zanuttini (1991: 152-3) and Ladusaw (1992), the functional motivation for this type is that post-verbal n-words in Romance are unable to take sentential scope. A preverbal expression of negation (n-word or SN) is thus motivated by the desire to express negation at the clausal (propositional) level. Den Besten (1986), Hoeksema (1997), van der Wouden (1994, 1997), Giannakidou (1997, 1998) and Zeijlstra (2004) refer to type III languages as ‘negative spread’, ‘improper’ or ‘non-strict’ negative concord.

In the remainder of this chapter, we will provide an account of all three types of negative concord languages in an extension of the bi-directional OT grammar developed in Chapter 4.

2. Towards an analysis

This section sets the stage for an account of Haspelmath’s classification of co-occurrence restrictions between the marker of sentential negation and negative indefinites in the OT analysis developed so far. First, we show that a straightforward extension of the bi-directional grammar developed in Chapter 4 explains why double negation languages like Dutch and English cannot be type I or III, but must be type II languages. Second, we show that the fact that negative concord languages can be type I, type II or type III languages raises a problem for classical analyses of negative concord in terms of licensing. The polyadic quantifier analysis developed by de Swart and Sag (2002) offers a radically different perspective on the role of sentential negation, and argues that the marker of negation is not needed to convey negation in

Chapter 5


concord constructions. Given that the marker of sentential negation is semantically redundant in negative concord contexts, languages are free to include it in the concord system, exclude it from the concord system, or exploit the marker of negation for syntactic purposes (typically as a scope marker). As we will show in Sections 3 and 4, this opens new ways to account for the typological variation we find in the co-occurrence restrictions between the marker of sentential negation and negative indefinites that we find in concord languages.

2.1 Lack of co-occurrence

In Chapter 3 we argued that the use of a marker of sentential negation incurs a violation of the constraint *Neg in the OT syntax. In Chapter 4, we argued that a negative indefinite also incurs a violation of the constraint *Neg in the OT syntax. If both expressions incur a violation of *Neg in the syntax, the combination of a marker of sentential negation and a negative indefinite (in some or in all cases) in the expression of a single negation reading thus requires a grammar in which we find the ranking *Neg >> IntNeg in the OT semantics. This ranking is the hallmark of negative concord languages, as we saw in Chapter 4. Accordingly, Neg-expressions in type I and type III languages are n-words, and all double negation languages are type II languages in Haspelmath's classification. Neg expressions in type II languages are either negative quantifiers in double negation languages such as English or n-words in negative 'spread' languages like (spoken) French, in which we find negative concord with negative indefinites, but not with the marker of sentential negation (cf. the examples in 7-10) in Section 1.2 above.

A straightforward extension of the OT analysis developed in Chapter 4 accounts for the English and Dutch data in (4)-(6). NegAttract is operative in the OT syntax, and this constraint favors the realization of negation on an argument. In the absence of other faithfulness constraints driving the insertion of a negation marker, *Neg blocks the combination of a marker of sentential negation and a negative indefinite in the expression of a single negation reading. Tableau 1 illustrates.

Tableau 1: Negative indefinite without a marker of sentential negation (production)
(English, Dutch)


Meaning $\neg\exists xV(x)$	Form	FaithNeg	*Neg	NegAttr	MaxNeg
	indef V	*		*	*
	indef SN V		*	*	*
	neg V		*		
	neg SN V		**		

In Chapter 3, we adopted the ranking $\text{FNeg} \gg *Neg$ as the universal order of these constraints in all natural languages. The high ranking of FNeg blocks ‘indef V’ as the optimal candidate for the expression of a negation meaning. With the candidate ‘indef SN V’, the marker of sentential negation (SN) satisfies FaithNeg , and incurs a violation of $*Neg$, just like a Neg-expression. The candidate ‘neg V’ is a better candidate, because it satisfies NegAttr as well as FaithNeg . The combination of the marker of sentential negation with a Neg-expression as in the candidate ‘neg SN V’ satisfies all the relevant faithfulness constraints, but incurs an extra violation of $*Neg$ in comparison to the candidate ‘neg V’. Economy then dictates that that ‘neg V’ is a better candidate. This grammar thus accounts for the observation that we choose the form ‘Nobody came’ or ‘Niemand kwam’ as the optimal expression of the meaning $\neg\exists x\text{Come}(x)$ in examples (4) and (5) above (cf. Chapter 4, Section 2).

As far as the interpretation is concerned, the high ranking of IntNeg leads to the double negation reading as the optimal interpretation of sentences like (6), in which we find the combination of a marker of sentential negation and a negative indefinite. Tableau 2 illustrates.

Chapter 5

Tableau 2: Double negation in English, Dutch, etc. (interpretation)

Form SN V neg	Meaning	FaithNeg	IntNeg	*Neg
	$\exists x V(x)$	*	**	
	$\neg \exists x V(x)$		*	*
	$\neg \neg \exists x V(x)$			**

For the combination of a marker of sentential negation and a Neg-expression, the ranking $\text{FNeg} \gg \text{*Neg}$ implies that we cannot ignore the semantic contribution of the negation marker in the input form. The competition between a single negation and a double negation reading is decided by the way we order IntNeg and *Neg with respect to each other. For double negation languages like English and Dutch, Chapter 4 adopted the ranking $\text{IntNeg} \gg \text{*Neg}$. Both the marker of sentential negation and the Neg-expression need to contribute a negation in the semantics in order to fully satisfy IntNeg . The double negation reading incurs two violations of *Neg , but the low ranking of this constraint in the OT semantics makes this the optimal interpretation in the grammar of Dutch and English. The grammar exemplified in Tableau 2 then obtains the double negation reading of the combination of a marker of sentential negation and a Neg-expression in the same way as we obtained the double negation reading from the combination of two Neg-expressions in Chapter 4.

We see that the bi-directional grammar $\text{FNeg} \gg \text{IntNeg} \gg \text{*Neg} \gg \text{MaxNeg}$ we developed for double negation languages like Dutch and English extends in a straightforward way to the cases in which a marker of sentential negation co-occurs with a Neg-expression. This accounts for one half of the set of type II languages. Economy reasons will also turn out to explain the French data in (8) and (9). However, given that French is a negative concord language, and not a double negation language, this will be easier to show once we have dealt with Haspelmath's type I and type III languages, so we will postpone the analysis of French until Section 6 below. If all we had was a competition between NegAttract , MaxNeg and *Neg , we would predict that we never find the combination of a marker of sentential negation and a Neg-expression. Even negative concord languages would then all be of type II. But of course, we find such combinations in type I and type III languages. So other

constraints are active, and come into play in these languages. Before we work out the OT analysis, it is useful to explain why we find cross-linguistic variation in the use of the marker of sentential negation in concord languages.

2.2 The role of sentential negation in negative concord

As pointed out by de Swart and Sag (2002: 401), the fact that the role of sentential negation in negative concord is subject to considerable cross-linguistic variation constitutes a significant problem for approaches to negative concord in which sentential negation plays an important role as the licenser of the n-word (Laka 1990, Ladusaw 1992, Przepiórkowski and Kupść 1999, Giannakidou 1998, Zeijlstra 2004 and others). Licensing conditions on negative polarity are by and large the same across languages. Variation only obtains within strict limits. But if negative concord involves a mechanism by means of which the n-word is licensed by a marker of sentential negation or a negative head, Haspelmath's co-occurrence restrictions seem to imply that we have to assume that each language has its own set of licensing conditions on n-words. After all, in some negative concord languages the n-words are incompatible with the marker of sentential negation (French), in other languages n-words always require the marker of sentential negation (Slavic, Greek, Hungarian, Afrikaans) and still other languages display a preverbal/post-verbal asymmetry (Portuguese, Spanish, Italian). According to Ladusaw (1992: footnotes 10 and 11), a proliferation of licensing conditions is not very attractive.

Zeijlstra (2004, Chapter 8) fully endorses the consequences of the licensing approach, and claims that negative markers in different types of negative concord languages have different negation features. Variation thus resides in the lexicon. Zeijlstra exploits the distinction the minimalist framework establishes between interpretable and non-interpretable features to this aim. The negation marker in a non-strict (type III) negative concord language like Spanish has an interpretable Neg-feature, but the negation marker in strict (type I) languages like Slavic has an uninterpretable Neg-feature. N-words and negative markers in type I languages participate in a feature checking relation with an abstract, i.e. phonologically empty operator that takes clausal scope. In type III languages, the uninterpretable feature of the post-verbal n-word is checked against the interpretable feature of the marker of negation, whereas the uninterpretable feature of the preverbal n-word is checked

Chapter 5

against the interpretable Neg-feature of an abstract negative operator. Within the overall set-up of the minimalist framework, the covert negative operator is motivated by the unified treatment of negative concord in terms of syntactic, rather than semantic agreement (Zeijlstra 2004: 246).

In a more surface oriented syntax, an approach which does not need negations that are semantically potent, but syntactically ‘hidden’ would be preferred. Zanuttini (1991: 126 sqq) and Ladusaw (1992) already make this point in relation to Laka’s (1990) postulation of a ΣP that hosts semantic negation, but is not always filled with lexical material (cf. Chapter 1, Section 4). Although Zeijlstra uses a more recent version of the Chomskian paradigm, he is vulnerable to the same criticism. If we do not want to posit covert negation operators, we cannot reduce negative concord to syntactic agreement, and we are back to where Zanuttini and Ladusaw were in the early nineties.

Watanabe (2004) provides an alternative which also relies on the notion of feature checking in the minimalist framework. Unlike Zeijlstra, Watanabe takes n-words to be inherently negative (cf. Chapter 1, Section 4). This raises the question how the combination of a marker of sentential negation and an n-word can express a single, rather than a double negation in contexts like (1)-(3) or (13b), but not in (6). In double negation as well as negative concord languages, the negative head also contributes a negation. Watanabe proposes an indirect account in terms of checking of focus features, which leads to the copying of neg-features in negative concord languages. Feature copying guarantees the presence of two neg-features on the negative head. The two neg-features cancel each other out, so that the negative head in (1)-(3) or (13b), but not (6) denotes the identity function, rather than negation. Although Watanabe accounts for the doubling of an n-word by a marker of sentential negation in type III and type I languages along these lines, he does not account for the possibility of sequences of multiple n-words (negative spread), as illustrated in (14).

- (14) Mario *non* ha parlato di *niente* con *nessuno*. [Italian]
Mario SN has talked about *nothing* to *nobody*
‘Mario didn’t talk to anyone about anything.’

The mechanism of feature copying applies to the negative head *non*, but leaves the negative value of both *niente* and *nessuno* intact. In order to obtain the single, rather than the double negation reading of examples like (14), Watanabe suggests that the polyadic quantifier treatment proposed by de Swart and Sag provides a good analysis of negative spread. Watanabe (2004, footnote 27) claims that the extension of this account to negative doubling, as proposed by de Swart and Sag, is not justified, given his treatment of negative doubling. In this section, we will turn this argumentation around, and suggest that a unified analysis, if possible, is preferred. There is no need for an account of negative doubling separate from negative spread, given that the polyadic quantifier analysis can account for both phenomena. As pointed out in Chapter 4, Section 4, under the polyadic quantifier analysis developed by de Swart and Sag (2002), negative concord is viewed as semantic agreement. The difference between DN and NC languages resides in the grammar, rather than in the lexicon. One of the advantages of the polyadic quantifier analysis is that it provides a new view on the role of sentential negation in negative concord constructions. This view constitutes the semantic foundation for the cross-linguistic variation in the role of sentential negation under the OT analysis we develop in Sections 3 and 4 below.

In the polyadic quantifier analysis, the single negation reading of a sequence of Neg-expressions is the result of a resumptive interpretation of a sequence of monadic negative quantifiers. The resumptive quantifier maps a series of k n-words and one k -ary predicate onto a proposition involving one negative quantifier binding k variables. Crucially, the resumptive quantifier binds the sum of all the variables of the composing monadic quantifiers (cf. Chapter 4, Section 4). The example in (15), repeated from Chapter 4, spells this out.

- (15) a. Nessuno ha ~~detto~~ niente. [Italian]
 Nobody has said nothing.
 ‘Nobody said anything.’
 b. $\text{NO}_{\text{E2}}^{\text{HUM} \times \text{INAN}} (\text{SAY})$
 c. $\neg \exists x \exists y \text{ Say}(x, y)$

Verwijderd: i

Verwijderd: .

De Swart and Sag (2002) extend the construction of the resumptive quantifier to include mixed cases in which a sequence of Neg-expressions combines with a marker

Chapter 5

of sentential negation. Of course, sentential negation is a propositional operator, not a variable binding operator. In terms of the polyadic quantifier theory, this means that it is an expression of a different type. Full NPs (or DPs) denote functions from the power set of the universe of discourse provided by a one-place predicate to truth values; they are defined as type $\langle 1 \rangle$ quantifiers. Determiners map a one-place predicate onto a DP, so they denote functions from the power set of the universe of discourse to type $\langle 1 \rangle$ quantifiers; they are defined as type $\langle 1, 1 \rangle$ quantifiers. A sentential operator like negation is a function from propositional entities into truth-values. If we conceive of propositions as zero-place predicates, we can treat a non-variable binding operator such as negation as a quantifier with adicity zero, or a quantifier of type $\langle 0 \rangle$.

- Non-variable binding, propositional operators such as negation are treated as quantifiers of type $\langle 0 \rangle$.

Under this definition of negation, we can extend our definition to allow resumption of quantifiers of different types. Recall that a resumptive negative quantifier interprets a sequence of anti-additive quantifiers $Q^1 \dots Q^k$ of type $\langle 1, 1 \rangle$ as one complex negative quantifier Res_Q of type $\langle 1^k, k \rangle$. This means that the resumptive quantifier maps a series of k one-place predicates and one k -ary predicate onto a proposition. As such, it binds the sum of all the variable of the composing quantifiers. Given that sentential negation does not bind any variables, it does not add any variables to the sum of variables bound. As a consequence, it does not change the type of the resumptive quantifier. An extension of the rule for resumptive quantification to a sequence of negative quantifiers that involves a mixture of type $\langle 1, 1 \rangle$ and type $\langle 0 \rangle$ quantifiers can thus be defined as follows.

- Resumption of a sequence of k type $\langle 1, 1 \rangle$ quantifiers Q and l type $\langle 0 \rangle$ quantifiers Q' leads to the construction of a resumptive quantifier Q'' of type $\langle 1^k, k \rangle$, such that:

$$Q''_{E^{A_1 \dots A_k}}(R) = Q_{E^k}^{A_1 \times A_2 \times \dots \times A_k}(R)$$

Where $A_1 \dots A_k$ are subsets of the universe of discourse E , and $A_1 \times A_2 \times \dots \times A_k$ and R are subsets of E^k .

In sum, resumption is only defined for quantifiers that are somehow ‘the same’. The resumptive negative quantifier is only defined for anti-additive quantifiers such as *nobody*, *nothing*, etc. Of course, *not* is also anti-additive, so it can participate in the resumptive negative quantifier. As a type <0> quantifier, however, it does not affect the type of the polyadic quantifier. As a consequence, negation is semantically redundant in a negative concord context. The Italian example in (14), repeated in (16) illustrates.

- (16) a. Mario *non* ha parlato di *niente* con *nessuno*. [Italian]
 Mario SN has talked about *nothing* to *nobody*
 ‘Mario didn’t talk to anyone about anything.’
 b. $\text{NO}_{\text{E2}}^{\text{INAN} \times \text{HUM}}(\text{SAY}_M)$
 c. $\neg \exists x \exists y \text{ Say}(m, x, y)$

The two n-words *niente* and *nessuno* provide two type <1> quantifiers, the negation marker *non* provides a type <0> quantifier, and the verb applied to the subject (written as SAY_M) denotes a two-place relation. The resumptive quantifier is spelled out in (16b) as $\text{NO}_{\text{E2}}^{\text{INAN} \times \text{HUM}}(\text{SAY}_M)$, and requires no pair of a thing and a human to stand in the relation of be-spoken-to-by-Mario. This corresponds with the truth conditions $\neg \exists x \exists y \text{ Say}(m, x, y)$ in (16c), which require there to not be a thing x and an individual y such that Mario said x to y . The negation marker *non* has been absorbed in the mixed resumptive quantifier, and leaves no separate reflection in the truth conditions. The polyadic quantifier analysis thus relies on n-words, not on sentential negation to express a negative proposition involving multiple indefinites. This leads de Swart and Sag (2002: 401) to conclude that the marker of sentential negation is semantically redundant in a negative concord context.

Of course, concord languages have a marker of sentential negation, just like any other language. They employ it to express negation in propositions that do not involve ‘negative variables’ (i.e. indefinites in argument or adjunct position), as discussed in Chapter 3 (Section 2), and further illustrated in a sentence like (17).

Chapter 5

- (17) Gianni non mangia. [Italian]
Gianni SN eat
'Gianni doesn't eat.'

In an example like (17), the negation marker is responsible for the syntactic marking of negation, as well as for the semantic interpretation of the sentence as expressing a negative proposition. So there is no doubt about the marker of sentential negation actually having the semantics of a negation operator in double negation and negative concord languages alike. Furthermore, the syntactic and semantic status of the marker *non* in (16a) is strictly the same as that of *non* in (17). In fact, *non* in (16a) has to have the semantics of a real negation operator, otherwise it could not participate in the resumption of a sequence of anti-additive quantifiers (16b). It is just that in the course of the resumption process, the negation contributed by the sentential negation marker is absorbed in the polyadic negative quantifier, so we don't find a separate contribution of *non* in the truth conditions spelled out in (16c). In the absence of an n-word, no resumptive negative quantifier is built in (17), so the semantic contribution of *non* is directly reflected in the truth conditions. Thus the claim that negation is semantically redundant is restricted to sentences involving one or more n-words.

If we accept the polyadic quantifier analysis, we know that sentential negation is semantically redundant in contexts of resumption, although not in contexts involving just propositional negation. We predict then that languages are free to exclude the marker of negation from concord constructions (as observed for *pas* in French, cf. 8 and 9 above) or include the negation marker in the concord system, and exploit it for syntactic purposes, as in non-strict and strict concord languages (examples 1-3 and 13 respectively). Haspelmath's (1997) classification reflects the typological patterns we find. De Swart and Sag (2002) do not offer a typological theory that accounts for the different uses languages make of the marker of sentential negation in contexts involving n-words. The HPSG analysis provides the syntax-semantic interface of natural language grammars in general, and does not predict which language works out which option. In this chapter, we couple the polyadic quantifier analysis proposed by de Swart and Sag (2002) with an OT grammar that accounts for the typological dimension, as an extension of the analysis developed in Chapter 4. In Section 3, we will show that non-strict (type III) negative concord languages exploit the constraint NegFirst, which was already introduced in Chapter 3

to account for the cross-linguistic preference for preverbal negation. Strict (type I) negative concord languages require the introduction of a new constraint, which will be labelled as MaxSN (Section 4). Sections 5 through 7 show the OT analysis at work in more complex situations.

3. Preverbal/post-verbal asymmetry

As indicated in Section 1.3 above, type III languages are characterized by a preverbal/post-verbal asymmetry. Since Zanuttini (1991) and Ladusaw (1992), it is well known that n-words in these languages can occur without negation in preverbal position, but need the support of a marker of sentential negation to mark clausal scope when they occur in post-verbal position:

- (18) a. Mario **(non)* ha parlato di *niente* con *nessuno*. [Italian]
 Mario **(SN)* has talked about *nothing* to *nobody*
 ‘Mario didn’t talk to anyone about anything.’
 b. *Nessuno* (**?non*) ha parlato con *nessuno*.
Nobody (**?SN*) has talked with *nobody*.
 ‘Nobody talked to anyone.’

- (19) a. **(No)* ha visto a *nadie*. [Spanish]
**(SN)* has seen nobody
 ‘He hasn’t seen anybody.’
 b. *Nadie* (**?non*) ha dicho *nada*.
Nobody (**?SN*) has said nothing
 ‘Nobody said anything.’

- (20) a. Não veio ninguém [E. Portuguese]
SN came nobody.
 ‘Nobody came.’
 b. Ninguém (**não*) veio.
Nobody (**SN*) came
 ‘Nobody came.’

Chapter 5

As these examples indicate, negation must be preverbal, but it does not matter whether it is expressed by a marker of sentential negation (18a, 19a, 20a), or by an n-word (18b, 19b, 20b). When the preverbal negation is expressed by a Neg expression, a marker of sentential negation is excluded. Insertion of a preverbal marker of sentential negation in combination with a preverbal n-word, as in (18b), (19b) and (20b) generally leads to ungrammaticality, and marginally to double negation readings (Zanuttini 1997, Corblin and Tovenà 2003, cf. also Chapter 6 below).

According to Horn (1989: 450), Haspelmath (1997: 211) and Corblin and Tovenà (2003: 332), NegFirst provides the key to the Romance pattern. We defined it as a violable constraint in Chapter 3 (Section 4).

- ◆ NegFirst
Negation precedes the finite verb


Variants of NegFirst are discussed in the literature, e.g. Jespersen (1917, 1933), Dahl (1979), Horn (1989), Haspelmath (1997), Corblin and Tovenà (2003), Corblin et al. (2004). As argued in Chapter 3, NegFirst is functionally motivated by the desire ‘to put the negative word or element as early as possible, so as to leave no doubt in the mind of the hearer as to the purport of what is said’ (Jespersen 1933: 297 as quoted by Horn 1989: 293, who dubs this principle ‘NegFirst’). Languages that place the marker of negation in a preverbal position have a high ranking of NegFirst in the OT syntax.

NegFirst can be satisfied either by a marker of sentential negation or by a negative indefinite. In Chapter 4 (Section 2), we used this insight to explain the alternation between ‘We didn’t meet anyone’ and ‘We met no one’ in English. The claim that Neg-expressions can satisfy NegFirst proves crucial for non-strict negative concord languages. Following Corblin and Tovenà (2003), we argue that NegFirst is operative in Haspelmath’s type III languages, where it accounts for the asymmetry between preverbal and post-verbal n-words.

The type III languages in Haspelmath’s sample are all SVO languages. In the OT analysis, we need to establish a distinction between preverbal and post-verbal n-words as the correlation of the contrast between clausal or VP scope of negation. In the input meaning, we write clausal negation as $\neg\exists xV$ or $\neg V\exists x$. This notation reflects

that negation takes scope over the proposition as a whole, but the focus of negation is on an indefinite in preverbal or post-verbal position respectively. We propose to complement the usual constraint ranking for concord languages with a highly ranked constraint NegFirst for languages like Portuguese, Spanish and Italian. In sentences with a preverbal n-word, the n-word satisfies NegFirst, so a marker of sentential negation is syntactically redundant. This is illustrated in Tableau 3.

Tableau 3: Preverbal n-word without marker of negation in type III languages (Italian, Spanish, etc.) (production)

Meaning $\neg\exists xV$	Form	FNeg	MaxNeg	NegFirst	*Neg
	indef V	*	*	*	
	SN indef V		*		*
	neg V				*
	SN negV				**

The first two candidate illustrates the high ranking of FNeg as usual. The candidates ‘SN indef V’ and ‘neg V’ show that the marker of sentential negation (SN) and the n-word (neg) both satisfy the constraint NegFirst. Because of the high ranking of MaxNeg in negative concord languages, the candidate ‘SN indef V’ is suboptimal, and ‘neg V’ is preferred. The combination of a Neg-expression with the marker of sentential negation is suboptimal. The negation marker is not necessary to satisfy any of the faithfulness constraints. Therefore, the extra violation of the markedness constraint *Neg is not motivated in any way, and economy makes ‘neg V’ a better candidate than ‘SN negV’. Tableau 3 illustrates that a grammar with a high ranking of NegFirst accounts for the data in (18b), (19b) and (20b). Note further that NegFirst and MaxNeg are not in direct competition, so their mutual order is irrelevant (indicated by the dotted line), as long as they are both ranked above *Neg.

When the indefinite under negation is post-verbal, the outcome of the optimization process is different. As we see in (18a), (19a) and (20a), a preverbal marker of sentential negation is obligatory when the n-word is in post-verbal position. The high ranking of NegFirst in the grammar is responsible for this outcome, as

Chapter 5

shown in Tableau 4. In combination with a low ranking of *Neg, this grammar also leads to the desired (concord) interpretation (Tableau 5).

Tableau 4: Preverbal marker of negation with post-verbal n-word in type III languages (Spanish, Italian, etc.) (production)



Meaning $\neg V \exists x$	Form	FNeg	MaxNeg	NegFirst	*Neg	IntNeg
	V indef	*	*	*		
	SN V indef		*		*	
	V neg			*	*	
	SN V neg				**	

Tableau 5: Preverbal negation with post-verbal n-word in type III languages (Spanish, Italian, etc.) (interpretation)

Form SN V neg	Meaning	FNeg	MaxNeg	NegFirst	*Neg	IntNeg
	$V \exists x$	*				
	$\neg V \exists x$				*	*
	$\neg V \neg \exists x$				**	

IntNeg does not play a role in the production Tableau 4, because it is a purely interpretive constraint. MaxNeg and NegFirst do not play a role in the interpretation Tableau 5, because they are purely syntactic constraints. All the constraints are visible in both tableaux, so that we see the full bi-directional grammar at work. Tableau 4 shows that ‘V neg’ is not an optimal expression of the meaning $\neg V \exists x$, because the post-verbal n-word does not satisfy NegFirst. We cannot do without the n-word, for ‘SN V indef’ does not satisfy MaxNeg. In order to satisfy both NegFirst and MaxNeg, we need a preverbal marker of sentential negation, as well as a post-verbal n-word.

Accordingly, ‘SN V neg’ emerges as the optimal realization of the input meaning. If we compare Tableau 4 to Tableau 3, we see that the preverbal n-word satisfies two constraints (MaxNeg and NegFirst), whereas the post-verbal n-word satisfies only one constraint (MaxNeg). The marker of sentential negation must be inserted in examples (18a), (19a) and (20a) in order to satisfy the faithfulness constraint NegFirst, whereas it is blocked in (18b), (19b) and (20b) for economy reasons.

Tableau 5 confirms that the OT semantics doesn’t care how many negations there are in the form. The ranking *Neg >> IntNeg we adopted for negative concord languages implies that only one of them is realized in the interpretation. According to the polyadic analysis, the propositional negation is absorbed in the resumptive quantifier without affecting the type of the quantifier (cf. Section 2.2). Thus the preverbal/post-verbal asymmetry is a syntactic phenomenon. In line with the claims made by Zanuttini (1991), Ladusaw (1992) and de Swart and Sag (2002), we take negation to mark the clausal scope of negation.

Even though the negative marker is semantically redundant, its co-occurrence is functionally motivated by the desire to express negation ‘early’ in the sentence. The preverbal position is exploited to guarantee clausal scope of the VP-internal n-word. In the OT perspective, we always expect the presence of the marker of negation to be functionally motivated. If the negation marker is not necessary to satisfy a particular syntactic faithfulness constraint, it is not used. Tableau 3 shows that the markedness constraint *Neg is at work even in negative concord languages that are generally in favor of multiplication of negative forms in the syntax. OT constraints are minimally violable, and the “best” candidate is the winner (Ch 2, Section 1). In the absence of a functional motivation for the use of a marker of sentential negation in sentences with a preverbal n-word, it is left out by an appeal to economy.

As Zanuttini (1991) and (Corblin and Tovenia 2003) point out, insertion of a preverbal marker of sentential negation in combination with a preverbal n-word, as in (18b), (19b) and (20b) generally leads to ungrammaticality, but marginally a double negation reading seems to be available. These findings are reminiscent of the double negation readings we find in French combinations of *pas* and an n-word (examples 8b and 9b in Section 2 above). The grammar we have developed so far cannot account for these sentences, because it relies on a strong version of bi-directional OT. In Chapter 6 (Section 5), we offer an account of the double negation reading in negative concord languages which exploits weak bi-directional OT.

Chapter 5

NegFirst is operative in several Romance languages, including Spanish, Italian, Sardinian Portuguese (Posner 1984), and old Rumanian (Falaus 2006), but it is not a family trait of Romance. On the one hand, NegFirst is not sufficient to account for formal, written French, for modern Rumanian, or for Old Spanish and Old Portuguese, which are all strict concord languages. On the other hand, NegFirst is also operative outside of the family of Romance languages, for instance in New Testament Greek, older varieties of several Slavic languages (which are class I languages in their modern varieties, cf. Haspelmath 1997: 210- 212), and certain varieties of (white) vernacular English (Labov 1972). Haspelmath (1997: 211-212) cites the following Old Russian examples (from Křížková 1968: 24).

- (21) a. i ne idjaše s nimi nikto že [Old Russian]
and SN went with them nobody PART
'And nobody went with them.'
- b. Ničego že sja bojat' běsi, tokmo kresta.
nothing PART self fear demons only cross.
'The demons are afraid of nothing, except the cross.'

The data suggest that we find a high ranking of NegFirst in a variety of not necessarily related languages.

4. Obligatory marker of sentential negation

The type III languages discussed in Section 3 show a preverbal/post-verbal asymmetry, and display non-strict negative concord. Type I languages are strict negative concord languages, which require the presence of a marker of sentential negation in all negative sentences. Polish, Rumanian and Hungarian are strict negative concord languages, as illustrated in (1)-(3) in Section 1.3 above. For comparison, we add examples from Greek (Giannakidou 1997) and Japanese (Watanabe 2004):¹

¹ Watanabe (2004) glosses *nani-mo* as 'what-mo', because it consists of a *wh*-item followed by the focus particle *mo*. In line with the way we write *n*-words in this book, we gloss it as 'nothing'.

- (22) a. Dhen ipa TIPOTA. [Greek]
 SN said.1sg nothing.
 ‘I didn’t say anything.’
 b. KANENAS *(dhen) idhe ti Roxani.
 Nobody *(SN) saw.3sg the Roxanne.
 ‘Nobody saw Roxanne.’
- (23) a. John-wa nani-mo tabe-nak-atta. [Japanese]
 John-TOP nothing eat-SN-PAST
 ‘John didn’t eat anything.’
 b. Dare-mo monku-o iwa-nak-atta.
 nobody complaint-ACC say-SN-PAST
 ‘Nobody complained.’

Just like type III languages, type I languages require a marker of sentential negation with a post-verbal n-word (22a) or an object (23a). Unlike type III languages, type I languages also require such a marker when the sentence contains a preverbal n-word (22b) or a subject (23b). A high ranking of NegFirst would be sufficient to account for the configuration in (22a), but it would not account for sentences like (22b) or (23). We need a new constraint, which we label MaxSN:

◆ MaxSN

A negative clause must bear a marker of sentential negation

MaxSN is a constraint that is functionally motivated by the desire to realize clausal negation by means of a sentential operator. The marker of sentential negation in type I languages thus functions as a scope marker, but in a different way than in type III languages. MaxSN is operative in languages if the grammar ranks it above *Neg. In type I and II languages, this constraint is ranked below *Neg. If we would add MaxSN to Tableaux 1, 3 and 4, its position below *Neg would not change the optimization process. On the other hand, there is no reason to assume a high ranking for NegFirst in type III languages, so we rank it below *Neg. The insertion of a

Chapter 5

negation marker in sentences with post-verbal and preverbal n-words is spelled out in Tableaux 6 and 7 respectively:

Tableau 6: Generation of type I languages with post-verbal n-word (Greek, Slavic, ...)

Meaning	Form	MaxNeg	MaxSN	*Neg	NegFirst	IntNeg
$\neg V \exists x$						
	SN V indef	*		*		
	V neg		*	*	*	
\Rightarrow	SN V neg			**		

Tableau 7: Generation of type I languages with preverbal n-word (Greek, Slavic, ...)

Meaning	Form	MaxNeg	MaxSN	*Neg	NegFirst	IntNeg
$\neg \exists x V$						
	indef SN V	*		*		
	neg V		*	*		
\Rightarrow	neg SN V			**		

MaxSN and MaxNeg are not in direct competition, so their mutual ranking is irrelevant, as indicated by the dotted line. It suffices that MaxSN and MaxNeg are both ranked higher than *Neg. There are two important differences between NegFirst and MaxSN. First, unlike NegFirst, MaxSN is not sensitive to the position of the marker of sentential negation: it can be preverbal or post-verbal, as long as it is there. Second, a preverbal n-word can satisfy NegFirst, but n-words cannot satisfy MaxSN. In type III languages, the n-word is licensed by MaxNeg, just like in any concord language, but MaxSN can only be satisfied by the presence of a negation marker. Given that both MaxSN and MaxNeg are ranked above *Neg, we need to have both an n-word and a marker of sentential negation in order to express a single negation reading. Of course, all type I languages are negative concord languages that rank *Neg above IntNeg in the semantics. As a result, the semantic contribution of the

negation marker is absorbed in the resumptive quantifier, and the single negation reading is recoverable. Because of the resumptive interpretation, negative concord languages can exploit the marker of sentential negation for syntactic purposes such as scope marking.

Many class I languages contain a preverbal marker of negation (e.g. Slavic, Rumanian, Hungarian, Greek). The preverbal marker of sentential negation does not only satisfy MaxSN, but automatically satisfies NegFirst as well. In OT terms, this is an instance of harmonic binding.² In Tableaux 6 and 7, I did not consider any candidates that did not realize the marker of negation preverbally. However, MaxSN cannot be reduced to a version of NegFirst. The constraints can be shown to be independent in NC languages that satisfy the constraint MaxSN with a post-verbal marker of SN. Afrikaans *nie* provides an example:

- (24) a. Jan het gehoop dat *niks* met hom sou gebeur *nie*. [Afrikaans]
 Jan has hoped that nothing with him would happen SN
 ‘Jan hoped that nothing would happen to him.’
 b. Sy hou *nooit* op met werk *nie*.
 She holds never up with work SN
 ‘She never stops working.’

In Afrikaans, NegFirst is ranked below constraints that favor a position late in the sentence (e.g. FocusLast, cf. Chapter 3). However, we find fewer type I languages that behave like Afrikaans than that behave like Slavic, Greek, etc. Probably, the typological distribution finds its source in the pervasive influence of NegFirst in natural language (cf. Chapter 3, Section 4).

Note that the high ranking of the constraint MaxSN favors candidates that incur additional violations of *Neg. Because of the ranking *Neg >> IntNeg, the proliferation of the negations does not have any consequences for the semantics. Tableau 8 illustrates this for the interpretation of a sentence with a preverbal n-word.

² . In McCarthy’s (2002: 23) definition of harmonic binding, the mapping from input A to an output candidate B harmonically binds the mapping from input A to another output candidate C if and only if the mapping onto B incurs a proper subset of the constraint violations incurred by the mapping onto C.

Chapter 5

Tableau 8: Preverbal negation with preverbal n-word in type I languages (Greek, Slavic, Hungarian, etc.) (interpretation)

Form neg SN V	Meaning	FNeg	MaxNeg	NegFirst	*Neg	IntNeg
	$\exists xV$	*				
\neg	$\neg \exists xV$				*	*
	$\neg \exists x \neg V$				**	

It does not matter how many negative forms the sentence contains. Under the ranking $FNeg \gg *Neg \gg IntNeg$ in the OT semantics, they all get absorbed into one resumptive negation. The marker of sentential negation is semantically redundant in a context which contains one or more Neg-expressions. We conclude that both type I and type III languages support the view put forward by de Swart and Sag (2002) that the marker of sentential negation, though inherently negative, does not affect the semantics of negative concord (Section 2.2). As a result, languages can use the negation marker for different syntactic purposes. Whether or not we find a (pre)verbal marker of sentential negation in concord languages depends on functional considerations of scope marking, which give rise to constraints like NegFirst or MaxSN.

5. Mixed cases

Catalan and Brazilian Portuguese exemplify a mixture of class I and class III properties (Ladusaw 1992, Vallduví 1994, Zanuttini 1997, Zeijlstra 2004):

- (25) a. En Pere **(no)* ha fet *res*. [Catalan]
 The Peter **(SN)* has done *nothing*.
 b. *Ningú* (*no*) ha vist en Joan.
Nobody (SN) has seen John.

Negation and negative indefinites



- (26) a. **(Nãõ) vi ninguem.* [Br. Portuguese]
 $*(SN)$ saw nobody.
 ‘I didn’t see anybody.’
 b. *Ninguem (nãõ) disse nada.*
 Nobody (SN) said nothing.
 ‘Nobody said anything.’

As (25) and (26) indicate, a preverbal marker of sentential negation is required with a post-verbal n-word. With a preverbal n-word, the negation marker is optional. This indicates that NegFirst is ranked above *Neg, but MaxSN somehow interacts with *Neg. We can account for these data if we assume the ranking MaxNeg >> NegFirst >> MaxSN <<>> *Neg. Suppose that MaxSN and *Neg are ranked equally high (i.e. <<>> in ordinal OT) or have a strongly overlapping range (in stochastic OT, cf. Chapter 3, Section 5). Given that NegFirst is higher than either one, we generate a preverbal marker of sentential negation with post-verbal n-words, just like in a type III language (25a, 26a, Tableau 9). With preverbal n-words (25b, 26b), the equal position of MaxSN and *Neg generates two optimal outputs (Tableau 10).

Tableau 9: Generation of Catalan/Brazilian Portuguese with post-verbal n-word

Meaning	Form	MaxNeg	NegFirst	MaxSN	*Neg	IntNeg
$\neg\forall\exists x$						
	V neg		*	*	*	
\Rightarrow	SN V neg				**	

Tableau 10: Generation of Catalan/Brazilian Portuguese with preverbal n-word

Meaning	Form	MaxNeg	NegFirst	MaxSN	*Neg	IntNeg
$\neg\exists x_1 \forall\exists x_2$						
	neg V neg			*	**	
	neg SN V neg				***	

Chapter 5

The difference between preverbal and post-verbal n-words is accounted for by the high ranking of NegFirst. However, Catalan is not a full type III language, because MaxSN is not ranked (strictly) below *Neg. It shares features with type I languages in allowing rankings in which MaxSN wins over *Neg. Thus a marker of sentential negation optionally shows up in outputs for the expression of preverbal n-words. As pointed out by Vallduví (1994), the optionality of a preverbal marker of sentential negation in combination with a preverbal n-word does not have a semantic effect. In the OT semantics, *Neg is ranked above IntNeg, so all negative meanings of the individual Neg-expressions and the negation marker are collapsed into the single negation of the resumptive quantifier (cf. Tableaux 5 and 8 above).

Vallduví does not discuss any factors that might differentiate the two varieties of Catalan. Maria Teresa Espinal (p.c.) suggests that the older generation typically uses the type I variety, and the younger generation uses the type III variety. She relates this to the influence of Spanish. If her observations are correct, there are actually two grammars of Catalan, one that ranks MaxSN >> *Neg (the older generation), and one that ranks *Neg >> MaxSN (the younger generation), and Catalan is moving away from a Rumanian-like type I language towards a Spanish-like type III language. Spanish itself was a type I language in its older varieties (cf. Herburger 2001), so the diachronic pattern is not unusual.³

Haspelmath (1997: 211, 213) observes that the Catalan pattern is also found in Old Church Slavonic, and in several (mostly African-American) dialects of English. Haspelmath quotes the following examples from Labov (1972: 785-6), which indicates that the negation marker is optionally present with n-words in subject position in African American English (AAE).

- (27) a. *Nobody* don't know where it's at. [AAE]
b. *Nobody* fights fair.

If there is free variation in AAE between the constructions in (27a) and (b), this language displays a mixed case as well.

³ Note that the development is not necessarily unidirectional. According to Falaus (2006), old Rumanian was a type III language, whereas modern Rumanian is a type I language, as we saw in Sections 1 and 4 above.

Berber also displays features of a type I as well as a type III language. Ouali (2003, 2005) observes that post-verbal n-words require the presence of the preverbal negation *ur*, whereas with preverbal n-words, *ur* is optional. Ouali discusses different Berber dialects, with slightly different restrictions. Example (28) illustrates the situation in Tamazight Berber.

- (28) a. *ur as-wshi.x walu* [Tamazight Berber]
 SN him-give.PER.3SG nothing
 ‘I did not give him anything.’
 b. *urgin (ur) dix gher Frans*
 never (SN) go.PERF.1SG to France
 ‘I have never been to France.’

It is hard to account for such mixed systems in a linguistic theory that locates the distinction between strict and non-strict negative concord in the lexicon. Such an approach would postulate a lexical ambiguity of the marker of sentential negation between a negative and a non-negative meaning. We consider such lexical ambiguities unmotivated, and defend a unified analysis of the marker of sentential negation as contributing a semantic negation. In the OT system, languages can be set in between a type I and a type III language, but nevertheless represent a balanced system that reflects the interaction of NegFirst, MaxSN and *Neg.

6. Two varieties of French

The French language is an unusual case in Haspelmath’s typology. As far as the negation system is concerned, we need to distinguish two varieties. In the formal (written) language, all negative sentences contain the preverbal marker *ne*, even those that contain the post-verbal marker of sentential negation *pas* (29a). Multiple n-words allow an interpretation in terms of negative concord (29d). The combination of *pas* with an n-word always leads to a double negation reading (29e). Because of the obligatory presence of *ne*, this variety of French is a clear case of a type I language.

Chapter 5

- (29) a. Il n'est *(pas) venu. [written French]
 He SN is *(SN) come.
 'He didn't come.'
- b. Il n'a rien vu.
 He SN has nothing seen.
 'He hasn't seen anything.'
- c. Personne n'est venu.
 Nobody SN is come.
 'Nobody came.'
- d. Personne n'a rien dit.
 Nobody SN has nothing said.
 'Nobody said anything.'
- e. Il n'est pas venu pour rien.
 He SN is SN come for nothing.
 'He has not come for nothing.'

In spoken French, the clitic *ne* is frequently dropped, even in the higher registers (Asbey 1981, 2001). Accordingly, the post-verbal marker *pas* or a single n-word is sufficient to make the sentence express a negative statement (30a, b). A sequence of n-words can express negative concord (30c). The combination of *pas* with an n-word expresses double negation (30d), just as it is in the written variety (29e). Because of the incompatibility of *pas* with an n-word under the single negation reading, we qualified spoken French as a type II language in Section 1.2 above.

- (30) a. Il vient pas. [spoken French]
 He comes SN.
 'He doesn't come.'
- b. J'ai rien dit
 I have nothing said.
 'I didn't say anything.'
- c. Personne a dit ça.
 Nobody has said that
 'Nobody said that.'

Negation and negative indefinites

- d. J'ai *rien* dit à *personne*.
 I have nothing said to nobody.
 'I haven't said anything to anyone.'
- e. Il est pas venu pour *rien*.
 He is SN come for nothing.

The comparison of (29) and (30) show that the only empirical difference between written and spoken French involves the use of the preverbal clitic *ne*. The standard view, defended by Bréal (1900), Gaatone (1971), Horn (1989), Godard (2004) and many others is that *pas* is the bearer of sentential negation, and *ne* is a scope marker. Corblin and Tovenia (2003) label *ne* as 'co-negative', rather than a negation marker. In Chapter 3 (Section 5), we discussed the pattern of diachronic change in relation to the expression of propositional negation. The development from 'Jeo ne dis' (old French) via 'Je ne dis pas' (written French) into 'Je dis pas' (modern spoken French in France) is frequently quoted as an instance of the Jespersen cycle. According to this pattern of diachronic change, the original preverbal marker of negation (*ne*) is first reinforced by a post-verbal marker of negation (*pas*), leading to the discontinuous negation *ne..pas*. When *ne* loses its negative force, only the post-verbal marker *pas* remains.

Chapter 3 (Section 4) proposed two constraints that govern the placement of negation: NegFirst and FocusLast. As far as the expression of propositional negation is concerned, NegFirst favors a preverbal marker of negation (Romance, Slavic, etc) and FocusLast a post-verbal one (Germanic, spoken French). If NegFirst and FocusLast are both ranked above *Neg, a discontinuous marker of negation emerges as the optimal outcome (Old English, formal Welsh, written French, etc). Tableaux 11 and 12 spell out the placement of negation in the two varieties of French.

Tableau 11: Discontinuous negation in written French (first version)

Meaning $\neg \text{Come}(x)$	Form	NegFirst	FocusLast	*Neg
	Il ne vient		*	*
	Il vient pas	*		*
☞	Il ne vient pas			**

Tableau 12: Post-verbal marker of negation in spoken French (first version)

Meaning $\neg\text{Come}(x)$	Form	FocusLast	*Neg	NegFirst
	Il ne vient	*	*	
\Rightarrow	Il vient pas		*	*
	Il ne vient pas		**	

According to this view, the two grammars of spoken French and written French reflect two stages of the Jespersen cycle. In this section, we will actually argue that the expression of propositional negation is more complex than that reflected in Tableaux 11 and 12. The evidence will come from the discussion of the co-occurrence restrictions between the marker of sentential negation and negative indefinites.

The first observation we make is that the interaction with preverbal n-words in (29b-d) indicates that *ne* is licensed to satisfy MaxSN, as well as NegFirst. Written French is a type I language, and not a type III language, because it does not display a preverbal/post-verbal asymmetry. Of course, most type I languages involve a preverbal marker of sentential negation, as observed in Section 4 above, so this is not a major change in the analysis. However, the ranking of MaxSN above *Neg allows NegFirst to be below *Neg (rather than above it as in tableau 11), and still have an effect on the placement of negation.

Furthermore, we observe an interesting contrast between *ne* and *pas*. *Ne* is compatible with n-words, and its presence is even required in the written French sentences (29b-e). We take this to be an indication that MaxSN is at work in this variety of the language. But *pas* does not combine with n-words in the expression of a single negation reading, in either written French (29b-e) or spoken French (30b-d). The insertion of *pas* in a sentence that already contains an n-word obligatorily leads to a double negation reading in both varieties of the language (29e, 30d). Chapter 6 (Section 5) will provide an account of the double negation reading of sentences like (29e) and (30d) in a weak version of bi-directional OT.

Negation and negative indefinites

As far as the contrast between *ne* and *pas* in the expression of a single negation is concerned, two things strike us as relevant. The fact that *pas* is not used in combination with n-words suggests that *ne* is conceived as an expression that satisfies MaxSN, but not *pas*, at least not in modern French (whether written or spoken). The fact that *pas* is not used with preverbal n-words (29c, 30c) suggests that FocusLast is ranked too low to play a role in sentences involving n-words in French. This suggests that FocusLast is in fact ranked below *Neg, rather than above it, as in Tableaux 11 and 12. FocusLast can still play a role in the placement of *pas* in sentences expressing propositional negation if the presence of the negation marker is licensed independently (e.g. by FaithNeg), as we will see shortly. Under these assumptions, Tableaux 13 and 14 illustrate how we obtain (29c) and (30c) as the optimal form for the expression of a single negation reading with a preverbal negative indefinite. Tableaux 15 and 16 do the same for post-verbal n-words (as in 29b, 30b):

Tableau 13: Generation of sentences with preverbal n-word in written French

Meaning $\neg\exists xV$	Form	MaxSN	MaxNeg	*Neg	NegFirst	Focus Last
	neg V	*		*		*
☞	neg ne V			**		*
	neg V pas	*		**		
	neg ne V pas			***		

Tableau 14: Generation of sentences with preverbal n-word in spoken French

Meaning $\neg\exists xV$	Form	MaxNeg	*Neg	MaxSN	Focus Last	NegFirst
☞	neg V		*	*	*	
	neg ne V		**		*	
	neg V pas		**	*		
	neg ne V pas		***			

Chapter 5

Tableau 15: Generation of sentences with post-verbal n-words in written French

Meaning $\neg V \exists x$	Form	MaxSN	MaxNeg	*Neg	IntNeg	NegFirst	Focus Last
	V neg	*		*		*	
\Rightarrow	ne V neg			**			
	V pas neg	*		**		*	
	ne V pas neg			***			

Tableau 16: Generation of sentences with post-verbal n-words in spoken French

Meaning $\neg V \exists x$	Form	MaxNeg	*Neg	IntNeg	MaxSN	Focus Last	NegFirst
	ne V neg		**				
	ne V pas neg		***				
\Rightarrow	V neg		*		*		*
	V pas neg		**		*		

In order to simplify the presentation, Tableaux 13-16 only consider candidates that satisfy MaxNeg. We see that preverbal *ne* satisfies MaxSN (as well as NegFirst), but *pas* does not. French *pas* is not the only post-verbal marker of negation in Romance which displays this behavior. Zanuttini (1994: 433-434, 441-442) provides examples from other languages that do not require the co-occurrence of a (post-verbal) negative marker with post-verbal n-words.

- (31) a. Maria a mangia nen. [Piedmontese]
 Maria CL_{sub} eats SN
 ‘Maria doesn’t eat.’
 b. I l’hai vist gnun.
 I have seen nobody
 ‘I haven’t seen anybody.’

- (32) a. El l'ha mina scrivuu. [Milanese]
 he has SN written
 'He hasn't written.'
- b. L'ha mangiaa niént.
 he has eaten nothing.
 'He hasn't eaten anything.'

In principle, there is no reason why a post-verbal marker of negation could not satisfy MaxSN. In fact, Afrikaans *nie* has been argued to be an instance of a post-verbal negation marker that satisfies MaxSN (example 24 in Section 4 above). But in modern French, *pas* is not used to satisfy MaxSN, and neither are the post-verbal negation markers in the other Romance languages exemplified in (31) and (32).

Zanuttini (1991: 185 sqq) attempts to relate this observation to the status of *pas* as a specifier, rather than a head, but her arguments have been refuted by Déprez (1998). As an alternative, Déprez (1998, 2000) proposes an analysis in terms of the nature of the n-words involved. Neither Zanuttini's analysis, nor Déprez's proposal is compatible with the OT analysis developed so far. In our theory, no further syntactic or semantic distinctions are drawn between Neg-expressions or markers of negation in different languages. Instead, cross-linguistic differences are handled in terms of different constraint rankings in the grammar. Furthermore, we argued that the marker of sentential negation is semantically redundant in concord constructions, and is optionally used as a scope marker. What the French contrast between *ne* and *pas* tells us is that there may be a lexical markers that can be used as a scope marker (and satisfy MaxSN) (*ne*), and others that don't (*pas*). I take this to be an issue that is lexically decided in the distribution of labor between *ne* and *pas*. This distribution may very well be due to the historical origin of *ne* as a negation marker, and of *pas* as a reinforcement of negation. But as far as the synchronic grammar of modern French is concerned, all we have is a lexical difference between the two markers, which interacts with the grammar, as reflected in the violation pattern in Tableaux 13-16.

Independent evidence in favor of a shallow, lexical difference between the 'old' preverbal and the 'new' post-verbal marker, would come from Romance languages in which a post-verbal marker of negation does satisfy MaxSN. In older stages of French, it was in fact possible to combine *pas* with n-words. An example

from Molière is cited in Bernini and Ramat (1996: 174), and repeated here as (33a). This situation survives in certain dialects of continental French (33b, from Muller 1991), and in Canadian French (33c, also from Muller 1991).

- (33) a. Ne faites pas semblant de rien. [17th century French]
SN make.IMP SN semblance of nothing.
'Do not fake anything.'
- b. S'il y a quelque chose, il fera pas d'cadeau à personne.
[French dialect]
If there is something, he give.FUT SN of present to nobody.
'If there is a problem, he will not grant anyone a favor.'
- c. Il y a pas personne en ville. [Québécois]
There is SN nobody in town.
'There is no one in town.'

The examples cited involve a post-verbal n-word. Since both the n-word and the negation marker are post-verbal, the co-occurrence with the marker of sentential negation cannot be explained as an effect of NegFirst. So the presence of *pas* in these sentences must be licensed by MaxSN. Déprez (2000: 260) strengthens the evidence, and shows that the post-verbal marker of negation is obligatory with both preverbal and post-verbal n-words in Louisiana French Creole.

- (34) a. Mo te pa wa pe(r)son. [Louisiana French Creole]
I have SN seen nobody.
'I did not see anybody.'
- b. A(r)jen gruj pas.
Nothing moves SN.
'Nothing moves.'

In (35) and (36), we cite examples from Zanuttini (1991: 181-182), which illustrate the situation in Lengadocian varieties of Occitan and in Valdotaian.

- (35) a. Degun es pas vengut. [Occitan]
 Nobody is SN come.
 ‘Nobody has come.’
 b. Vendra pas jamai.
 Come.FUT.3SG SN never.
 ‘He will never come.’
- (36) a. Dze si ren. [Valdotain]
 I know nothing
 ‘I don’t know anything.’
 b. L’est pas ren.
 It is SN nothing.
 ‘It is nothing.’

In (33) and (36), the post-verbal marker of negation is optional, but in Louisiana French Creole (34) and Occitan (35) it is obligatory. The data support the claim that these languages have a high ranked constraint MaxSN, similar to the grammar sketched for written French in Tableau 12, and that it is the post-verbal negative marker that satisfies MaxSN. The optionality in Québécois and Valdotain can be explained as the result of an overlapping range of the constraints *Neg and MaxSN. If *Neg and MaxSN are ranked equally high, or overlap in range, we expect that the output oscillates between the presence and the absence of the negation marker, without any changes in meaning. This analysis is thus similar lines to what we proposed for Catalan and Brazilian Portuguese in Section 5 above.

The claim that *pas* does not satisfy MaxSN in Tableaux 13-16 provides an immediate explanation for the absence of *pas* from sentences containing an n-word (29b-d), (30b-d). In spoken French (Tableau 14), Only MaxNeg is ranked above *Neg. This means that multiplication of n-words is functionally motivated, but MaxNeg does not target the marker of sentential negation. The only reason for using a negation marker is if there is a semantic motivation for it. According to the polyadic quantifier analysis, there is no semantic motivation for a negation marker in concord constructions, because the negation marker gets absorbed in the polyadic quantifier. We see in Tableau 14 that the candidate ‘neg V pas’ incurs an extra violation of *Neg compared to ‘neg V’. The candidate ‘neg V’ is better, because it avoids this extra

Chapter 5

violation. Thus, *pas* is left out of sentences involving one or more Neg-expressions for reasons of economy. In written French (Tableau 14), the situation is almost the same. According to this grammar, the presence of *ne* is motivated by the functional need to satisfy MaxSN. However, the lexicon determines that *pas* does not satisfy this constraint. The candidate ‘neg *ne* V *pas*’ incurs an extra violation compared to ‘neg *ne* V’. For economy reasons then, *pas* is blocked in sentences containing Neg-expressions in both written and spoken French.

The picture that emerges from this analysis of the French data is that *pas* is used as a last resort strategy: it is inserted to express semantic negation in those contexts in which no Neg-expression is available to convey negative force. In Tableaux 13-16, the constraint FNeg has been left out to simplify the presentation. All Neg-expressions satisfy FNeg, so no candidate in Tableaux 13-16 violates this constraint. However, if we add FNeg to the tableaux governing the expression of propositional negation, we see that the account of discontinuous negation can be brought in line with the constraint ranking in Tableaux 13-16. Instead of Tableaux 11 and 12, we should adopt the Tableaux in 17 and 18 as the final account for the expression of propositional negation in the two varieties of French:

Tableau 17: Discontinuous negation in written French (production)(final version)

Meaning $\neg\text{Come}(x)$	Form	FNeg	MaxSN	*Neg	NegFirst	FocusLast
	Il vient	*	*		*	*
	Il ne vient	*		*		*
	Il vient pas		*	*	*	
☞	Il ne vient pas			**		
	Il ne pas vient			**		*
	Il vient ne pas				*	

Tableau 18: Post-verbal negation in spoken French (production)(final version)

Meaning $\neg\text{Come}(x)$	Form	FNeg	*Neg	MaxSN	FocLast	NegFirst
	Il vient	*		*	*	*
	Il ne vient	*	*		*	
☞	Il vient pas		*	*		*
	Il ne vient pas		**			

The candidate form ‘il ne vient’ in Tableaux 17 and 18 violates FNeg, just as ‘il vient’ does. *Ne* is a negative form, but it does not convey a negative meaning in modern French. We follow the literature in analysing *ne* as a co-negative marker, rather than the bearer of semantic negation in modern French. We implement this view as the failure of *ne* to satisfy FNeg. As a co-negative marker, *ne* satisfies the constraint MaxSN, but it does not satisfy FNeg. *Pas* is introduced as a last resort mechanism that supplies a semantically potent marker of negation. In spoken French, the demotion of MaxSN implies that there is no more functional motivation for *ne*, and the sole presence of *pas* is enough to convey semantic negation. The ranking *Neg >> MaxSN implies that *ne* is left out in this variety of French for economy reasons (Tableau 18). In written French, a post-verbal rather than a preverbal position of *pas* is optimal to satisfy FocusLast, in a situation where NegFirst has already been satisfied by the preverbal clitic *ne* (Tableau 17). FocusLast plays a role in the strengthening of negation as we have seen in Chapter 3. In spoken French, the demotion of MaxSN is accompanied by a demotion of NegFirst (Tableau 18).

Four important insights emerge from our discussion of French negation. First, the presentation of the Jespersen cycle in Chapter 3 was incomplete. It captured the competition in the placement of the marker of sentential negation in sentences expressing propositional negation, but did not consider the more complex interaction with n-words. The analysis further suggests that a crucial condition for the development of a discontinuous negation along the lines of French is for the language to be a type III language, and display strict negative concord. It would be worth exploring this issue in more detail, but currently we don’t have all the cross-linguistic

Chapter 5

data we need to substantiate this claim, so the connection is left for future studies. Even under the revised analysis, we maintain the insight that discontinuous negation satisfies NegFirst as well as FocusLast. Tableau 17 illustrates that the interaction of FNeg and MaxSN makes it possible for the balance between NegFirst and FocusLast to be played out even when both are ranked below *Neg. Although the details of the analysis are different from Chapter 3, the main line of the argumentation has thus been preserved.

Second, we see that French displays another instance of economy in a language that favors multiplication of negation. Just as in Spanish and Italian, the presence of the marker of sentential negation *pas* is governed by economy principles where the presence of Neg-expressions and the preverbal marker *ne* is not. Outside the family of Romance languages, we find a similar situation in Berber. Ouali (2003, 2005) observes that certain Berber dialects have a discontinuous negation. For Tamazight Berber this is illustrated in (37a). The preverbal marker *ur* is obligatory, and the post-verbal marker *sha* is optional (cf. Chapter 3, section 5.3), so with respect to the expression of propositional negation, the situation is not exactly the same as in French. As far as the combination of the negation marker with negative indefinites is concerned, Tamazight Berber does not use the post-verbal marker in combination with an n-word (37b). The insertion of *sha* renders the sentence ungrammatical (37c).

- (37) a. *ur ssex (sha).* [Tamazight Berber]
 SN drink-perf.2SG SN
 ‘I don’t drink.’
- b. *agidge ur-as-t iwshan*
 nobody SN-him-it give.IRE.3SG
 ‘No one gave it to him.’
- c. **agidge ur-as-t iwshan sha*
 nobody SN-him-it give.IRE.3SG SN

The ungrammaticality of (37c) is an effect of economy. If the preverbal marker of sentential negation *ur* in (37a) is weakened, emphatic negation licences the post-verbal marker *sha* (Chapter 3, section 4). The presence of *sha* is not necessary in (37b), because the n-word *agidge* is inherently negative. As (37b) is a more economical expression than (37c), it is preferred. We will see in Chapter 6 that

economy provides the key to the explanation of double negation readings involving the combination of the negation marker and n-words in certain configurations.

Third, we see that the behavior of preverbal markers of negation in concord languages is much more consistent than that of post-verbal markers of negation. This asymmetry has already been observed by Zanuttini (1991) and Zeijlstra (2004), but it gets a new interpretation in the OT system developed here. The presence of preverbal markers of sentential negation in negative concord constructions is governed by the two functionally motivated constraints NegFirst and MaxSN. The presence of post-verbal markers of sentential negation in concord languages can be motivated by MaxSN (as argued for Afrikaans *nie*, and the post-verbal negative markers in French Creoles), but it can also be motivated by the fact that an existing preverbal marker is too weak to express semantic negation, and the post-verbal marker comes in to satisfy FNeg (as argued for French *pas*). Even in the post-verbal domain, the influence of NegFirst is felt, as we observed in Chapter 3 (Section 4), and will work out for Welsh in Section 7 below.

Fourth, we see that there is no reason why a type II language could not display negative concord. The reason that (spoken) French behaves like a class II language (negative spread), rather than a class I or a class III language is that there are no additional syntactic constraints that trigger the insertion of a marker of sentential negation in a sentence that contains one or more Neg-expressions. We observe that a DN language like Dutch would end up with the same candidate V+neg as the optimal output for the input in Tableau 17. This illustrates our fundamental claim that the status of Neg-expressions is not determined by the lexicon but by the grammar, and that the marker of negation plays an ancillary role in negative concord.

The last remaining issue concerns the double negation readings that arise in the combination of *pas* and n-words. Sentences like (29e) and (30e) are not ungrammatical in standard modern French, as we might expect from the generation Tableaux 12-15, but they express a double negation meaning. In Chapter 6, we will explain this as an effect of weak bi-directional optimality or ‘superoptimality’ in Blutner’s (2000, 2003) terms.

7. Negation and negative indefinites in Welsh

In Chapter 3 (Section 5.3) we discussed the complex situation of the expression of sentential negation in formal and colloquial Welsh. Welsh is a VSO language. Borsley and Jones (2005) show that in formal Welsh, the post-verbal particle *ddim* is optionally used to reinforce the preverbal marker of negation *nid* in sentences expressing propositional negation (38a, b). In informal Welsh, the presence of *ddim* is mandatory in such contexts (38c, d).

- (38) a. Nid oedd Sioned yn gweithio. [formal Welsh]
 SN be.IMPF.3SG Sioned PROG work.
 ‘Sioned was not working.’
- b. Ni soniodd Sioned ddim am y digwyddiad. [formal Welsh]
 SN mention.PAST.3SG Sioned SN about the event
 ‘Sioned did not talk about the event.’
- c. Doedd Gwyn *(ddim) yn cysgu. [informal Welsh]
 SN.be.IMPF.3SG Gwyn *(SN) PROG sleep.
 ‘Gwyn was not sleeping.’
- d. Fydd Sioned ddim yn hapus. [informal Welsh]
 be.FUT.3SG Sioned SN PRED happy.
 ‘Sioned will not be happy.’

In (38a), the preverbal particle *nid* negates the entire clause. The negative particle *ddim* can be used to reinforce the negation (38b). In (38c), negation has been incorporated into the verb (*oedd-doedd*), but the negative form of the verb is not strong enough to express semantic negation. The particle *ddim* in post-verbal position carries the negative force of the sentence. Not all verb forms in informal Welsh have special negative forms. With non-distinctive forms, *ddim* is the only visible marker of sentential negation (38d). Negative concord is found with n-words, as in (39):

- (39) a. Ni soniodd neb am y digwyddiad. [formal Welsh]
 SN mention.PAST.3SG nobody about the event.
 ‘No one mentioned the event.’


Negation and negative indefinites

- b. Does neb yn yr ardd. [informal Welsh]
 SN.be.PRES.3SG nobody in the garden.
 ‘No one is in the garden.’
- c. Welish i neb. [informal Welsh]
 see.PAST.3SG I nobody.
 ‘I saw no one.’

As far as formal Welsh is concerned, the fact that we are dealing with a negative concord language indicates that we have the ranking FNeg >> MaxNeg >> *Neg >> IntNeg in the bi-directional grammar. Furthermore, we have a high ranking of either MaxSN or NegFirst in order to account for the obligatory presence of the preverbal negative particle in all negative sentences (38a, b as well as 39a). Given that the negative particle *ni(d)* appears in a preverbal position, and both subject and object are post-verbal, we cannot decide which of the two constraints applies, but at least one of them must have a ranking higher than *Neg. If we treat Welsh in a similar way as French, the preverbal particle in formal Welsh should be taken to realize MaxSN. It survives in part in informal Welsh in verb forms that have incorporated *ni(d)*, as in (38c), (39b). However, the incorporation does not extend to all verbs (38d, 39c), and the incorporated form is unable to express semantic negation by itself (38c). This situation is reminiscent of the difference between the realization of *ne* in written and spoken French discussed in section 6 above. If we adopt a high ranking of MaxSN in formal Welsh, an example like (39a) is the optimal outcome of the ranking in Tableau 19.

Chapter 5

Tableau 19: Generation of preverbal *ni(d)* + post-verbal n-word (formal Welsh)

Meaning $\neg\exists x\text{Mention}$ (x, the_event)	Form	FNeg	MxSN	MxNeg	*Neg
	Soniodd rywun am y digwyddiad. 'Mentioned someone the event'	*		*	
	Ni soniodd rywun am y digwyddiad. 'SN mentioned someone the event'			*	*
	Soniodd neb am y digwyddiad 'Mentioned no one the event'		*		
	Ni soniodd neb am y digwyddiad 'SN mentioned no one the event'				**
	Ni soniodd neb ddim am y digwyddiad 'SN mentioned no one SN the event'				***

The high ranking of the constraint MaxNeg guarantees the use of the n-word. The high ranking of MaxSN in formal Welsh guarantees the use of the preverbal particle *ni(d)*. In the absence of any functional motivation for the use of the post-verbal particle *ddim*, it only incurs an extra violation of *Neg, and it is blocked for reasons of economy. In informal Welsh, the constraint MaxSN is being lowered. In those cases in which the verb does not have a special negative form anymore, the n-word is the sole expression carrying the negative force of the sentence (39c).

Informal Welsh displays a complex interaction between n-words and the marker of sentential negation *ddim*. Welsh *ddim* is not allowed after a negative subject, so a sentence like (40a) is ungrammatical. Adverbial n-words are fine in this position, as illustrated by (40b):

Negation and negative indefinites

- (40) a. *Fydd neb ddim yma.
 be.FUT.3SG no one SN here
 ‘No one will be here.’
 b. Fydd neb byth yma.
 be.FUT.3SG no-one never here.
 ‘No one will ever be here.’

Dimm is not incompatible with n-words in general, so the situation is different from that of French *pas* in Section 6. *Ddim* co-occurs with n-words in (41a) and (b):

- (41) a. Na’th Emrys ddim gweld dim byd.
 do.PAST.3SG Emrys SN see NEG world
 ‘Emrys didn’t see anything.’
 b. Fuo’ fo ddim yn gweithio erioed.
 be.PAST.3SG he SN PROG work never.
 ‘He has never worked.’

In fact, the examples (41a) and (b) would be ungrammatical without *ddim*, as (42a) shows, unless *erioed* is moved to a position immediately following the subject (42b):

- (42) a. *Fuo’ fo ’n gweithio *erioed*.
 Be.PAST.3SG he PROG work never.
 b. Fuo’ fo *erioed* yn gweithio.
 Be.PAST.3SG he never PROG work.

The fact that *ddim* is required with a sentence-final adverbial n-word (41b), but is missing with a negative subject (40b) or when the n-word is in an adverbial or object position closer to the verb (39c), (42b) shows that negation must be expressed ‘high enough’ in the structure to take clausal scope. The need for negation to take clausal scope suggests that a version of NegFirst is at work here. However, it cannot be the ‘standard’ version of NegFirst which requires negation to precede the verb, because informal Welsh has lost the preverbal particle *ni(d)*, and *ddim* is post-verbal. In Chapter 3 (Section 4.4), we already suggested that the exact formulation of NegFirst might vary from one language to the next. For Afrikaans, we proposed a version of

Chapter 5

NegFirst that structures the post-verbal domain. We extend that proposal to Welsh, and formulate variations that reflect different degrees of closeness to the verb or hierarchical order as relevant for propositional scope. The Welsh phrase structure is VS(A)O(A), with an adverbial position immediately following the subject, and another one at the end of the sentence. The first version of NegFirst mirrors the negative dependency constraint of Borsley and Jones (2005: 45):⁴

- ◆ NegFirst (Welsh version 1) (also called NegFirst1)
Negation must precede everything following VS(A)O.

NegFirst1 immediately explains why *ddim* has to occur in post-subject position: the sentence-final adverbial position would be too low in the structure. Adverbs like *byth*, *erioed* can appear either in either adverbial position. In post-subject position, they satisfy NegFirst1, so (42b) is fine. In sentence-final position, they don't satisfy NegFirst1, so (42a) is ungrammatical. A sentence with an adverbial n-word in sentence-final position requires the presence of *ddim* in post-subject position in order to satisfy NegFirst1 (41b). Tableau 20 illustrates.


Tableau 20: Generation of post-verbal *ddim* + sentence-final adverbial n-word

Meaning $\neg\exists t \text{ Work}(\text{he}, t)$	Form	NegFirst1	MaxNeg	*Neg
	Fuo' fo 'n gweithio erioed. 'Was he working never'	*		*
☞	Fuo' fo ddim yn gweithio erioed. 'Was he SN working never'			**

N-words in subject or object position satisfy NegFirst1, so (39b, c) do not require the support of *ddim*. The presence of *ddim* in post-subject position is redundant, and therefore ungrammatical (40a). Tableau 21 illustrates.

⁴ The constraints are intended to account for finite main clauses. The situation of negation in non-finite and subordinate clauses in Welsh is different, and will not be discussed here. See Borsley and Jones (2005) for extensive data and an HPSG analysis.

Tableau 21: Generation of n-word in subject position without *ddim*

Meaning $\neg\exists x \text{ Here}(x)$	Form	NegFirst1	MaxNeg	*Neg
	Fydd neb yma. 'Will be no one here'			*
	Fydd neb ddim yma. 'Will be no one SN here'			**

The status of *ddim* as a marker of sentential negation makes it dispensable, and therefore sensitive to economy arguments. An n-word like *byth* is not dispensable in this way. The extra violation of *Neg *byth* incurs in (40b) is legitimate because the use of the n-word satisfies the higher ranked constraint MaxNeg. The asymmetry between (40a) and (b) confirms the general distinction between markers of sentential negation and adverbial n-words, illustrated for French (Section 6) as well as for type II languages like Spanish and Italian (Section 3).


Obviously, NegFirst requires negation to be 'close enough' to the verb, and 'high enough' in the structure to take propositional scope. In SVO languages, 'high enough' typically correlates with 'outside of the VP' (Ladusaw 1991). In a VSO language like Welsh, there is no evidence for a VP, according to Borsley (1996). However, we still find subject-object asymmetries in Welsh: whereas (42a) is downright ungrammatical, (41a) alternates with (39c). That is, an n-word in object position does not require the presence of *ddim* (39c), but does not block it either (41a). The Welsh version 1 of NegFirst allows (39c), but would block (41a) for economy reasons. The well-formedness of (41a) suggests that a stricter version of NegFirst is operative in Welsh.

- ◆ NegFirst (Welsh version 2) (also called NegFirst2)
Negation must precede everything following VS(A).

NegFirst2 would allow (41a), but block (39c), as illustrated in Tableau 22.

Chapter 5

Tableau 22: Generation of n-word in object position with *ddim*

Meaning $\neg\exists x \text{ See}(e,x)$	Form	NegFirst2	MaxNeg	*Neg
	Na'th Emrys gweld dim byd. 'Emry sees nothing'	*		*
	Na'th Emrys ddim gweld dim byd. 'Emry sees SN nothing'			**

The main difference between versions 1 and 2 of the Welsh constraint NegFirst is that version 1 treats all the arguments of the verb on a par (excluding sentence-final adverbs as outside of the argument structure), whereas version 2 is more focused on closeness to the verb, treating objects as well as sentence-final adverbs as 'too far away' from the verb to take propositional scope.

From the presentation of the Welsh data by Borsley and Jones, it is not entirely clear to me whether (39c) and (41a) are freely available for all speakers, or whether we find dialectal or individual variation here. Free variation would suggest an oscillation of the system between a stricter and a more relaxed interpretation of NegFirst. This situation could be modeled in the OT system adopted here by ranking both constraints at the same level. It is also possible to adopt a stochastic OT, and allow the two constraints to overlap in range. In principle, the strengths of the two constraints could be slightly different for different speakers, possibly depending on the regional variety of Welsh they are speaking. A third option would be to assume the variation between (39c) and (41a) to reflect a diachronic change in progress. This could also be modeled in a stochastic version of the OT analysis. The data do not allow me to decide one way or another, but the insight that the distribution of *ddim* in Welsh involves a version of NegFirst seems validated in either case.

Dialectal variation is reported for the combination of two negative adverbs in post-subject position. According to Borsley and Jones (2005: 98), South Wales speakers accept examples like (43) and (44), but North Wales speakers don't:

Negation and negative indefinites

- (43) Dw i ddim byth yn mynd i wisgo 'r sgidie 'ma eto.
 be.PRES.1SG I SN never PROG go to wear the shoes here again.
 'I'm never going to wear these shoes again.'
- (44) Dw i ddim erioed wedi gweld hyn o 'r blaen.
 Be.PRES.1SG I SN never PERF see this of the front
 'I've never seen this before.'

The unacceptability of (43) and (44) for North Wales speakers is accounted for by NegFirst2. With the adverbial n-word (*byth* or *erioed*) in post-subject position, NegFirst2 has been satisfied. *Ddim* is redundant in such cases, and is blocked for economy reasons. The South Wales speakers who allow (43) and (44) adopt an even stricter version of NegFirst, which does not allow the adverbial n-words *byth* and *erioed* to satisfy NegFirst.

- ◆ NegFirst (Welsh version 3) (also called NegFirst3)
 Negation must precede everything following VS.

Examples (43) and (44) satisfy NegFirst3 by means of the marker of sentential negation *ddim*, which appears in a position following the subject, but preceding other adverbial material. Adverbial n-words such as *byth* and *erioed* can follow *ddim* as instances of MaxNeg, but they do not satisfy NegFirst3. Under version 2 of NegFirst, the insertion of *ddim* is blocked for economy reasons, but under version 3 the presence of *ddim* is functionally motivated. The variation spelled out in (43) and (44) is then another instance of variation in the exact formulation of what counts as 'high enough' in the structure or as 'close enough' to the verb to be able to express sentential scope of negation. The data provided by Borsley and Jones support dialectal variation in the ranking of NegFirst versions 2 and 3.

The NegFirst versions 1 through 3 offered in this section spell out the range of variation in propositional scope for the negation marker in a VSO language that has an adverbial position immediately following the subject. If we consider these constraints to be instances of NegFirst albeit in the post-verbal domain, the Welsh data provide additional evidence for the pervasiveness of NegFirst in natural

language. It would be interesting to investigate the interaction between the negation marker and negative indefinites in the Central African VO languages studied by Dryer (2006). The data in his paper are relevant for the position of the marker of sentential negation (cf. Chapter 3, Section 4 for discussion), but Dryer does not discuss negative indefinites. Hopefully, future studies will be able to complement our typology.

(45) a. Dw i ddim ddim yn poeni.
be.PRES.1SG I SN SN PROG worry.
'I don't not worry.'

b. Dw i byth ddim yn poeni. [133]
be.PRES.1SG I never SN PROG worry.

c. Dydy hi erioed ddim wedi helpu. [133]
SN.be3SG she never SN PERF help
'She has never not helped.'

206

8. Conclusion

In studies on negation, the position of the marker of sentential negation with respect to the verb and with respect to other negative indefinites in the sentence has always been an important object of study. In this chapter, we saw that double negation languages like English and Dutch never combine negative indefinites with a marker of sentential negation in the expression of a single negation reading. This is a straightforward extension of the bi-directional grammar developed in Chapter 4. Under the polyadic quantifier analysis, we find that the marker of sentential negation is actually redundant in negative concord contexts. This makes it possible for negative concord languages to rely solely on Neg-expressions (negative spread as in spoken French), or to exploit the marker of negation as a scope marker. Concord languages that display a preverbal/post-verbal asymmetry use the marker of negation to satisfy NegFirst in contexts in which the n-word is not in preverbal position (Spanish, Italian, European Portuguese). Languages that always require the presence of a marker of sentential negation (Greek, Hungarian, Slavic, Afrikaans) use the negation marker to indicate clausal scope. Several mixed cases arise from stochastic ranking of the relevant constraints. The main advantages of the OT analysis are that we don't need to assume 'hidden' or 'uninterpretable' negations, that we can maintain the unified analysis of n-words and negative quantifiers we adopted in Chapter 4, and that we can account for mixed cases (Catalan, Brazilian Portuguese) and micro-variation within a language (French, Welsh).

In Chapters 4 and 5, we relied on a classification of languages as displaying either negative concord, or double negation. However, we find certain cases of what looks like negative concord in double negation languages, and cases of double negation in negative concord languages. Such cases were expected under the polyadic quantifier analysis, but we haven't spelled out the range and limits of the typological variation in the OT analysis. Chapter 6 investigates these unusual combinations.

Chapter 5

Chapter 6

Double negation in negative concord languages

0. Chapter summary

In this chapter, we study instances of double negation in negative concord languages. This may look like a contradiction in terms: after all, we defined negative concord as a system in which multiple expressions of negation ended up having just a single negation reading. If so, then how is it possible to express double negation in such languages? We will discuss three cases in which this arises. The first case involves constructions in which no resumptive negative quantifier is built. This involves combinations of sentence negation with constituent negation (Section 1) and multiple clause configurations. Negative concord is a clause-bound phenomenon, so Neg-expressions in different clauses lead to multiple negation readings in standard negative concord systems (Section 2). The second case involves the ambiguities between double negation and negative concord readings of sequences of Neg-expressions that played an important role in de Swart and Sag's (2002) analysis (Section 3). A stochastic OT analysis is developed for such cases. The third and most unusual case involves double negation readings in the interaction of sentential negation and negative indefinites, such as we find them in Romance, Afrikaans, West Flemish, and Welsh (Section 4). A weak bi-directional OT analysis is developed for these cases.

1. Affixal negation

In negative concord languages, a sequence of Neg-expressions produces a single negation. Native speakers usually have quite strong intuitions that a double negation reading is blocked. It is relevant to point out that there is no conceptual ban on double negation readings for speakers of a negative concord language. In languages like English, the best examples of double negation involve the combination of a negation marker with an adjective carrying a negative prefix, as in (1) (from Horn 2001):

- (1) a. It is not an impossible job.
 b. She is happy or at least not unhappy.
 c. Women's rights lawyers say such concerns are not unfounded.

Negative concord languages also exemplify double negation readings in combinations of negation with negative prefixes:

- (2) a. Il n'est pas incompetent. [written French]
 he SN is SN incompetent.
 'He is not incompetent.'
 b. Il n'est pas impensable qu'elle puisse commettre un meurtre.
 it SN is SN unthinkable that she can-SUBJ commit a murder
 'It is not unthinkable that she might commit a murder.'
 c. Non è un'impresa impossibile. [Italian]
 SN is a enterprise impossible
 'It is not an impossible enterprise.'
 d. Ona jest szczęśliwa...a przynajmniej nie jest nieszczęśliwa. [Polish]
 She is happy ...or at least SN is not-happy.
 'She is happy or at least not unhappy.'

Morphological negation (as realized by prefixes) does not participate in negative concord, and we never get a single negation reading for sentences like (2) in any NC language that I am aware of. In terms of the analysis developed in this book, the observations indicate that affixal negation does not qualify as a Neg-expression. Accordingly, negative adjectives are not collected in the N-store, and do not participate in the construction of a resumptive polyadic quantifier. Support for this analysis comes from the fact that affixal negation counts as constituent negation, rather than sentence negation, according to the criteria advanced in Chapter 1 (Section 1). In the languages under consideration, we can advance a new test. We observe that the negative prefix does not require the presence of the marker of sentential negation, the way a Neg-expression would do. That is, a single negation reading, with negation solely expressed by the negative prefix is expressed by the sentences in (3).

- (3) a. Il (*n')est incompétent. [written French]
 he (*SN) is incompetent.
 'He is incompetent.'
- b. Il (*n')est impensable qu'elle puisse commettre un meurtre.
 'It (SN) is unthinkable that she might commit a murder.'
- c. È un'impresa impossibile. [Italian]
 is a job impossible
 'It is an impossible job.'
- d. Ona jest nieszczęśliwa. [Polish]
 She is not-happy.
 'She is unhappy.'

If the prefix *un-* qualified as a Neg-expression, we would expect the insertion of the preverbal clitic *ne* to be obligatory in written French, because this language displays strict negative concord (Chapter 5). The fact that the presence of *ne* is blocked in (3a, b) indicates that the adjectives *incompétent*, *impensable* do not qualify as Neg-expressions. The fact that *nie* is missing in the Polish example in (3d) indicates that *nieszczęśliwa* is not a Neg-expression either, for Polish is also a strict negative concord language (Chapter 5). Italian is a type III language, which requires negation to be expressed pre-verbally. A post-verbal n-word thus requires the insertion of a preverbal marker of negation (Chapter 5). The absence of *non* in (3c) indicates that the adjective bearing the negative prefix does not have the status of an n-word in Italian. Adjectives expressing affixal negation exemplify constituent negation in both double negation and negative concord languages, and constituent negation does not participate in resumptive polyadic quantification.

The observations made with respect to (2) and (3) support the view that double negation is not a conceptual problem in negative concord languages, but a grammatical issue involving sequences of Neg-expressions. These data fit in with the analysis developed so far.

2. Multiple clause negation

Further support for the view that negative concord is a grammatical phenomenon, not a conceptual issue comes from the observation that negative concord is a clause-

bound phenomenon. The clause-boundedness of negative concord has been observed by Corblin (1996), Giannakidou (2000), de Swart and Sag (2002), Corblin and Tovenà (2003), Corblin et al. (2004).

2.1 *Neg-expressions in different clauses*

As Corblin and Tovenà (2003) point out, n-words in independent sentences have their own domain of negation. This is clear in question-answer sequences like (4).

- | | | | |
|-----|----|----------------------------|-----------------------|
| (4) | a. | Q: Chi non ha risposto? | A: Nessuno. [Italian] |
| | | Q: Who SN has answered | A: nobody |
| | | Q: 'Who has not answered?' | A: 'Nobody.' |
| | b. | Q: Qui n'a pas répondu? | A: Personne. [French] |
| | | Q: Who SN has SN answered | A: nobody |
| | | Q: 'Who has not answered?' | A: 'Nobody.' |
| | c. | Q: Kto nie odpowiedział? | A: Nikt. [Polish] |
| | | Q: Who SN answered | A: nobody |
| | | Q: Who did not answer? | A: 'Nobody' |

Complex sentences, involving a main and a subordinate clause, also illustrate that negative concord is clause bound. Italian sentences like (5a) get a single negation reading, unlike their English counterpart in (5b), whereas Italian sentences like (5c) get a double negation reading, just like their English counterpart in (5d):

- | | | | |
|-----|----|---|-----------|
| (5) | a. | Nessuno ha detto niente. | [Italian] |
| | | nobody has said nothing | |
| | | 'Nobody said anything.' | |
| | b. | Nobody said nothing. | |
| | c. | Nessuno ha detto che non era successo niente. | |
| | | nobody has said that SN was happened nothing | |
| | | 'Nobody said that nothing had happened.' | |
| | d. | Nobody said that nothing had happened. | |

Double negation

Similar data can be given for other negative concord languages, e.g. Hungarian, Russian, Polish. The examples in (6a, b) are from Harries (1973), and are quoted by Horn (2001); (6c) is from D. Klimek (p.c.).

- (6) a. Nem lehet nem nevet-ni. [Hungarian]
SN possible SN laugh-Inf.
'It was not possible not to laugh.'
- c. Ja ne mog ne dat' emu nagrǎdu. [Russian]
I SN could SN give him reward
'I couldn't not reward him.'
- d. Nikt nie powiedział, że nic się nie wydarzyło. [Polish]
Nobody SN said that nothing REFL SN happened.
'Nobody said that nothing happened.'

Hungarian, Russian and Polish are all type I languages in which a marker of sentential negation is obligatorily present in all negative clauses. However, when negation is present in both the main and the embedded clause, the complex sentence expresses double, rather than single negation (6).

Corblin (1996) and Corblin and Derzhanski (1997) point out that triple negation in natural language faces severe processing problems. Horn (2001) provides the example in (7), but notice that it involves multiple clauses.

- (7) The Mets did not not re-sign Mike Hampton because they didn't want to pay him the money.
= It was not because they did not want to pay him that they did not re-sign Mike Hampton.

We will leave triple negation aside, and focus on double negation readings.

2.2 Subordinate clauses introduced by 'without'

Sentences containing a subordinate clause introduced by *without* constitute an interesting case of multiple clause negation. De Swart and Sag (2002) discuss the behavior of French *sans* to illustrate the phenomenon. French *sans* 'without' is a Neg-

expression that establishes negative concord relations with n-words embedded under the connective, so examples like (8a) have a single negation reading. However, an n-word in the main clause leads to double negation in combination with *sans* (8b).

- (8) a. Il est parti sans rien dire à personne. [French]
 he has left without nothing say to nobody.
 ‘He left without saying anything to anyone.’
 b. Personne n’est parti sans rien dire.
 nobody SN has left without nothing say.
 ‘Nobody left without saying anything.’

The following are attested examples from the internet:

- (9) a. Je n’y vois rien sans lunettes. [French]
 I SN there see nothing without glasses
 ‘I don’t see anything without glasses.’
 b. Ne faites rien pour nous sans nous!
 SN do nothing for us without us
 ‘Do nothing for us without us!’

De Swart and Sag (2002) take *sans* ‘without’ to be the negative counterpart of *en*, a conjunction that combines with a present participle to build a modifier of the VP (10a).

- (10) a. Anne est partie en chantant.
 Anne est left CONJ singing
 ‘Anne left singing.’
 b. $\text{Leave}(a) \wedge \text{Sing}(a)$

The connective *en* builds an intersective modifier, so the conjunction of the VP and the participle leads to the semantic representation seen in (10b). The treatment of *sans* as the negative counterpart of *en* implies that the connective in (11a) expresses the

conjunction of the main verb and the negation of the property expressed by the infinitival complement (11b).

- (11) a. Anne est partie sans pleurer.
 Anne est left without cry
 ‘Anne left without crying.’
 b. $\text{Leave}(a) \wedge \neg \text{Cry}(a)$

Syntactically, *sans* and the marker of sentential negation are quite different, but semantically they are very much alike. Both are expressions of propositional negation that are collected in the N-store. We can build a resumptive polyadic quantifier with a sequence of n-words in the infinitival complement of *sans*, as illustrated in (9a), repeated in (12a). The resumptive interpretation strategy leads to one negative quantifier binding the two variables contributed by the n-words *rien* and *personne*. The truth conditions of the sentence are spelled out in (12b).

- (12) a. Anne est parti sans rien dire à personne. [French]
 Anne has left without nothing say to nobody.
 ‘Anne left without saying anything to anyone.’
 b. $\text{Leave}(a) \wedge \neg \exists x \exists y \text{ Say}(a, x, y)$

The resumptive strategy in (12) is possible because the connective *sans* takes scope over the infinitival complement, so *sans* and the n-words are all in the same N-store. N-words that are not in the infinitival complement of *sans* invariably create a double negation reading (9), because the construction of the resumptive polyadic quantifier cannot cross a clause boundary.

Counterparts of *without* in other negative concord languages display similar asymmetries between n-words embedded in the complement of *sans* and n-words in the main clause. Example (13a) is from Giannakidou (1997); (13b) is from E. Vlachou (p.c.). Sentence (14a) is from Corblin and Tovenà (2003); (14b) is from S. Benazzo (p.c.). Example (15a) is from Przepiórkowski and Kupść (1999); (15b) is from D. Klimek (p.c.).

- (13) a. O papus pethane [Greek]
the grandfather died.3SG
xoris na dhi KANENA apo ta egonia tu.
without SUBJ see.3SG none from the grandchildren his
‘The grandfather died without seeing any of his grandchildren.’
- b. Min kanis TIPOTA ja mas xoris emas
SN do nothing for us without us
‘Don’t do anything for us without us!’
- (14) a. Ha riposto senza nessuna esitazione. [Italian]
has answered without no hesitation
‘He/she answered without any hesitation.’
- b. non vedo niente senza i miei occhiali
SN see nothing without the my glasses
‘I don’t see anything without my glasses.’
- (15) a. Został bez niczego. [Polish]
Stayed-3SG without nothing
‘He was left broke.’
- b. Nic nie widzę bez moich okularów.
Nothing SN see-1.SG without my glasses
‘I don’t see anything without my glasses.’

The behavior of *sans* ‘without’ and its counterparts in other concord languages confirms the clause-bounded character of resumption as an instance of polyadic quantification. Retrieval of the Neg-expressions at the clause boundary is built into the HPSG mechanism of de Swart & Sag (2002): the bottom-up interpretation process requires the N-store to be emptied before the next clause up is interpreted.

2.3 Exceptions to clause-boundedness

Given that clause-boundedness is conceived as a standard restriction on resumptive quantification (Corblin et al. 2004, and references therein), languages generally do not show negative concord across clause boundaries. Exceptions are cases like (16)-(19),

in which neg-raising indicates that the clause boundary is permeable (Kayne 1984, Godard 2004). Permeability is frequently favored by non-finiteness (16) and (17) (from Przepiórkowski and Kupść 1999), and subjunctive mood (18). However, there is no one-one relation between mood and permeability. As argued by Giannakidou (1997), epistemic verbs in Greek subcategorize for indicative complements, but negative concord is allowed with neg-raising (19).

- (16) a. Paul n'accepte de recevoir personne. [French]
 Paul SN accepts to receive nobody
 'Paul does not agree to see anybody.'
- b. Personne n'accepte de rencontrer personne. [DN or NC]
 Nobody sn accepts to see nobody
 'Nobody agrees to see nobody/anybody.'
- (17) Jan nie chciał niczego kupować. [Polish]
 Jan SN wanted nothing buy.INF
 'Jan didn't want to buy anything.'
- (18) Non pretendo che tu arresti nessuno. [Italian]
 SN require that you arrest.SUBJ nobody
 'I don't require that you arrest anybody.'
- (19) Dhe nomizo oti idhe KANENAN. [Greek]
 SN believe.1sg that saw.IND.3SG no one.
 'I don't believe that he say anyone.'

Greek verbs that license long distance negative concord (Giannakidou 1997, 2000) also license inverse scope relations with universal quantifiers (Farkas and Giannakidou 1996). Inverse scope is arguably also a clause-bound phenomenon. In both cases, analysis of exceptional cases relies on an extension of the notion of predicate-argument structure, so that n-words in subordinate clauses count as arguments for a higher verb (cf. also de Swart and Sag 2002). If resumption and inverse scope are subject to the same constraints on clause-boundedness, and allow the same class of exceptions, this provides strong support for the polyadic approach.

If NC languages block double negation within the clause (or within a single predicate-argument structure), but double negation is not blocked conceptually in these languages, as argued in Sections 1 and 2, the question arises whether the borderline between NC and DN languages is absolutely sharp, or whether we find fuzzy cases in between. In Chapter 3 (Section 5), we discussed intermediate stages in the Jespersen cycle. These are found in languages that display a pattern in between preverbal and discontinuous negation, or in between discontinuous and post-verbal negation. We analyzed these (stages of) languages in terms of stochastic OT. We propose to use the same stochastic OT tools to account for intermediate cases involving Neg-expressions in Section 3.

3. Ambiguities with multiple n-words

In Chapter 4 (Section 4), we argued that an important argument in favor of the analysis developed by de Swart and Sag (2002) was that the HPSG grammar does not encode preferences for iteration or resumption. In principle, both interpretations of the polyadic quantifier (iteration and resumption) are available. Support in favor of this view comes from ambiguities arising with sequences of Neg-expressions, in double negation as well as negative concord languages. In this section, we review the empirical observations, and propose an analysis in terms of stochastic OT.

3.1 Empirical observations

Resumptive readings are found in double negation languages such as English and Dutch. Examples (20) and (21) are repeated from Chapter 4.

- (20) When *nobody* knows *nothing*, everybody is an expert. Nobody can seriously claim to be an expert on the collapse of the World Trade Center, simply because nobody had a chance to study the rubble. Everybody who has looked at the photographs and television news video knows as much about the collapse as the most knowledgeable scientists. Therefore, everybody who has viewed the photographs and video can claim to be an expert.

Double negation

- (21) Als *niemand* luistert naar *niemand* vallen er doden in plaats van woorden.
if nobody listens to nobody fall there deaths in stead of words
'When nobody listens to anybody, the conversation doesn't die, people do.'

Examples such as (20) and (21) are rare, but in so far as they are accepted by native speakers, they should be accounted for by the grammar.

Double negation readings with a sequence of n-words in NC languages constitute the mirror image of the resumptive readings in DN languages. French is the most prominent example discussed in the literature. Corblin (1996), Corblin and Tovenà (2003), and Corblin et al. (2004) argue that the French sentences in (22) and (23) are truly ambiguous:

- | | | |
|------|-------------------------------------|----------|
| (22) | Personne n'a rien payé. | [French] |
| | Nobody SN has nothing paid. | |
| | = No one has paid anything. | [NC] |
| | = Everyone has paid something. | [DN] |
| | | |
| (23) | Personne n'est le fils de personne. | [French] |
| | Nobody SN is the son of nobody. | |
| | = No one is the son of anyone. | [NC] |
| | = Everyone is the son of someone. | [DN] |

For (22), the two readings are equally available. The DN reading of (23) conforms to our world knowledge in ways that the NC reading of this sentence does not. Corblin (1996) argues that pragmatic factors may block the NC reading of examples like (23). Corblin brought out the consequences of the French double negation readings for the analysis of negative concord, but in the literature we find reports on similar ambiguities in other Romance languages. According to Zanuttini (1991: 144-5), (24) exemplifies double negation in Italian.

- | | | |
|------|---|-----------|
| (24) | <i>Nessuno</i> è rimasto con <i>niente</i> in mano. | [Italian] |
| | <i>no one</i> is left with <i>nothing</i> in hand | |
| | = No one was left with nothing. | [DN] |

Herburger (2001) reports that the Spanish example in (25) is ambiguous:

- (25) Nadie nunca volvió a Cuba. [Spanish]
 nobody never returned to Cuba
 = Nobody ever returned to Cuba [NC]
 = Nobody never returned to Cuba [DN]

According to Falaus (2006), the Rumanian examples in (26) and (27) are ambiguous:

- (26) Nimeni nu vine de nicaieri. [Rumanian]
 Nobody SN comes from nowhere
 = Nobody comes from anywhere [NC]
 = Nobody comes from nowhere [DN]
- (27) Nimeni nu moare niciodata [Rumanian]
 Nobody SN dies never
 = Nobody ever dies [NC]
 = Nobody never dies [DN]

The double negation reading of (26) is marked, but available in contexts involving the denial of a negative presupposition or assertion. The double negation reading of (27) is preferred for pragmatic reasons.

Outside the family of Romance languages, we find double negation readings in colloquial Welsh, as pointed out by Borsley and Jones (2005), in Hungarian (Puskás 2002, 2006), in West Flemish (Haegeman and Zanuttini 1996), and in Afrikaans (Botha, p.c.). Both formal and colloquial Welsh are negative concord languages, but the differences between these two versions of Welsh are substantial. The examples in (28) and (29) provide support for the claim that the negative dependents in colloquial Welsh have negative force (Borsley and Jones 2005: 75).

- (28) Does neb yn caru neb. [colloquial Welsh]
 SN.be.PRES.3sg no one PROG love no one.
 = No one loves anyone [NC]
 = No one loves no one [DN]

Double negation

- (29) Does neb yn dweud dim byd. [colloquial Welsh]
 SN.be.PRES.3sg no one PROG say NEG world.
 = No one is saying anything [NC]
 = No one is saying nothing [DN]

In both (28) and (29) the form *does* is glossed as negative, because it is the form of the verb *to be* that occurs in negative sentences. However, it cannot provide sentential negation on its own. Borsley and Jones characterize it as a ‘weak’ negative form (cf. Chapter 5). The expression *dim byd* literally means ‘no world’, but is used as a fixed expression for ‘nothing.’

Puskás (2002, 2006) provides the examples in (30), and argues that they can have either a negative concord interpretation, or a double negation reading, depending on intonation.

- (30) Senkivel nem beszélt semmiről [Hungarian]
nobody.INSTR SN speak.PAST.3sg nothing.DELAT
= He didn't speak about anything with anybody. [NC]
= He didn't speak with anybody about nothing. [DN]

The double negation reading requires a fall-rise intonation on *semmiröl*. Word order also plays a role. Hungarian is well-known to have relatively free word order, and permits two n-words in the preverbal domain, but the order in (31a) favors a negative concord interpretation, whereas the order in (31b) favors the double negation reading.

- (31) a. Senkivel semmiről nem beszélt. [Hungarian]
 nobody.INSTR nothing.DELAT SN speak.PAST.3sg
 ‘He didn’t speak about anything with anybody.’ [NC]
- b. Semmiről senkivel nem beszélt.
 nothing.DELAT nobody.INSTR SN speak.PAST.3sg
 ‘He didn’t speak with anybody about nothing.’ [DN]

The examples in (30) and (31) provide support for the claim that Neg-expressions in Hungarian have negative force (see Chapter 8, Section 3.2 for more on Hungarian).

According to Haegeman and Zanuttini (1996), the West Flemish example (32) allows either a negative concord or double negation reading.

- (32) K'en een an niemand niets gegeven. [West Flemish]
 I SN have to nobody nothing given
 = I didn't give anything to anybody. [NC]
 = I gave nothing to nobody. [DN]

In order to obtain the double negation reading, special emphasis is needed on both negative elements, with a marked pause separating them. Haegeman and Zanuttini (footnote 26) note that the double negation is often available as an alternative to the negative concord reading, but it is always the marked interpretation.

In Afrikaans, we find two different readings of (33) depending on the context. In the context of (34), the sentence naturally gets a negative concord interpretation; the context of (35) brings out the double negation reading:¹

- (33) Sy heb ons nooit niks lekkers om te eet gegee nie. [Afrikaans]
 she has us never nothing nice for to eat given SN
 = She has never given us anything nice to eat [NC]
 = She has never given us nothing nice to eat [DN]
- (34) Ons ouers het dit niet breed gehad niet. Ma moes maar kos maak van wat toevallig in die huis was. En sy het ons *nooit niks* lekkers om te eet gegee *nie*.
 'Our parents weren't very rich. Mother just had to make dinner with what happened to be in the house. And she has never given us anything nice to eat.'
 [NC]
- (35) Ons ouers het dit nie breed gehad nie. Vir hos was daar nie veel geld nie. Maar Ma kon bare goed kook en sy het ons *nooit niks* lekker om te eet gegee *nie*.
 'Our parents weren't very rich. There was not much money for us. But Mother was a very good cook, en she has never given us nothing nice to eat. [DN]

¹ I am grateful to Rudie Botha (p.c.) for help with the examples, and for providing the contexts in (31) and (32).

Resumptive readings in English and Dutch, and double negation readings in Romance, Welsh, Hungarian, West-Flemish and Afrikaans provide strong support for de Swart and Sag's (2002) approach.² In their analysis, all Neg-expressions are collected in the N-store, and interpreted upon retrieval. Upon retrieval, the sequence of Neg-expressions is interpreted in terms of iteration or resumption, leading to single and double negation respectively. If both interpretation strategies are freely available, an explanation of the ambiguities of the examples in (22) through (35) follows in a straightforward way. However, most theories of negation in natural language treat such examples as marginal, and typically do not include them in analyses. In line with the claim that languages are predominantly double negation languages, or predominantly negative concord languages, Chapter 4 develops separate OT grammars for double negation and negative concord languages. This raises the question whether we have lost de Swart and Sag's account of the ambiguities in (22) through (35) in our OT analysis. In this section we reconcile the two views by showing that the ambiguities are accounted for in a stochastic OT version of the analysis developed so far.

3.2 A stochastic OT analysis

According to ordinal OT, the ranking of constraint C_1 above C_2 means that C_1 is always stronger than C_2 . In Chapter 3, we argued that an ordinal ranking does not provide an analysis of intermediate stages in the Jespersen cycle. Intermediate stages arise when a preverbal marker of negation is always required, but a post-verbal marker is optional, or a post-verbal marker of negation is always required, but a preverbal marker is optional. This optionality is accounted for by creating overlap between the two relevant constraints, according to the stochastic version of OT developed by Boersma (1998), Boersma and Hayes (2001). If adjacent constraints have an overlapping range, their order can be reversed in certain outputs. In Chapter

² Van der Wouden (1994, Chapter 2) treats single negation readings of multiple Neg-expressions in Afrikaans in terms of emphatic negation. I find it hard to motivate this view, because the marker of sentential negation *nie* is obligatorily present in all negative sentences, making Afrikaans a type I language. The classification established in Chapter 5 states that all DN languages are type II languages, in which a marker of sentential negation is incompatible with a Neg-expression under a single negation reading. However, this classification does not clearly distinguish between negative doubling and negative spread, so a more detailed study of Afrikaans is required to resolve the issue. Chapter 8 (Section 3.4) suggests a possible line of analysis in the OT framework.

3, we assumed a stochastic version of the OT syntax. The cases discussed in this section suggest an ordinal ranking in the syntax, but a stochastic OT semantics.

Double negation languages like English adopt the ranking $\text{IntNeg} \gg *Neg$ in the semantics. Suppose that this is not an ordinal ranking but that there is some overlap between the range of the constraint IntNeg and the range of the constraint $*Neg$. If the overlap is small, this means that IntNeg will usually dominate. Accordingly, a combination of two Neg-expressions is usually interpreted in terms of double negation, as we have seen in Chapter 4. But in some contexts, $*Neg$ might win, and a resumptive reading as in (20) or (21) constitutes the optimal interpretation.

Negative concord languages adopt the ranking $*Neg \gg \text{IntNeg}$ in the semantics. Suppose again that this is not an ordinal ranking, but there is overlap between the range of the constraint $*Neg$, and the range of the constraint IntNeg . If the overlap is small, $*Neg$ will usually dominate. Accordingly, a combination of two Neg-expressions is usually interpreted in terms of negative concord, as we have seen in Chapter 4. But in some cases, IntNeg might win, and a double negation reading as in (22)-(35) comes out as the optimal interpretation. Syntactic structure (such as the form of the n-word, i.e. pronominal versus full DP, word order), intonation and context play an important role in disambiguation in general (cf. de Hoop 2004 and references therein). They might affect the balance between the two adjacent constraints, and thereby play a role in the disambiguation of cases like (20)-(35).

The analysis in terms of stochastic OT leads to the following conclusions. First, the fact that we find ambiguities in double negation as well as negative concord languages supports the view defended by de Swart and Sag (2002) that all Neg-expressions are inherently negative. Corblin (1996) argues that a view of n-words as negative polarity items is unable to derive the ambiguities, and so far, I have not seen an analysis which invalidates that claim. Second, the stochastic analysis maintains the core of the OT analysis developed in Chapter 4, but reconciles the OT typology with de Swart and Sag's (2002) claims about ambiguities by adding the possibility of a certain degree of overlap between the constraints $*Neg$ and IntNeg in the semantic component. Third, the stochastic view suggests that languages may occasionally switch to a ranking that was qualified as 'unbalanced' in Chapter 4. The fact that perturbation of the semantic constraints leads to an unbalanced relation between form and meaning might very well explain why the overlap between $*Neg$ and IntNeg is small. Double negation readings are a marginal phenomenon in negative concord

languages, and resumptive readings are infrequent in double negation languages. Language users may appreciate the special effects created by these exceptions, but are unlikely to invert the ranking in the semantic component without re-ranking the syntactic constraint MaxNeg, because the balance between form and meaning lies at the heart of the bidirectional grammar.

4. DN and NC languages in strong bi-directional OT

Aside from the cases discussed in Sections 1 through 3 of this chapter, which we provided independent accounts of, the bi-directional grammar developed in Chapters 4 and 5 does not allow double negation readings in NC languages. Of course this observation is the starting point of most discussions of negative concord, on the basis of examples such as (36), repeated from Chapter 4.

- (36) a. Nadie ha dicho nadie [Spanish]
 Nobody has said nothing.
 ‘Nobody said anything.’
- b. Nessuno ha detto niente. [Italian]
 Nobody has said nothing.
 ‘Nobody said anything.’
- c. Personne (n’)a rien dit à personne. [French]
 Nobody (SN) has nothing said to nobody.
 ‘Nobody said anything to anyone.’


Tableau 1, repeated from Chapter 4 expresses this insight in the OT analysis.

Tableau 1: Negative concord interpretation of a sequence of two Neg-expressions

Form	Meaning	FaithNeg	*Neg	IntNeg
neg + neg				
	$\exists x_1 \exists x_2$	*		
☞	$\neg \exists x_1 \exists x_2$		*	*
	$\neg \exists x_1 \neg \exists x_2$		**	

Tableau 1 shows that double negation readings of multiple Neg-expressions in single clauses are unintelligible in NC languages (cf. de Hoop 2004 and references therein). Similarly, it seems impossible to express double negation within a single predicate-argument structure. In OT terms, this is the problem of *ineffability* (cf. Legendre 2001 and references therein). If we try to express a double negation input with the constraints adopted so far, we see that the optimal way to express this in an NC language would also be a sequence of Neg expressions:

Tableau 2: Generation of Neg-expressions to express double negation in NC languages

Meaning	Form	FaithNeg	MaxNeg	*Neg
$\neg\exists x_1\neg\exists x_2$				
	indef+indef	*		
	neg+indef		*	*
	neg + neg			**

If both a single negation input and a double negation input lead to an optimal expression in terms of two Neg-expressions, we might expect neg+neg to be ambiguous. But examples such as (36) show that is not the case. As illustrated in Tableau 1, the ranking *Neg >> IntNeg yields $\neg\exists x_1\exists x_2$ rather than $\neg\exists x_1\neg\exists x_2$ as the optimal meaning of the sequence neg+neg in NC languages. So although neg+neg is the best form to express the double negation meaning, the double negation meaning is not the best meaning for the neg+neg form in NC languages. These results indicate that in a full theory of the syntax-semantics interface, we do not optimize uni-directionally, but we take the hearer's perspective into account when we speak, and we take the speaker's perspective into account when we listen. Several versions of bi-directional OT have been postulated that establish a tighter relation between forms and meanings than can be achieved by uni-directional optimization. Blutner (1998, 2000), Beaver and Lee (2004), and Beaver (2004) evaluate formalizations of bi-

directional OT that are currently in use. In this section, we will show that the grammars we developed in Chapter 4 reflect a strong version of bi-directional OT.

In Blutner's (1998, 2000) framework, a form-meaning pair is strongly optimal if there is no better (more optimal) meaning for the form at hand, and there is no better form for the meaning at hand. A pair $\langle f, m \rangle$ is strongly optimal if there is no more optimal pair $\langle f, m' \rangle$ and there is no more optimal pair $\langle f', m \rangle$. Strong optimality is illustrated in Figure 1 with two forms f_1 and f_2 and two meanings, m_1 and m_2 . The arrows indicate the preferences.

Figure 1

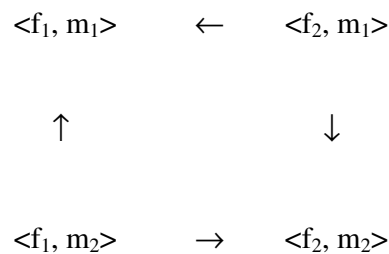




Figure 1 illustrates that $\langle f_1, m_1 \rangle$ and $\langle f_2, m_2 \rangle$ are strongly optimal form-meaning pairs, because both the horizontal and vertical arrows point as these pairs. For the interpretation of f_1 , the meaning m_1 is preferred over m_2 , and for the expression of m_1 , the form f_1 is preferred over f_2 . Similarly, for the interpretation of f_2 , the meaning m_2 is preferred over m_1 , and for the expression of m_2 , the form f_2 is preferred over f_1 . In strong bi-directional OT, optimization over forms and meanings converges. This convergence of forms and meanings constitutes the core of the bidirectional analysis developed in Chapters 3 and 4.


The expression and interpretation of propositional negation worked out in Chapter 3 is implemented in a straightforward way in strong bi-directional OT. Affirmative sentences usually do not contain any particular marking. Negative sentences always take a special form. The marker of sentential negation takes different forms in different languages, as illustrated by the examples in (37), repeated from Chapter 3. The bi-directional analysis is spelled out in Tableau 3.

- (37) a. John is *not* sick. [English]

- b. *Ou* petetai Sokrates. [Ancient Greek]
 SN flies Sokrates.
 ‘Socrates doesn’t fly’
- c. On *ne* igraet. [Russian]
 he SN plays.
 ‘He doesn’t play.’
- d. *Nid* oedd Sioned yn gweithio. [formal Welsh]
 SN be.IMPF.3SG Sioned PROG work
 ‘Sioned was not working.’
- e. János *nem* dohányz-ik. [Hungarian]
 János SN smoke.3SG
 ‘János doesn’t smoke.’

Tableau 3: Propositional negation in strong bi-directional OT

input [f,m]	FaithNeg	*Neg
f ₁ : S; f ₂ : not S m ₁ : p; m ₂ : ¬p		
[S, p] 		
[S, ¬p]	*	*
[not S, p]	*	*
[not S, ¬p] 		**


We take the input to be the pairing up of two different forms (S and *not* S) and two different meanings (p and ¬p). In the calculation of the optimal form-meaning pairs, we need to consider both whether there is a better form for a given meaning and whether there is a better meaning for a given form. Strongly optimal pairs are indicated by the victory sign (). In the bi-directional Tableau 3, violations of constraints that arise in either direction of optimization are added up. FaithNeg and *Neg are both ‘double-edged’ constraints that are active in OT syntax as well as OT semantics. In the second candidate, FaithNeg is violated because the form does not reflect the non-affirmative meaning. In the third candidate, FaithNeg is violated because the semantics does not reflect the non-affirmative form. In the fourth

candidate, *Neg is violated twice, because there is a negative form as well as a negative meaning.

The ranking FaithNeg >> *Neg is standard in the grammar of all natural languages, and reflects the syntactic and semantic markedness of negation with respect to affirmation (cf. Chapter 3). Accordingly, Tableau 3 treats S as the unmarked form, and *not* S as the marked form. Similarly, p is the unmarked meaning, and $\neg p$ the marked meaning. The combination of an unmarked form with an unmarked meaning [S,p] comes out as a strongly optimal pair, and so does the combination of a marked form with a marked meaning [not S, $\neg p$] (examples 37). The other two form-meaning pairs are not strongly optimal. The pairing up of an unmarked form with a marked meaning [S, $\neg p$] loses against [S, p], which is a better meaning for the same form. It also loses against [not S, $\neg p$], which is a better form for the same meaning. The combination of a marked form with an unmarked meaning [not S, p] loses against [not S, $\neg p$], which is a better meaning for the same form. It also loses against [S, p], which is a better form for the same meaning. The relation between form and meaning in sentences expressing propositional negation is then a straightforward application of strong bi-directional OT in the way set up by Blutner (1998, 2000). This is a natural result in view of the markedness theory developed in Chapter 3.

The ineffability and unintelligibility of double negation in negative concord languages constitutes the more interesting case. If we work out the combinations of forms and meanings on the basis of the examples in (33), we obtain the following.

Tableau 4: Negative concord languages in strong bi-directional OT

input [f,m]	FNeg	MaxNeg	*Neg	IntNeg
f ₁ : neg+indef; f ₂ : neg+neg m ₁ : $\neg\exists x_1\exists x_2$; m ₂ : $\neg\exists x_1\neg\exists x_2$				
[neg+indef, $\neg\exists x_1\exists x_2$]		*	**	
[neg+indef, $\neg\exists x_1\neg\exists x_2$]		*	***	
[neg+neg, $\neg\exists x_1\exists x_2$] 			***	*
[neg+neg, $\neg\exists x_1\neg\exists x_2$]			****	

FNeg is now respected by all the candidates under consideration. Negative concord languages adopt the ranking $\text{MaxNeg} \gg *Neg \gg \text{IntNeg}$ as established in Chapter 4. As a result, Tableau 4 shows only one strongly optimal form-meaning pair, namely $[\text{neg}+\text{neg}, \neg\exists x_1\exists x_2]$, the combination of a marked form with an unmarked interpretation. The pair $[\text{neg}+\text{neg}, \neg\exists x_1\neg\exists x_2]$ is not a strongly optimal form-meaning pair, because the single negation meaning is preferred for this form, due to the ranking $*Neg \gg \text{IntNeg}$. Because of the high ranking of MaxNeg in NC languages, a pair with the form $\text{neg}+\text{indef}$ is not strongly optimal for either possible meaning, because both meanings prefer to be expressed by the form $\text{neg}+\text{neg}$.

We conclude that under strong bi-directional optimality, double negation readings cannot be expressed by a combination of Neg-expressions and/or indefinites in NC languages. This yields the effects of ineffability and unintelligibility that we started out with. The results we obtained in this section confirm that the grammars $\text{NegInt} \gg *Neg \gg \text{MaxNeg}$ for DN languages, and $\text{MaxNeg} \gg *Neg \gg \text{NegInt}$ for NC languages are instances of Blutner's strong bi-directional OT.

Besides strong bi-directionality, Blutner (1998, 2000) also defines a notion of weak bi-directional optimization or "superoptimality." As we will see in Section 5 below, weak bi-directional optimization comes into play in certain special combinations of n-words with a marker of sentential negation that give rise to double negation readings.

5. Double negation in NC languages in weak bi-directional OT

Our conclusion that double negation cannot be expressed in NC languages is based on the behavior of sequences of Neg expressions, as analyzed in ordinal OT (for interpretations in stochastic OT, cf. Section 3 above). The results are expected on the basis of the bi-directional grammars developed in Chapter 4. In this section, we study cases that involve combinations of Neg-expressions with the marker of sentential negation. We will show that in special configurations, these combinations can lead to double negation readings, even in negative concord languages.

5.1 Neg-expressions and the marker of sentential negation

We know from Chapter 5 that there are three classes of NC languages as far as their use of the marker of sentential negation is concerned. A marker of sentential negation may be required for all negative sentences (Slavic, Greek, Afrikaans, etc.), due to the high ranking of the constraint MaxSN in the OT syntax. This leads to a type I language, exemplifying strict negative concord. A marker of sentential negation may be required for all negative sentences in which the n-word is post-verbal (Italian, Spanish, Portuguese), due to the high ranking of the constraint NegFirst in the OT syntax. This leads to a type III language, exemplifying non strict negative concord. Finally, the marker of sentential negation may be disallowed in sentences involving Neg-expressions (type II languages, negative spread), due to the lack of constraints enforcing its presence in the syntax (spoken French, varieties of West Flemish).

Empirical observations suggest that the circumstances under which double negation readings arise depend on the type of negative concord language at hand. Giannakidou (2006) explicitly states that double negation readings do not arise in strict negative concord languages (type I languages). Her claim is too strong, though, and two sets of counterexamples present themselves. First, we have seen that strict negative concord languages such as written French, Rumanian, Welsh, Hungarian, and Afrikaans allow double negation readings with a sequence of Neg expressions, because of the possibility of a stochastic OT interpretation (Section 3). Second, strict negative concord languages with discontinuous negation such as written French and Afrikaans allow double negation readings with one of the markers of the discontinuous negation, but not the other. For French, this is *pas* (but not *ne*), and for Afrikaans this is the immediately post-verbal *nie* (but not the sentence final *nie*). The economy constraint *Neg is responsible for these meaning effects, as we will show below. However, Giannakidou is right that the combination of a marker of sentential negation and a Neg expression in a strict concord language not exemplifying discontinuous negation is excluded. Falaus (2006) confirms this for Rumanian.

The core idea developed in this section builds on the assumption made by de Swart and Sag (2002) that the marker of sentential negation is semantically redundant in negative concord configurations. However, it can have a syntactic function as a scope marker. In Chapter 5, we worked out the OT syntax constraints which affect the marker of sentential negation. We can now link that analysis to our concerns with double negation readings in negative concord languages involving configurations with a negation marker, and formulate the claim that double negation readings cannot arise

in NC systems if the marker of sentential negation is required to satisfy a faithfulness constraint (FNeg, MaxSN, NegFirst) in the OT syntax. If the negation marker is required in order to satisfy some faithfulness constraint ranked above *Neg, its presence is licensed for syntactic reasons, and the ranking *Neg >> IntNeg will make sure its semantic contribution is absorbed in the resumptive polyadic quantifier. If the presence of the negation marker is not required by any faithfulness constraint ranked above *Neg, economy considerations come into play, and the negation marker is absent from sentences expressing a single negation reading. By means of a process of weak bidirectional optimization, the presence of the negation marker in such sentences leads to an interpretation in terms of double negation.

The analysis makes the following predictions for Type I, Type II and Type III languages. In strict negative concord systems (Type I languages), double negation readings do not arise in the interaction of a Neg-expression with the negation marker, because the high ranking of MaxSN requires the presence of the marker of sentential negation for scope reasons. As far as non strict negative concord languages (Type III) languages are concerned, we do not expect double negation readings to arise unless NegFirst is independently satisfied (e.g. by a preverbal n-word). In those circumstances, the marker of sentential negation is redundant, and is blocked in sentences expressing a single negation. If it is inserted anyway, the sentence can only be grammatical under a double negation reading. Type II languages exemplifying negative spread are predicted to convey double negation in all instances in which the negation marker combines with a Neg-expression. In the grammar of type II languages, there is no faithfulness constraint ranked above *Neg that requires the presence of the negation marker in configurations in which FNeg is independently satisfied (in casu by the n-word). Accordingly, the negation marker is blocked for economy's sake, and sentences involving the combination of a negation marker and a Neg-expression can only be grammatical under a double negation reading, licensed by a weak bidirectional optimization process.

In the remainder of this section, we will see how these predictions are verified. Of course, double negation readings are hard to elicit, even in DN languages, so the process of weak bidirectional optimization remains a fairly marginal phenomenon. Still, the fact that it works the way it works provides independent support for the analysis developed so far. Let us therefore take a more careful look at the data, and spell out the analysis in more detail.

5.2 DN readings in a strict negative concord language

Double negation readings are well attested for (continental) French when it comes to combinations of an n-word and the negation marker *pas*. A careful literature study reveals the existence of double negation readings in the combination of n-words and a negation marker in Welsh, Afrikaans, West Flemish, Spanish and Italian as well. Given that the details of the French data are fairly well known, I will first analyze double negation readings in French, and then extend the analysis to other NC languages.

In Chapter 5, French was treated as a special case in Haspelmath's typology. The written language is a clear case of a type I language, exemplifying strict negative concord. Preverbal *ne* is mandatory in all negative sentences, whether or not there is a preverbal n-word, as illustrated in (28) in Chapter 4, repeated here as (38).

- (38) a. Il ne vient pas. [written French]
 he SN come SN
 'He doesn't come.'
 b. Il n'a rien vu.
 He SN has nothing seen.
 'He hasn't seen anything.'
 c. Personne n'est venu.
 Nobody SN is come.
 'Nobody ever came.'

In spoken French, *ne* is generally dropped, and a post-verbal n-word is sufficient to make the sentence express a negative statement. Spoken French is a type II language exemplifying negative spread (39).

- (39) a. Il vient pas. [spoken French]
 he come SN.
 'He doesn't come.'
 b. J'ai rien dit.
 I have nothing said.
 'I haven't said anything.'

- c. Personne a dit ça.
 Nobody has said that
 ‘Nobody ever said that.’

In Chapter 5, we accounted for the obligatory presence of *ne* in written French as an instance of the high ranking of MaxSN in this language. We accounted for the discontinuous negation pattern in (38a) in terms of a division of syntactic and semantic labor between the preverbal *ne* and the post-verbal *pas*. The clitic *ne* is inserted to satisfy MaxSN, which can apparently not be satisfied by *pas*. On the other hand, we need *pas* to express semantic negation, because *ne* has lost its original semantic force. The way the syntactic role of *ne*, and the semantic role of *pas* combine was shown in Chapter 5 (Tableau 17), and is reproduced here as Tableau 5.

Tableau 5: Discontinuous negation in written French (production)

Meaning $\neg \text{Come}(x)$	Form	FNeg	MaxSN	*Neg	NegFirst	FocLast
	Il vient	*	*		*	*
	Il <i>ne</i> vient	*		*		*
	Il vient <i>pas</i>		*	*	*	
☞	Il <i>ne</i> vient <i>pas</i>			**		
	Il <i>ne pas</i> vient			**		*
	Il vient <i>ne pas</i>			**	*	

Both *ne* and *pas* induce a violation of *Neg. Discontinuous negation emerges as the optimal candidate, because of the requirement to satisfy FaithNeg as well as MaxSN. NegFirst and FocusLast take care of the position of one marker in preverbal position, and the other in post-verbal position. The observation that *pas* is inserted in sentences expressing plain propositional negation in order to satisfy FaithNeg implies that *pas* will not be necessary in sentences that satisfy FaithNeg by independent means. Sentences involving negation ranging over variables in argument or adjunct position instantiate that situation. The ranking MaxNeg >> *Neg triggers the use of Neg-

expressions. Neg-expressions are inherently negative, so *pas* is truly redundant in such cases. Tableau 6, a reproduction of Tableau 13 in Chapter 5, illustrates this for example (38c) with a preverbal n-word.

Tableau 6: Generation of written French with preverbal n-word

Meaning $\neg\exists x \text{ Come}(x)$	Form	FNeg	MaxSN	*Neg	NegFirst	FocLast
	personne vient		*	*		*
☞	personne <i>ne</i> vient			**		*
	personne vient <i>pas</i>		*	**		
	personne <i>ne</i> vient <i>pas</i>			***		

*Neg functions as an economy constraint that blocks candidates with more instances of negative expressions than necessary. Given that *pas* is not needed to satisfy any syntactic constraint (neither FNeg, nor MaxSN), it is simply redundant. Therefore, it is not used in written French to express a single negation in combination with Neg expressions. The analysis supports the view that the proliferation of negative expressions in NC languages is not random, but governed by highly ranked faithfulness constraints. Tableau 6 illustrates the economy effect of *Neg even in NC languages.

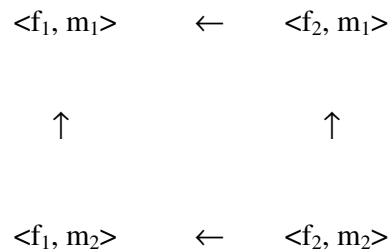
According to the ranking in Tableau 6, the combination of *pas* with n-words in modern French should lead to ungrammaticalities, for the candidate involving *pas* is suboptimal. In reality, the combination of *pas* with n-words is not ungrammatical, but leads to a double negation interpretation, both in written French (which preserves *ne*, 40a), and in spoken French (which drops *ne*, 40b).

- (40) b. Il n'est pas venu pour rien. [DN]
 he SN is SN come for nothing.
 'He did not come for nothing.'
- a. C'est pas rien. [DN]
 it is SN nothing.
 'It is not nothing.' (= It is quite something.)

In the strong bi-directional OT system developed so far, this comes as a surprise. According to the syntactic Tableau 7, the sentences in (40) should be ungrammatical. Furthermore, given the ranking $*Neg \gg IntNeg$ in the semantics of negative concord languages, we would expect all formal expressions of negation to be absorbed in the resumptive negative quantifier. So if the sentences in (40) were interpretable at all, they should have a single negation reading. The fact that these sentences are grammatical, and exhibit a double negation reading is unexpected under a strong bi-directional OT analysis of negation in French. However, it can be explained as an effect of weak bi-directional optimality, also called ‘superoptimality’ in Blutner’s (1998, 2000) approach.

Blutner (1998, 2000) defines a form-meaning pair $\langle f, m \rangle$ as a weakly optimal pair (also called ‘superoptimal’ pair) if there is no other superoptimal pair $\langle f', m \rangle$ such that $\langle f', m \rangle$ is more optimal, and there is no other superoptimal pair $\langle f, m' \rangle$ such that $\langle f, m' \rangle$ is more optimal than $\langle f, m \rangle$. It follows from this definition that strong pairs are superoptimal, but not all superoptimal pairs are strong. We can illustrate the notion of superoptimality with the two forms f_1 and f_2 and the two meanings m_1 and m_2 as in Figure 2. The arrows indicate preference relations, just like in Figure 1 above.

Figure 2





According to the preference relations in Figure 2, f_1 is always preferred over f_2 , and m_1 is always preferred over m_2 . As a result, two arrows are pointing towards the pair $\langle f_1, m_1 \rangle$, and two arrows are pointing away from the pair $\langle f_2, m_2 \rangle$. The fact that two arrows are pointing towards the pair $\langle f_1, m_1 \rangle$ indicates that this is a strongly optimal pair. The pairs $\langle f_1, m_2 \rangle$ and $\langle f_2, m_1 \rangle$ lose against this strongly optimal pair, because

$\langle f_1, m_1 \rangle$ has a better form for the same meaning, or a better meaning for the same form. As a result, $\langle f_1, m_2 \rangle$ and $\langle f_2, m_1 \rangle$ are neither strong nor superoptimal pairs. Under strong bi-directional OT, the pair $\langle f_2, m_2 \rangle$ is blocked, because there are better form-meaning pairs available, as the arrows indicate. Under weak bi-directional OT, the pair $\langle f_2, m_2 \rangle$ arises as a weakly optimal (or ‘superoptimal’) form-meaning pair, because there is no superoptimal pair that has either a better form or a better meaning. In Figure 2, $\langle f_2, m_2 \rangle$ is not in direct competition with the only other superoptimal pair $\langle f_1, m_1 \rangle$, because the two pairs differ in both their form and their meaning component. As we can see from Figure 2, weakly optimal pairs involve forms that are suboptimal in uni-directional generation, and meanings that are suboptimal in uni-directional interpretation. As a result, superoptimality pairs up marked forms and marked meanings that would not be available otherwise.

Superoptimality is used to account for cases of partial blocking in Blutner (1998, 2000). We propose to apply it here to the unusual pattern of double negation readings with a negation marker and a Neg-expression. If we apply the superoptimality approach to the French sentences in (38, 39), we observe that the strongly optimal form-meaning pair in continental French combines single negation with n-words, at the exclusion of *pas*, which is redundant and would only incur an extra violation of *Neg. The insertion of *pas* creates a marked form that pairs up with the marked double negation meaning (40), as a weakly optimal pair. Tableau 7 gives us the bi-directional implementation.

Tableau 7 French [*pas+neg*, DN] in weak bi-directional OT

Input [f,m]	MaxNeg	*Neg	IntNeg
f_1 : neg; f_2 : pas+neg m_1 : $\neg\exists xV(x)$; m_2 : $\neg\neg\exists xV(x)$			
[neg, $\neg\exists xV(x)$] 		**	
[neg, $\neg\neg\exists xV(x)$]		***	
[pas+neg, $\neg\exists xV(x)$]		***	*
[pas+neg, $\neg\neg\exists xV(x)$] 		****	

The Neg-expression is unmarked compared to the combination of *pas* with a Neg-expression, because it is formally simpler and shorter. Just like in Tableau 4, we take single negation to provide the unmarked meaning as compared to the marked double negation meaning. The pair [neg, $\neg\exists xV(x)$] is strongly optimal, because there is no better interpretation for this form, and no better form to express this meaning. Examples (38) and (39) instantiate this unmarked form-meaning combination. No other form-meaning pair is strongly optimal, because *Neg functions as an economy constraint. [neg, $\neg\neg\exists xp$] is not a strongly optimal pair, because single negation is a better, more economical interpretation for this form. [pas+neg, $\neg\exists xp$] is not a strongly optimal pair, because *neg* is a better, more economical form to express this meaning.

In a secondary (not optimal but ‘superoptimal’) round of evaluation, the restriction of the comparison to superoptimal pairs eliminates both [neg, $\neg\neg\exists xp$] and [pas+neg, $\neg\exists xp$] from the set of competing form-meaning pairs. Both lose against the strongly optimal candidate [neg, $\neg\exists xp$], and therefore cannot be superoptimal pairs themselves. The strong pair [neg, $\neg\exists xp$] does not directly compete with [pas+neg, $\neg\neg\exists xp$], because it has both a different form and a different meaning. Given that there is no better superoptimal alternative, [pas+neg, $\neg\neg\exists xp$] itself qualifies as a weakly optimal, or superoptimal form-meaning pair. The examples in (40) are instantiations of this marked form-meaning combination. Obviously, we would never be able to obtain this in a unidirectional system, because pas+neg is itself a suboptimal form, and $\neg\neg\exists xp$ a suboptimal meaning. Weak bi-directional optimality thus allows the expression of double negation in negative concord languages, whereas this is impossible under strong bi-directional optimality, as we saw in section 4 above.

The same analysis can be applied to the double negation readings of certain Afrikaans examples. Afrikaans displays a pattern very similar to French, as illustrated by the data in (41) (from Waher 1978, van der Wouden 1994, K. van Gass, p.c.).

- (41) a. Haar suster het *nie* haar verjaarsdag vergeet *nie*. [Afrikaans]
 Her sister has SN her birthday forgotten SN
 ‘Her sister didn’t forget her birthday.’
- b. *Niemand* het dit gesien *nie*.
 Nobody has this seen SN
 ‘Nobody has seen this.’

- c. Hulle het *nooit* gesing *nie*.
 They have never sung SN
 ‘They have never sung.’
- d. Hy kon *nie niemand* gesien het *nie*. (DN)
 He could not nobody saw has SN
 ‘He could not have seen nobody’

Afrikaans has discontinuous negation, just like French. One occurrence of *nie* is in an immediately post-verbal position, and the other one appear in sentence-final position (41a) (cf. Chapter 3). The sentence-final negative element *nie* co-occurs with the negative indefinites *niemand* and *nooit* in (41b, c). If we add an immediately post-verbal occurrence of *nie* to a sentence already containing a Neg expression, a double negation reading ensues (41d). We can explain this along the same lines as the co-occurrence restrictions between sentential negation and negative indefinites in French.

The constraint ranking in Afrikaans is FNeg >> MaxSN >> *Neg >> FocusLast >> NegFirst. Sentence-final *nie* satisfies MaxSN. Sentence-final *nie* is too weak to express propositional negation by itself, so negation is doubled in examples like (41a). The doubling *nie* is the bearer of semantic negation, and satisfies FNeg. The negative indefinites express semantic negation, so the immediately post-verbal marker *nie* is redundant in (41b,c). As a result of the economy constraint *Neg, the doubling *nie* is left out. The double negation reading of (41d) cannot be explained under strong bidirectionality: the sentence should be ungrammatical, and the ranking of *Neg >> IntNeg should block a double negation reading. The acceptability of (41d) with a double negation reading is explained along the lines of weak bidirectionality: the example combines the marked form (n-word plus doubling *nie*) with the marked, double negation meaning. All we need to do is replace *pas* by *nie* in Tableau 7, and reverse the constraints NegFirst and FocusLast that govern the placement of negation in the sentence. In this way, we have an account of Afrikaans that directly mirrors the analysis of French.

5.3 DN readings in a non-strict negative concord language

The double negation readings in negative concord languages are not restricted to strict negative languages that display discontinuous negation, such as written French and

Afrikaans. The fact that the meaning effects are the same in written (40a) and spoken French (40b) supports the view that negative spread is also governed by economy constraints. As far as non strict negative concord languages are concerned, we find double negation readings in certain combinations of preverbal n-words and preverbal sentential negation. Italian, Spanish, and European Portuguese are type III languages in which post-verbal n-words require the presence of a preverbal marker of negation (42a, 43a), but preverbal n-words do not (42b, 43b).



- (42) a. Mario *non* ha parlato di *niente* con *nessuno*. [Italian]
 Mario SN has talked about *nothing* to *nobody*.
 b. *Nessuno* ha parlato con *nessuno*.
Nobody has talked with *nobody*.
- (43) a. *No* he visto a *nadie*. [Spanish]
 SN has seen *nobody*
 ‘He hasn’t seen anybody.’
 b. *Nadie* ha dicho *nada*.
Nobody has said *nothing*
 ‘Nobody said anything.’

In Chapter 5, we highlighted the role of NegFirst in type III languages. NegFirst requires the expression of negation to be preverbal. In Italian and Spanish, the high ranking of this constraint triggers the insertion of a preverbal negation marker with post-verbal n-words (42a, 43a). Both n-words and the marker of sentential negation can satisfy NegFirst. If preverbal n-words satisfy NegFirst, the marker of sentential negation is redundant. The functioning of *Neg as an economy constraint penalizing unnecessary multiplications of negation predicts the insertion of a negation marker to be ungrammatical in contexts like (42b, 43b). However, Zanuttini (1991: 151) observes that we marginally find double negation readings in such configurations, as illustrated by (44a). Corblin and Toven (2003) make the same claim for (44b). They add that double negation readings are easier to obtain with determiners (as in 44b) than with pronominal n-words (as in 44c), which they give a question mark. A native speaker of Italian that I consulted accepts (44c) with the appropriate intonation contour in a context which supports the DN interpretation.

- (44) a. *Nessuno* degli studenti *non* è venuto. [Italian]
None of the students *not* is come.
 = None of the students hasn't come.
- b. Nessun bambino non va scuola in questa società.
 no child SN goes school in this society
 'No child does not to go school in this society.'
- c. ?Niente non giova mai.
 Nothing SN helps never
 'Nothing is never useful.'

If we follow up on the idea that *Neg functions as an economy constraint, and the presence of the marker of sentential negation in negative concord constructions needs to be licensed by a faithfulness constraint, configurations of a negation marker with a preverbal n-word provide the ideal environment for type III languages to allow double negation readings. The unmarked (NC) reading is expressed by the unmarked form (with a preverbal n-word, without a negation marker) (39b, 40b), whereas the marked form (with a preverbal n-word and a negation marker) expresses the marked, double negation reading (41). In type III languages, the role of NegFirst is crucial. Only if NegFirst is independently satisfied, does the possibility of a weak bidirectional optimization process leading to the expression of double negation emerge.

Tableau 8: Italian [*non+neg*, DN] with preverbal n-word in weak bi-directional OT

Input [f,m]	NegFirst	*Neg	IntNeg
f ₁ : neg V; f ₂ : neg+non V m ₁ : $\neg\exists xV(x)$; m ₂ : $\neg\neg\exists xV(x)$			
[neg V, $\neg\exists xV(x)$] 		**	
[neg V, $\neg\neg\exists xV(x)$]		***	
[neg+non V, $\neg\exists xV(x)$]		***	*
[neg+non V, $\neg\neg\exists xV(x)$] 		****	

NegFirst is satisfied by the preverbal n-word, so none of the candidates under consideration in Tableau 8 violates this constraint. The unmarked form-meaning combination [neg V, $\neg\exists xV(x)$] constitutes as a strongly optimal pair. The marked form-meaning combination [neg+non V, $\neg\neg\exists xV(x)$] emerges as a weakly optimal pair. No double negation readings are predicted for the combination of a preverbal marker of sentential negation and a post-verbal n-word, because in that case, the preverbal negation marker is required to satisfy NegFirst. Indeed, all the examples of double negation readings in type III languages reported in the literature I am familiar with involve a preverbal n-word.

Welsh constitutes a special case, because of the complex set of constraints governing the occurrence of negation in post-verbal position (Cf. Chapter 5, Section 7). Borsley and Jones (2005: 133) report double negation readings for sentences in colloquial Welsh that combine two negative adverbs in post-subject position, the second of which is *ddim*:

- (45) a. Dw i *ddim ddim* yn poeni. [informal Welsh]
 be.PRES.1SG I SN SN PROG worry.
 ‘I don’t not worry.’
- b. Dw i *byth ddim* yn poeni.
 be.PRES.1SG I never SN PROG worry.
- c. Dydy hi *erioed ddim* wedi helpu.
 NEG.be3SG she never SN PERF help
 ‘She has never not helped.’

Colloquial Welsh is a VSO language with an adverbial position immediately following the subject. The first negative adverb following the subject satisfies a modified (post-verbal) version of NegFirst in Welsh which requires negation to precede all material following VS. In (45), the second negative adverb following the subject is the marker of sentential negation *ddim*. *Ddim* is not required to satisfy NegFirst, because there is an n-word (or another instance of *ddim*) in the adverbial position following the subject that takes care of that requirement. The additional presence of *ddim* means that the candidate incurs an extra violation of *Neg. Syntactically, it is then a less optimal form than its counterpart without the marker of

sentential negation. Therefore, we would expect sentences like (45) to be ungrammatical, but they are not. However, they are only grammatical under a double negation reading. The felicity of this form-meaning combination arises as the result of a weak bi-directional optimization process. A variant of Tableau 8 with the appropriate post-verbal version of NegFirst accounts for the Welsh data.

West Flemish is another negative concord language that exemplifies double negation readings in certain configurations, as pointed out by Haegeman and Zanuttini (1996). They observe that (46a) has a single negation reading, but (46b) can only express double negation.

- (46) a. da Valère niets (nie) kuopt. [NC][West Flemish]
 that Valere nothing (SN) buys
 ‘that Valère does not buy anything.’
 b. da Valère nie niets kuopt. [DN]
 That Valère SN nothing buys
 ‘that Valère does not buy anything.’

According to Haegeman and Zanuttini (1996), the Neg-expression must precede the (optional) negator *nie* in order to establish a negative concord relation. They claim that Neg-expressions must scramble out of the VP in order to take sentential scope. As pointed out in Chapter 8 (Section 3.3), a full analysis of the interaction of the negation marker and Neg-expressions is outside the scope of this book, because it is not entirely clear which constraint triggers the presence of *nie* in an immediately preverbal position in (46a). However, suppose we can resolve this issue somehow, and derive the optionality of *nie* in the configuration (46a) from overlap with *Neg in a stochastic OT analysis. In that case, the fact that word order makes the difference between the single negation reading of (46a) and the double negation reading of (46b) suggests that the presence of *nie* in (46b) is not required for scope reasons, and should be blocked by economy. As a result, the sentence can only be grammatical under a double negation reading along the lines of the weak bidirectional optimization process outlined in this section.

As pointed out in Chapter 2 (Section 4), a number of studies have argued against the recursive mechanism of weak bidirectional optimization (Zeevat 2000, Beaver and Lee 2004). According to Beaver and Lee (2004), full recursion implies the

possibility of an infinite number of rounds of optimization. As a result, in weak bidirectional OT, every pair is a winner, as Beaver and Lee (2004: 126) phrase it. In certain non-linguistic optimization processes, such as the matching partners in a dancing competition (Hendriks et al. 2006: Chapter 1, see also Chapter 2 above), this is the desired outcome. In most linguistic applications, two rounds of optimization constitute a natural limit. There are various ways to address the overgeneralizations made by weak bidirectional OT. We could reformulate the analysis in the bidirectional OT developed by Beaver (2004), using *Block instead of superoptimality. *Block eliminates pairs that are not bi-directionally optimal, but it functions as a constraint that can be ranked just like any other constraint. The other option is to impose general cognitive limitations on recursion, as proposed by Blutner, Hendriks and de Hoop (2006: 149). This would limit bidirectional optimization to at most two rounds, in agreement with the bounds that can be observed for other cognitive tasks (such as the epistemic reasoning required for playing strategic games). As far as double negation is concerned, two rounds of optimization suffice to derive the patterns discussed in this section. The first round derives the single negation readings, the second round the double negation readings. Corblin (1996) argues that triple negation runs into processing problems, and is therefore not naturally found in natural language. If triple negation would indeed require three rounds of optimization, the general bound on recursion proposed by Blutner, Hendriks and de Hoop (2006) would be sufficient to account for the patterns of multiple negation readings in natural language.

6. Conclusion

In this chapter, we focused on instances of double negation in negative concord languages. At first sight, such cases might seem problematic for the analysis developed so far, because the ranking *Neg >> IntNeg in the OT semantics should lead to a resumptive negative quantifier, and force a single negation reading throughout. In fact, the double negation readings we find provide independent evidence in favor of the account developed so far. We argued that there is no conceptual ban on double negation in negative concord languages, but the OT grammar forces a resumptive interpretation for a series of Neg-expressions within a

single predicate-argument structure. The double negation readings arising with morphological (affixal) negation and with negation in multiple clauses constructions provide support for this view. The construction of a resumptive polyadic quantifier is restricted to Neg-expressions, and we have good reason to believe that affixal negation does not qualify as a Neg-expression. Furthermore, polyadic quantification is generally clause-bound, so the presence of Neg-expressions and/or a marker of sentential negation in different clauses should rule out a single negation reading. We conclude that these two constructions support the OT approach developed in this book.

Other instances of double negation readings in negative concord languages require an extension of the OT analysis developed so far. Ambiguities with multiple n-words were an important motivation for the analysis developed by de Swart and Sag (2002). Their insights can be reconciled with the typology developed in Chapter 4 if we accept that there is overlap between the constraints *Neg and IntNeg in a stochastic extension of the OT semantics. Finally, double negation readings arising in special combinations of the marker of sentential negation with an n-word are accounted for under a weak bidirectional version of the OT analysis. As far as we know, the two phenomena of double negation readings with multiple n-words and double negation readings with an n-word and a negation marker are not explained in existing analyses of negation and negative concord in the literature. Obviously, the examples we give are highly marked, dependent on particular intonation patterns, and contextually restricted. However, these considerations apply to double negation in double negation languages like (standard) English as well (cf. Horn 1989, 2001). We conclude that the observations cannot easily be dismissed. The fact that these unusual patterns get a straightforward explanation in a weak bidirectional version of the OT analysis developed in Chapter 4 and 5 constitutes an important new insight.

Chapter 7

Negation in L2 acquisition and implications for language genesis

0. Summary of chapter

Early second language has been defined as a restricted linguistic system that can offer a “window” on language genesis. In this chapter, I model the acquisition of negation by L2 (adult) learners as a sequence of constraint rankings in the framework of Optimality Theory. The rankings shift from pragmatics via conventionalization of negation as a focus operator to syntax. It is argued that early language follows the same path. The transition from protolanguage to language is located in the shift from pragmatic combinations of symbols to semantic recursion over propositions as visible in the use of negation as a truth-functional operator. In this view, semantic recursion precedes and drives syntactic recursion.

1. Negation, L2 and language genesis

Section 1 sketches the background and basic assumptions of the research. We establish the study of restricted linguistic systems as a possible “window” on language genesis (Section 1.1). The empirical phenomenon studied here is negation. Section 1.2 motivates this choice in terms of the relevance of a study of semantic recursion for the debate on language genesis. The transition from a protolanguage not involving the concept of proposition to a language stage in which semantic recursion over propositions is visible in the use of negation can be modeled in Optimality Theory (OT) (Section 1.3). OT has a clear concept of language acquisition that we will take to apply to L2 acquisition as well (Section 1.4).

Section 2 proceeds with a detailed study of negation in L2 acquisition, based on the data collected in the so-called ESF project (Perdue 1993). The ESF project actually involves two European projects on adult L2 acquisition ‘*The structure of*

learner varieties’ and ‘*The dynamics of learner varieties*’, and a number of spin offs. The ESF project coordinates research teams from different European universities. Section 3 models the transition from pragmatics to syntax in the early stages of L2 acquisition in an OT framework. Section 4 returns to the evolutionary perspective, and formulates possible inferences towards a similar transition in language genesis, in an OT system that starts from general cognitive constraints and gradually adds specific linguistic constraints.

1.1 Restricted linguistic systems as “windows” on language genesis

Early second language acquisition is a restricted linguistic system that might provide a “window” on language genesis, according to Jackendoff (2002), Botha (2004). Although other species use various systems of communication, none seems to have the complexity of human language. The uniqueness and complexity of human language makes it an important target for evolutionary studies. Early stages of human language have left no traces, so the evolution of language is not directly recoverable. The main question is how it is best reconstructed in the context of neo-Darwinian evolution theory and modern linguistic theory (Botha 2003). The best approach to this issue is heavily debated. Various proposals have been made, but no agreement has been reached in the field, as is obvious for instance from the recent debate between Chomsky on the one hand and Pinker, Bloom, and Jackendoff on the other (cf. Pinker and Bloom 1990, Hauser, Chomsky and Fitch 2002, Pinker and Jackendoff 2004, Fitch, Hauser and Chomsky 2005). This chapter offers an empirical contribution to the debate by focusing on the notion of recursion in the conceptual system (semantics) and its interaction with the computational system (syntax).

The paucity of evidence concerning what happened in the very early stages of language evolution makes it attractive to look for indirect evidence that might help us understand the evolutionary process (Botha 2003). Bickerton (1990, 1998), Calvin and Bickerton (2000) and Jackendoff (2002) take language to originate in “protolanguage”. Via one or more intermediate stages, with more or less gradual or sudden transitions, they believe this protolanguage developed into full language. They argue that the study of synchronic varieties of language that are intermediate between protolanguage and full language may help us understand this process (Bickerton,

1998, 354). Examples are pidgins, (early) stages of first and second language acquisition, home signs invented by deaf children of non-signing parents, and aphasia. In a series of papers, Botha (2004, 2005, 2006) discusses the potential of the “windows” approach on language genesis, and points out the merits and limitations of various windows (pidgins, home signs, motherese). A reflection on the conceptual basis of the windows framework is outside the scope of this study. It just offers an example analysis in the windows framework by focusing on one particular set of data from early second language acquisition, and using these data to derive possible hypotheses about language genesis. Given the wealth of data available within the ESF project, the study of L2 acquisition is particularly promising. Lack of time and space prevents us from working out the patterns in other restricted linguistic systems in this chapter.

1.2 Negation as semantic recursion

The empirical phenomenon under investigation is negation. The study of negation is driven by the claim that negation is a universal category of natural language (Dahl 1979, Chapter 2). It has been claimed that no animal communication system has a notion of negation (Horn 1989, Jackendoff 2002). However, recent research on animals cognition suggests that a concept of pre-logical negation might be available in the cognitive representation of higher animals (birds, dolphins, primates). On the basis of a review of the available literature (Patterson 1978, Premack and Premack 1983, Herman and Forestell 1985, Savage-Rumbaugh 1986, Pepperberg 1999, Zuberbühler 2002), Heine and Kuteva (2006: Chapter 3) conclude that trained animals are able to develop notions of rejection and refusal, and even of non-existence. However, they take it that none of these non-human animals clearly has acquired a notion of denial, that is, the ability to deny the truth or falsity of a given assertion. If this is correct, higher animals could be ascribed a notion of pre-logical negation, but not full, truth-conditional negation. One obvious reason for this fundamental difference between human language and animal communication systems would be that human language is a recursive system, and animal communication systems possibly lack this feature (Hauser, Chomsky and Fitch 2002). Negation in natural language is recursive because it functions as a propositional operator: semantically, it takes a proposition *p* as its

argument, and builds a new proposition $\neg p$ out of it. Syntactically, it also involves recursion, for it is an optional element that builds a new sentence when added to a sentence. Because of its recursive nature, we would expect negation and other uses of language that go beyond purely factual information (such as questions, imperatives, modalities) to be at the heart of the evolutionary debate, but strangely enough, this is not the case (as pointed out by Jeroen Wiedenhof and Paul Dekker in a research proposal posted on the internet).¹ My study emphasizes the relevance of recursion in the conceptual system (semantics), and the way it feeds into the computational system (syntax) for the debate on language genesis. I will restrict myself to the speech act of assertion.

Full language implies a notion of proposition that can be operated on by negation and other propositional operators (including first-order connectives such as conjunction, disjunction and implication, as well as modal, temporal, and speech act operators). The most straightforward way to model negation as a propositional operator is in terms of the connective \neg from first-order logic. Analyses involving first-order logic or building on a representation similar to first-order language are pervasive in model-theoretic semantics. I don't intend to make any claims about the psychological reality of first-order logic, but I will assume that something like or something equivalent to first order predicate logic is part of (modern) human cognition, because this logic models important parts of human reasoning. Thus, full languages typically have well-formed expressions that express meanings like $\neg p$.

I take it that protolanguage does not or does not necessarily involve the same notion of proposition and truth-value as full language. Jackendoff (2002) assumes that protolanguage involves linear order of concatenated symbols, organized by pragmatic principles like 'Focus Last' (Jackendoff 2002: 246-249). It is not necessary to ascribe to the speakers of a protolanguage the conceptual notion of proposition to allow them to combine symbols in this way. A conservative approach would therefore postulate that protolinguistic utterances are well-formed speech acts that convey meaning, but do not denote propositions with a truth-value. Such a view implies that the notion of proposition emerges somewhere in the transition from protolanguage to full language. It is very difficult to make that transition visible in factual language use, because it is a conceptual one, rather than something that can be observed on the basis of linguistic

¹ Reference: <http://www.wiedenhof.nl/ul/evom-gts.pdf>

output. The behavior of negation can be used as a pointer under the assumption that one cannot use a propositional operator until one has a concept of proposition. Given that negation is a very foundational concept for human beings, expressions for $\neg p$ would closely follow the introduction of the notion of proposition. Under this scenario, the introduction of a truth-functional operator such as negation provides a criterion for characterizing the transition between a protolanguage not involving the conceptual notion of proposition, and a language stage that does. Whether this stage counts as ‘full’ language or not depends on the criterion one wants to use to characterize ‘full’ languages, but negation as recursion would certainly be a possible cut-off point, and the one I will adopt here.

At this point, we need to make a caveat about the association of the linguistic marker *no* or *not* with the truth-functional connective \neg . Negative utterances can function as speech acts indicating rejection, internal desire, refusal as well as truth-functional negation or falsity. These distinctions are relevant for the acquisition of negation by children (Horn 1989, Section 3.1), and should also come into play in our study of the L2 acquisition of negation, especially once we consider the implications for language genesis. Rejection and refusal are sometimes described as affective or pre-logical negation (Horn 1989: 164) In order to avoid misunderstandings, I will adopt the conservative position that rejection and refusal might not be properly characterized as signaling semantic recursion over propositions. Clearly, these uses of negation are rooted in the discoursal context, relating the speaker’s utterance to actions or utterances of the interlocutor. As such, they have an important communicative function. However, I will base the claims of negation as semantic recursion on uses of negation that are clearly truth-functional in nature.

Full recursion with negation is rare in natural language, i.e. we seldom find instances of multiple negation as in ‘She didn’t not talk to me,’ and tri-negative interpretations seem to be blocked altogether. Corblin (1996) argues that we don’t find semantic representations involving more than two negations because of performance limitations: it may be impossible for human speakers to process complex embeddings quickly enough. This chapter focuses on sentences containing a single negation, because I am interested in the recursion step, not in performance limitations.

1.3 Optimality Theory and the emergence of the unmarked

The next step involves an operationalization of this evolutionary scenario in a model of language. One complication that immediately arises when we intend to study negation from an evolutionary perspective is that systems of negation in natural language reflect highly complex grammaticalization processes, and are therefore widely diverging, as is well known from typological and theoretical research on negation. How can we retrace the evolutionary path hidden under this bewildering variety? In this book, I explore the range and limits of this variation by exploiting the tools of bidirectional Optimality Theory. Optimality Theory uses variable rankings of violable and potentially conflicting constraints to model aspect of natural language. If constraints that are ranked higher do not discriminate between candidates, we see the force of lower ranked, ‘weak’ constraints at work. This phenomenon is called the ‘emergence of the unmarked’ (McCarthy and Prince 1994). Under the assumption that higher constraints may ‘mask’ the effect of lower constraints, it is useful to study the expression of negation in restricted linguistic systems to see how the unmarked negation emerges and develops in these. In line with the “windows approach”, I will use the emergence of unmarked negation in early L2 acquisition as the basis for my hypothesis on language genesis.

1.4 Optimality Theory and language acquisition

Prince and Smolensky (1997, 2004), and Smolensky and Legendre (2005) model the grammar as a harmonic system of interacting, soft constraints. In Optimality Theory (OT), grammatical well-formedness is associated with a harmony function over a connectionist network. The input-output relations are determined by a (strict) ranking of constraints. As we have seen in Chapter 2, constraints come in two types: faithfulness constraints and markedness constraints. Faithfulness constraints specify input-output relations. For instance, FNeg (cf. Chapter 3, and section 3.1 below) requires the non-affirmative nature of the input to be reflected in the output. Markedness constraints are output oriented only. They penalize marked (long, complex, infrequent) forms and favor unmarked (short, simple, frequent) expressions. *Neg (cf. Chapter 3, and section 3.1 below) is a markedness constraint, because it penalized negation in the output, no matter what the input. Faithfulness and

markedness constraints frequently conflict. A faithfulness constraint might drive the speaker to use a more elaborate form that is penalized by a markedness constraint. In OT, this conflict is resolved by the ranking of constraints: lower ranked constraints can be violated in order to satisfy a higher ranked constraint. Constraints are universal, but the ranking of constraints is language specific. Different grammars arise from the interaction within a fixed set of constraints.

Within this overall setting, Tesar and Smolensky (1998, 2000) formulate their ideas about (first) language acquisition. The basic assumption is that the learner will develop a series of grammars getting closer and closer to the grammar of the target language he/she is acquiring. The learner starts out with a grammar in which markedness constraints are ranked above all faithfulness constraints. For Tesar and Smolensky, this assumption is motivated by children's acquisition of phonology, which shows that their ability in sound production lags dramatically behind their ability in comprehension. If formal structure is blocked by the high ranking of the markedness constraints, the learner may not be able to produce any output yet. If the markedness constraints only concern formal features, the learner may start to understand the language before he or she is able to produce language, when the learner has access to the faithfulness constraints. This approach allows comprehension to precede production. The task of the learner is to rerank the constraints, and find the right balance between faithfulness and markedness constraints. Reranking takes place in small steps (one constraint at a time), which allows for intermediate stages.

This model was proposed for first language acquisition, and I extend it here to second language acquisition. Just like Tesar and Smolensky (1998, 2000), I assume that the L2 learner starts out with a grammar in which all markedness constraints are ranked higher than all faithfulness constraints. Under the assumption that the constraints are universal, we could assume that we don't need to worry about access to the constraints. The adult learner might have access to the constraints thanks to the grammar of the first language he or she has learnt. This position would imply access to Universal Grammar in the process of second language acquisition. However, the debate in the literature leaves the issue of full access to UG by L2 learners undecided, and I don't want to be committed to it. Furthermore, in view of the implications of early L2 acquisition for the debate on language evolution it is actually attractive to adopt a weaker position. Researchers working on L2 acquisition in the context of the ESF project have argued that learners rely on pragmatic principles to structure their

utterances in the early stages of L2 acquisition (cf. Klein and Perdue 1992, Klein and Perdue 1997 and others). Syntactic principles do not come into play until later stages. I will follow their idea that in L2 acquisition grammar is developed again. In order to model the acquisitional path, I propose a sequence of OT systems, in which pragmatic principles of utterance structure are gradually replaced by syntactic rules. In Section 4, the same development will be postulated for language genesis.

2. Negation in L2: data and analyses

Section 2 discusses the data that have been collected on the L2 acquisition of negation, and the analysis of the findings that have been proposed. We start with some preliminaries and early observations (Section 2.1), and then define the main stages of L2 acquisition as they have been defined in the ESF project (Section 2.2). Sections 2.3 and 2.4 spell out the patterns of negation in the pre-basic and basic variety. Sections 2.5 and 2.6 add some complexities, but confirm the main insights. Section 3 provides an interpretation of the development of negation in L2 acquisition in an optimality theoretic framework.

2.1 Preliminaries

An important debate in L2 acquisition concerns the distribution of labor between transfer from L1, Universal Grammar (UG), and the cognitive strategies of (adult) speakers who have already mastered a first language. Is the output the result of interference with L1, or is it the result of general linguistic or cognitive strategies? Wode (1981) is an early reference bringing the complexity of this issue for various stages of L2 acquisition to the foreground in relation to the acquisition of negation. Wode's subjects are German speaking children acquiring English as a second language in the United States. They produce utterances showing apparent first language influence, such as (1):

- (1) John go not to the school. (Wode 1981: 98)

In standard modern German, the marker of negation is placed after the finite verb (in main clauses), but of course in English, negation requires *do* support. So the production of English utterances like (1) can be related to interference with the German L1 of the L2 speaker. However, the situation is more complex than that. Wode points out that his subjects did not produce such sentences early on. Their first attempts at negation were utterances like (2) and (3):

(2) No, Tiff. (Wode 1981: 98)

(3) No sleep. (Wode 1981: 98)

They do not produce sentences such as (1) until they have acquired the rule of negation for auxiliaries, i.e., when they produce utterances like (4):

(4) It's not finished. (Wode 1981: 100)

Wode concludes that first language influence appears in later stages of L2 acquisition, but not in the earliest ones. Stauble (1984) and Ravem (1968) also suggest an early phase in which negation appears in preverbal position. Stauble compares L2 speakers of English with either Spanish or Japanese as their L1. Given that negation is preverbal in Spanish, and post-verbal in Japanese, the fact that both groups show *asn+V* pattern cannot be due to simple transfer. The same holds for Ravem's Norwegian speakers, given that Norwegian also has post-verbal negation.

Most early studies focused on English as a target language, and corpus data were not available on a large scale. Data on a wider range of languages are now available through the ESF project (cf. Perdue 1993). In this project, longitudinal data have been collected from untutored adult learners (mostly immigrants with no or very limited language training). The focus of the project is on European languages as L2 (English, German, Dutch, French, Spanish). The range of L1 languages is broader, but there is no full typological spread of language pairs, so the patterns detected might be influenced to a certain degree by the languages involved. However, a number of insightful observations have been made with respect to L2 acquisition that legitimate a more extensive discussion in the context of the "windows approach". In this section, we discuss the data that have been collected in the ESF project, and the analyses that have been proposed to account for the different developmental steps taken by L2

learners. In Section 3, we will relate these insights to the OT model introduced in Section 1.4. Section 4 draw inferences towards language genesis.

2.2 Stages of L2 acquisition and the role of negation in them

The results of the ESF project support the view that the different acquisitional stages of the learner can be described as separate linguistic systems. Even if the transitions are not always sharp, it is possible to distinguish three main developmental stages, referred to as the pre-basic variety, the basic variety, and the post-basic variety. The three stages are distinguished in terms of their grammatical system. The pre-basic phase is a phase based on nominal structure. The structure of the utterance is driven by topic-focus articulation, rather than by phrase structure rules. This pragmatic regularity is referred to as ‘Focus Last’. The utterances consist of two or three constituents (typically nouns, some adjectives and adverbs, no or almost no verbs). The appearance of verbs leads to a new stage of the grammar. The presence of a verbal element allows the building of a relational structure around the kernel of the verb: the notion of predicate-argument structure emerges. The schematic structure of the sentence is NP₁-V or NP₁-V-NP₂ or NP₁-Copula-NP₂/Adj or V-NP₂. During this stage, the verb form shows no morphological reflections of tense, person, number, and there is little or no functional structure. In the post-basic stage, verbal inflection and functional structure appear, and the grammar becomes closer to that of a native speaker of the target language. There is more variation in the features of the post-basic variety depending on the target language. However, it is argued that the pre-basic and the basic variety share many features that are relatively independent of the source language (the L1 of the user) and the target language (the L2 of the learner). Obviously, it is those features that qualify early L2 acquisition systems as a potential window on language genesis. If learners appeal to ‘older’ general cognitive principles in the early stages of second language acquisition, we can take the production in the pre-basic and basic variety to display features of historically early language. Such utterances are thus viewed as ‘living’ fossils.

The interest of researchers for the acquisition of negation in L1 and L2 seems to be motivated by the view that negation can be a diagnostic of the acquisition of the syntax, and especially the morpho-syntactic system of the verb. In my study, negation is also used as a diagnostic of the acquisition of semantics, in particular propositional

structure and recursion (building of complex propositions out of atomic ones). In L1, negation appears very early (14-15 months), and children generally use the same forms within one speech community. The acquisition of negation parallels certain cognitive developments: absence of a referent, refusal expressing the inner desire of the child, and finally the more abstract notions of opposition between true and false, and contrastive negation. There are strong correlations between the acquisition of negation by children and by second language learners, according to Klein (1986). But there are also certain differences. For Clahsen and Muysken (1986), the stages identified in the L2 of German indicate that adults, in contrast to children, use general cognitive strategies to guide the acquisitional process. In view of the inferences we want to draw for language genesis, we will not study the acquisition of negation in L1, but restrict ourselves to L2 acquisition.

According to Bernini (1996), the prophrase *no* functions as a negative reaction (described in Section 1.2 above as pre-logical negation) in the earliest phase of L2 acquisition. In the next phase, the structures SN + X and X + SN appear.² In SN + X, negation bears on an element X in focus. In X + SN, it is the negator that functions as comment on the topicalized element X. This topic-focus structure is confirmed by intonation: with SN + X, there is no break between the two elements. With X + SN, the topicalized X is pronounced with a rising contour, and focalized SN with a descending contour. According to Bernini, the structure SN + X easily lends itself to the development of verbal negation. If the negator affects the assertion, is it placed before the verb. The post-verbal placement is preferred when the negator bears on a constituent to the right of the verb. His data come from L2 learners of Italian, so of course these statements are in need of cross-linguistic verification.

In recent reports on the acquisition of negation by L2 learners with different first language backgrounds and acquiring different target languages provided by Bernini (1996), Perdue, Benazzo and Giuliano (2002), Stoffel and Véronique (2003), Giuliano (2004), the patterns of negation in the utterance are correlated with learner varieties (pre-basic, basic, post-basic variety). We will maintain this division, in order to make the development of the grammar more transparent.

² Bernini, Giuliano and others typically use the notation NEG for the marker of sentential negation. In accordance with the distinction drawn in this book between sentential negation and negative indefinites, I will use the notation SN for the expression of propositional negation.

2.3 Negation in the pre-basic variety

At the very beginning of the learner's process, holophrastic (or anaphoric) negation is evidenced. It denies the assertability of a proposition previously mentioned in the discourse. A relevant example is the following:³

- (5) IN c'est un accident. Giuliano (2004: 116)
 'It is an accident.'
 SF *non* + *un* manifestation.
 'No, a demonstration.'

Holophrastic negation has the function of denial, refusal, rejection or correction, so it does not necessarily function as a propositional (truth-conditional) operator.

Already in the pre-basic variety, the stage in which the utterance is organized around nominals, we find combinations of holophrastic negation with a complete utterance. Dimroth et al. (2003) emphasize the clausal scope of the negator in examples like (6) and (7).

- (6) a. MAD nee hier huis Dimroth et al. (2003: 74)
 no here house
 b. MAD veel eten nee
 much eat no
- (7) a. PG nein tasche eh links
 no bag uh to the left
 PG nei platz eh *gazett*
 no place uh newspaper

³ IN indicates the interviewer. SF indicates that the speaker's L1 is Spanish, her L2 is French. IE: L1 is Italian, L2 is English. MAD: L1 is Moroccan Arabic, L2 is Dutch. PG: L1 is Polish, L2 is German. IG: L1 is Italian, L2 is German. The data consist of transcriptions of oral material. + indicates a pause. * indicates material borrowed from another language (usually the source language). The paraphrases may insert material not pronounced (between ||). The examples come from different sources. I have followed the author's transcriptions as closely as possible.

In (6a), *hier* functions as the topic, and *huis* as the predicate or focus. The negator *nee* precedes the combination of the topic with the predicate, and ranges over the entire utterance. The structure of the other examples is similar, according to Dimroth et al. (2003). They claim that the anaphoric origin of the negation operator may explain why forms like *nee* and *nein* are used as opposed to the target form of sentence negation, i.e. *niet* or *geen* in Dutch, and *nicht* and *kein* in German.

Giuliano (2004) also emphasizes the role of topic-focus structure in the pre-basic variety. Besides the holophrastic use of the negator in (5), she discusses the integration of negation in the utterance structure. She claims that the negative utterances in the pre-basic variety come in two versions: SN + X and X + SN, where X=N, Adj, Adv. In utterances with the structure X + SN, X is the topic, and negation functions as the comment. Relevant examples of X + SN include the following:

- (8) IN il y a des taxis
SF non + taxis non
'No, taxis no.'
- Giuliano (2004: 116)

- (9) IN so you are having an easy time yes?
IE For me yes + for my manager the restaurant no.
- Giuliano (2004: 308)

(8) is qualified by Giuliano as a topic-focus structure, where the topic of conversation is taxis, and *non* is the comment on *taxi*.

Just like Bernini (1996), Giuliano observes that negation functions as a focus operator in constructions SN + X, in the sense that X is the constituent that is affected by negation. Relevant examples of SN + X include the following:

- (10) SF *ahì no* [nepa] là
(there, not there/don't look there))
- Giuliano (2004: 117)

- (11) IN qu'est-ce qu'il fait après? Qu'est-ce qui s'est passé après?
(What does he do next? What happened next?)
SF *que él trabajo? El* [de traBaj] ++ *lo* + [nepade] travail
(that he works? He works lhe does| not work)
- Giuliano (2004: 117)

- (12) PE daughter's dad + no job P,B&G (2002: 858)⁴
(the little girl's father doesn't have a job)

It is sometimes difficult to distinguish holophrastic (anaphoric) negation from non-anaphoric, focus-related negation in this phase, as illustrated by (13).

- (13) IN Are there English people in the factory? Giuliano (2004: 316)
IE No Italian
IN Only Italians?
IE yeah + *solo italiani*
IN mm
IE No English
IN No English?

In 'no Italian', negation has an anaphoric function. In 'no English', the negator functions as a focus operator and affects the constituent *English* to its right. In the pre-basic variety, holophrastic negation, SN + X and X + SN make up the inventory of negative expressions of the L2 speaker.

2.4 Negation in the basic variety

In the basic variety, the verb emerges as the kernel of the utterance. Argument structure (involving thematic arguments like AGENT, THEME, GOAL) evolves along with the verb-noun distinction. The verb does not bear morphological finiteness features yet. It is typically used in an invariant form that does not reflect tense, person, or number. Although we still find some examples of X + SN, its use diminishes in favor of the constructions SN + X, and, in particular SN + V. The dominant phrase structure of negative utterances in the basic variety is (NP) + SN + V (+ Y), where V is morphologically non-finite, and Y = NP, PP or AdvP (Perdue, Benazzo and Giuliano 2002, Giuliano 2004: 350). Examples of SN + X include the following:

⁴ PE stands for a Punjabi learner of English.

- (14) SF *en* la cite [*nepade*] classe Giuliano (2004: 126)
 (à la cité il n'y a pas de classe)
 'In the cité there are no classes.'

- (15) SF [el demãnd] à la dame *por* [mãZe] Giuliano (2004: 126)
 (Elle demande à la dame pour manger.)
 'She asks for the lady to eat.'
 SF *y* [*nepade*] l'argent *por* [pãZe]
 (et il n'a pas d'argent pour payer)
 'And he does not have money to pay.'

In the examples (14) and (15), the copula remains implicit, but the negation is clearly propositional in nature. In (16) and (17), negation precedes a lexical verb:

- (16) IN Est-ce qu'il y a un travail que vraiment vous n'aimeriez pas du tout faire?
 Is there a kind of work you would really not like to do at all?
 SF Ah oui + *nepade* komprende *por* français à travail de kusin.
 (ah oui + je ne comprends pas à cause de mon français le travail de cuisine.)
 'Ah, yes, I don't understand because of my French the kitchen work.'

Giuliano (2004: 127)

- (17) SF mon mari eh [eskri] *y* [kompri] bien le français Giuliano (2004: 127)
 (mon mari écrit et comprend bien le français)
 'My husband writes and understands French well.'
 SF mais moi [*nepadekriBir*]
 (mais moi l'je n'écrit pas)
 'But me, I don't write.'

The L2 speaker of French who produced the data in (16), (17) frequently uses an unanalyzed form *nepade* as the marker of sentential negation. It always appears

preverbally, even though *pas* in modern French is post-verbal.⁵ We find a similar phenomenon of a frozen negation form in the following L2 English example:

- (18) IN What other things could you see in the room? Giuliano (2004: 268)
 IE I [*dont*] see very well.
 (I didn't see very well.)

The form *dont* looks like the combination of *do* and enclitic *n't*, but it is most likely morphologically unanalyzed, because it doesn't inflect for person, tense or number. *Dont* always occurs before the lexical verb.

Dimroth et al. (2003) analyze negation in the basic variety as a link between topic and focus. They provide examples like the following to support their views:

- (19) MAD ik niet *hapis* gaan Dimroth et al. (2003)
 I not prison go
- (20) IG meine kind nix in schul Dimroth et al. (2003)
 my child nothing in school

The structure (NP) + SN + V (+ Y) is then an instance of the pattern topic + link + focus, with the possibility of an implicit, anaphoric topic.

Perdue, Benazzo and Giuliano (2002) and Giuliano (2004) suggest that the structure SN + V is a characteristic of the basic variety independently of the source and target languages at hand. The target in the acquisition of French is for *pas* to follow the finite verb. The target in the acquisition of English is for *not* to follow the auxiliary (*have*, *be*, modals) if there is one in the sentence, and to introduce *do*-support with lexical verbs. These structures do not systematically arise until the post-basic variety, where auxiliaries are acquired, and morphology and functional structure emerge. Giuliano (2004) extensively discusses the possibility of influence from the source language. Her data come from Spanish and Italian learners of French and English respectively, and both Spanish and Italian have preverbal negation, so this

⁵ Post-verbal occurrences of *pas* are frequent in formulaic speech, as in *Je sais pas* ('I don't know') or *Je comprends pas* ('I don't understand'). Giuliano takes these to be remembered as 'chunks', and claims they do not tell us much about the grammar of the speaker.

would be a natural possibility of transfer. However, Giuliano argues that transfer is unlikely to explain the data in full. In her view, we would not expect L2 users to come up with idiosyncratic forms like *nepade* in the preverbal position if the input contains post-verbal *pas*. Moreover, the preverbal *ne* is frequently dropped in the informal, spoken French of the input, so the L2 learner does not really get support for a preverbal negation from the input. Of course, the role of transfer remains an important issue in theories on L2 acquisition. A certain influence from the source language remains possible, especially if the source language also realizes negation preverbally (like Spanish and Italian do). But let us assume with Giuliano that we need something more to explain the data. Giuliano (2004: 219) favors an explanation in terms of ‘natural syntax’, and assumes that preverbal negation is the typologically unmarked option. Accordingly, preverbal negation might be the first hypothesis about the position of negation to be entertained by the L2 learner. It is not until the post-basic variety that learners acquire the correct (i.e. target language) placement of negation, along with verb morphology and a richer syntactic structure. Not all L2 learners reach this stage: some never progress past the basic variety.

2.5 More data on negation in L2 acquisition

The data discussed by Stoffel and Véronique (2003), and Giuliano and Véronique (2005) add some complexity to the observations made by Perdue, Benazzo and Giuliano (2002) and Giuliano (2004). These studies describe patterns of negation in Moroccan learners of French. Moroccan Arabic has a complex system of preverbal and discontinuous negation, the realization of which depends on the verb class and the morphological form of the verb (prefixed or suffixed form). Stoffel and Véronique suggest that Moroccan learners of French might be more sensitive to a relation between verb form and placement of negation because of their L1, and therefore acquire the post-verbal position of *pas* in an earlier stage. The observations made with respect to the pre-basic variety are parallel to the data reported by Giuliano (2004). That is, we find holophrastic negation *non* from the very beginning:

- (21) IN Tu veux une cigarette? (S&V 2003)
 ‘You want a cigarette?’
 MF Non
 ‘No.’

As soon as combinations are possible, we find both SN + X and X + SN. The two orders mirror the pragmatic principles of Topic First and Focus Last, just like we have seen above. The form used in utterances of the type X + SN is always *non*. In (22) and (23) we find examples where negation provides the comment on a topic under discussion (X + SN). In (24), negation is associated with a constituent that constitutes the focus of negation (SN + X).

- (22) IN Oui? Vous pouvez me l’écrire S&V (2003)
 ‘Yes? You can write it down for me.’
 MF (negative gesture)
 IN Non?
 ‘No?’
 MF Non français non
 ‘No, French no.’

- (23) MF La théâtre?
 ‘The theater?’
 IN Oui.
 ‘Yes.’
 MF La théâtre non.
 ‘The theater no.’

- (24) IN C’est pas un tambour pour toi?
 ‘It is not a drum for you?’
 MF Non + tambour.
 ‘It is not a drum.’

Very quickly, *pas* emerges in the speech of the learners investigated by Stoffel and Véronique and. Just as in Giuliano’s learners, formulaic expressions such as ‘(je)

/kõprã/ pas' (*je ne comprends pas*, 'I don't understand'), '(je) /se/ pas' (*je ne sais pas*, 'I don't know') and presentative/existential constructions like '/jãna/ pas' (*il n'y en a pas*, 'there aren't any') or '/se/ pas' (*c'est pas*, 'it is not') are the first environments where *pas* appears. *Pas* is always post-verbal in these formulaic expressions. Presumably, they are taken as unanalyzed wholes. Outside the domain of formulaic expressions, the position of *pas* is variable across speakers, and even within the system of one individual. For one speaker, Stoffel and Véronique report that *pas* is post-verbal (V+*pas*) from its first appearance onwards.

- (25) MF Moi + euh part pas à l'école. V&S (2003)
(Moi, je ne pars pas à l'école)
'I don't go to school.'

- (26) MF parce que mon mari /itravaj/ pas + /pas/ pas à l'école. V&S (2003)
(Parce que mon mari, il ne travaille pas, pas à l'école.)

For a second and third speaker, a preverbal placement of negation alternates with a post-verbal occurrence during the basic variety. Early examples of the second speaker, in which *pas* or *non pas* precedes the lexical verb include the following:

- (27) IN Tu as trouvé du travail? (V&S 2003)
'Did you find work?'
MF ah + + + /jan/ pas /travaj/ non non.
(Ah, je n'ai pas travaillé, non non.)
'Ah, I haven't worked, no no.'

- (28) IN Tu connais Aix? (V&S 2003)
'Do you know Aix?'
MF Non pas /kon/ Aix.
(Non, je ne connais pas Aix.)
'No I don't know Aix.'

Preverbal and post-verbal *pas* alternate in the following examples from the same speaker at the same stage of acquisition:

- (29) MF Ah moi je pas /ganje/ trente dix mille par mois. (V&S 2003)

(Ah moi, je ne gagne pas trente dix mille par mois.)

‘A me, I don’t earn thirty thousand a month.’

- (30) MF Non non moi je /regard/ pas. (V&S 2003)

(Non non, moi je ne regarde pas.)

‘No, no, I don’t watch.’

Once auxiliaries are introduced, *pas* is properly placed in between the auxiliary and the participle/infinitive by all L2 speakers:

- (31) MF /Ze/ pas /maze/ moi /Ze/ faim. (V&S 2003)

(Je n’ai pas mange moi, j’ai faim.)

‘I didn’t eat, I am hungry.’

In Véronique and Stoffel’s data, the distinction between pre-basic, basic and post-basic variety seems harder to establish with these learners than with the L2 users whom Giuliano (2004) investigated. If the transitions between the stages are less clearly defined, and the influence of verb morphology plays a role in earlier stages of acquisition, it is possible that features from different varieties occur synchronically in the data of the learner. At the same time, Stoffel and Véronique’s data also indicate multiple occurrences of preverbal *pas* and *non*, which supports the view that SN + V is the privileged structure at least at some intermediate stages of L2 acquisition.

Meisel (1997) questions the universality of a SN + V structure as a phase of L2 acquisition. He reports no clear instances of preverbal negation in a corpus of Spanish L2 speakers of French. Given that Spanish has preverbal negation, we might expect the possibility of transfer from L1, Meisel does not find this. Meisel analyzes the frequent use of preverbal *ne* in the data as an influence of the written language and/or French language instruction. In the German L2 data that Meisel examines, preverbal negation is found with some speakers, but not with others. According to Meisel (2003: 248) preverbal negation characterizes a specific type of learner rather than a phase of L2 acquisition. Such learners commonly resort to simplification strategies, where

‘simplification’ is defined in terms of processing complexity. Meisel characterizes these as properties of language use, rather than of grammatical systems.

The main insight of the approach defended by Perdue et al. (2002), Giuliano (2004) and others is that we don’t need to oppose language use and grammar in this way. I will follow them in this respect, and model the transition from more pragmatic-based communication to a system driven by morpho-syntactic features in a cross-modular OT system. Moreover, it might very well be that the simplification strategies that Meisel refers to provide a better window into language genesis than the grammar driven speakers who are sensitive to morpho-syntactic features early on in their acquisition process. For the purpose of this study then, variation in the learner profile is not necessarily a problem. All in all, I conclude that the situation might be more complex than that sketched by Perdue, Benazzo and Giuliano (2002) and Giuliano (2004), but it is not necessarily incompatible with their views.

More difficult cases are discussed in Bardel (2000) and Bernini (2000, 2003). These involve post-verbal negation in Swedish L2 learners of Italian. Given that the examples involve auxiliaries, they are part of more advanced stages of acquisition:

(32) nostra ca/eh capodanno eh son eh no con italiano Bernini (2003: 178)
 Our New Year’s day they-are not with Italian
 ‘Our New Year’s day isn’t like in Italy.’

(33) a. un problema de cambiadore è non buono Bardel (2000: 112, 199, 114)
 ‘a problem of change is not good.’
 b. fare eeh hm no ingegnere
 ‘do [=be] not engineer’
 c. ma eh ho no fatto
 but I-have not done

This pattern only arises with auxiliary verbs; there are no examples of post-verbal negation with full lexical verbs. Accordingly, it is unlikely that this is an instance of transfer from the post-verbal negation in the Swedish L1 of the learners, where auxiliaries and main verbs pattern alike. Bardel (2000) suggests that the position of the auxiliary before the negation mirrors the raising of inflected verbs to IP. Bernini (2003: 179) takes the auxiliary verb to mark the topic time of the utterance. Because

the topic time is not included in the scope of negation, the topic comes before the negator. According to this view, the examples in (32), (33) are an instance of the structure SN + X, where X constitutes the focus of the negation. If this interpretation is the correct one, the examples in (32) and (33) do not constitute counterexamples to the general pattern found by Giuliano and others, but we have to conclude that the focus-based pattern SN + X persists into the phase in which auxiliaries are acquired.

2.6 *Swedish learners of French: a test case.*

One of the recurrent themes in the study of L2 acquisition concerns the role of transfer from the L1, and the influence of UG on the acquisition process. Researchers in the ESF framework emphasize that learners with different source languages and acquiring different target languages show many similarities in their acquisitional path. The presence of SN + V in the basic variety is one of the features that could be labeled as an overall tendency. However, in most of the cases we have seen so far, the L1 languages had preverbal negation (Italian, Spanish), or discontinuous negation (Moroccan Arabic). It would be interesting to test the hypothesis of preverbal negation emerging as the unmarked case in a context in which both the L1 and the L2 have post-verbal negation. Such a case could function as a testcase of the general hypothesis that preverbal negation is a feature of the basic variety. The study of Swedish learners of French, reported by Sanell (2005) could very well provide the relevant ingredients. Swedish has a post-verbal position for negation, just like German. Formal French has a discontinuous negation *ne* + V + *pas*, but the spoken language only preserves the post-verbal negation *pas*.

Sanell's L2 learners of French are highly tutored: they are high school students, college students, and university students training to be language teachers. Sanell uses the classification developed by Bartning & Schlyter (2004) to describe the various stages of L2 acquisition. The initial stage in this classification resembles the pre-basic variety from the ESF framework. The post-initial stage seems roughly parallel to the basic variety, although some of the morphological features that Sanell includes in this stage (such as the opposition between finite and non-finite forms, the use of the *Passé Composé* and some *Imparfait* forms) already belong to the post-basic variety in the terms of the ESF framework. The intermediate stage could be equated with the post-basic variety, and the advanced stages are definitely past the levels

distinguished in the ESF framework, and will not be discussed here. Although the differences in classification should caution us to be careful in the comparison, some interesting observations can be made. In the initial stage, the post-initial stage and the intermediate stage, constructions with preverbal negation are found. Relevant examples include *non* preceding the lexical verb in (34) and (35), *ne* seul preceding the lexical verb in (36), (37), and *pas* preceding a finite lexical verb (38):

(34) E: e:h/eh ils non comprendre comprendre.

(Ils ne comprennent pas)

‘Oh, they don’t understand.’⁶

I: Les Français ne comprend + comprennent pas l’anglais.

(Les Français ne comprennent pas l’anglais)

‘The French don’t understand English.’ (Carin: 1, GD) *initial stage*

(35) I: tu as travaillé?

‘You have worked?’

E: non + non travaille non non

(Non, non, je n’ai pas travaillé)

‘No + no I haven’t worked no no.’ (Carin: 1, GD) *initial stage*

(36) E: eh mais mais je ne n’étudiE chaque jour

(Eh, mais mais je n’étudie pas chaque jour)

‘Oh, but but I don’t study every day.’ (Vera: 4, GD) *post-initial stage*

(37) I: Plusieurs fois par semaine?

‘Several times a week?’

E: par se- # je ne comprends.

(Parce que, je ne comprends pas)

‘Because, I don’t understand.’ (Pelle: 1, GD) *post-initial stage*

⁶ Sanell renders the L2 French in standard French. The English translations are mine.

- (38) I: qu'est-ce que # c'est le soleil qui te désoriente?
 'What is it # it is the sun that disturbs you?'
 E: non no (RIRE) non eh je je seulement / je je seulement pas vois mon/ mon
 <schema>
 (Non non, seulement, je ne vois pas mon schéma)
 'No no, no it is just that I don't see my schema.'
 (Pelle: 7, GD) *post-initial stage*

The numbers are fairly low: we are talking about a total of 18 utterances in the initial, post-initial and intermediate stage together. The number of utterances involving post-verbal negation by means of *pas* in the same three stages is 145, 11 of which already occur in the initial stage. A relevant example includes the following:

- (39) E: oui. (I:mm) et mais/ le garçons est plus gentiLS. (RIRE)
 (Oui, mais les garçons sont plus gentils.)
 'Yes, but the boys are nicer.'
 I: sont plus gentils que les filles? + Xc'est Xvrai. Ah bon.
 'Are nicer than the girls? It's true. Ah well.'
 E: (RIRE) SIM mais il est / il est deux filles / qui n'est pas. <NEJ>. Qui eh
 n'est pas (SOUPIR) //
 (Mais il y a deux filles qui ne sont pas)
 'There are two girls who are not.'
 I: il y a deux filles/
 'There are two girls.'
 E: eh je ne // est ce je n'aime pas.
 (Eh, que je n'aime pas)
 'Oh, that I don't like.' (Heidi: 1, GL) *initial stage*

In Heidi's data, there are three occurrences of *je n'aime pas* ('I don't like') in the initial stage. She also uses *je ne sais pas* ('I don't know') *je n'ai pas* ('I don't have'), and *qui n'est pas* ('who is not') The other occurrences of post-verbal *pas* in the initial stage all involve *je ne sais pas* ('I don't know'). According to Sanell, these are probably pre-fabricated sequences that could be compared to Giuliano's and Stoffel and Véronique's formulaic speech (see Sections 2.4 and 2.5 above).

In the post-initial stage, there are 82 occurrences of sentence negation, almost all of which follow the pattern of the target language. Mostly we find the full discontinuous negation *ne...pas*, with very few instances of dropped *ne*:

- (40) E: *yes c'est dommage mais / ils eh / mm // ils eh // ils ne mm / mm respectE
(I: oui) pas les musiciens pour (I: mm) SIM je je n'sais pas par parce que
(RIRE) euh.
(Oui, c'est dommage mails ils, ils ne respectent pas les musiciens pour ... je
ne sais pas parce que (rire).
'Yes, it is too bad, but they don't respect the musicians, I don't know, because
(laugh).'
(Thomas: 2, GL) *post-initial stage*

- (41) E: Tous les week-ends/ (I:mm) parce que / je / je ne / je ne rencontre pas. / je
ne les rencontrE pas. / (I: oui) eh par la semaine.
(Tous les week-ends, parce que je ne les rencontre pas pendant la semaine.)
'Every weekend, because I don't see them during the week.'
(Gabriella: 1) *post-initial stage*

The fact that *ne* is frequently present in the data, could be an effect of the schooling the subjects received. The observation that the post-initial stage is moving towards post-verbal *pas* could be the result of the fact that there is already some transition from basic variety towards post-basic variety.

What we see in the L2 French of Swedish learners looks similar to the data reported by Meisel, Giuliano, and Stoffel and Véronique in the sense that early occurrences of post-verbal *pas* are reported for formulaic sequences. But the presence of preverbal negation in the L2 French of Swedish learners is quite surprising. Obviously, this cannot be an influence of the source language, for negation in Swedish is post-verbal. Even though the numbers are low, the appearance of SN + V constructions in the L2 French of Swedish learners provides support for Giuliano's hypothesis that preverbal negation is part of 'natural' syntax, i.e. that preverbal negation is the unmarked word order.

3. An interpretation of the L2 data on negation in OT

In this section, we address the question of the interpretation of the data reported from the literature on the L2 acquisition of negation in an Optimality Theoretic (OT) framework. Although not all researchers maintain the distinction between the pre-basic and basic variety, I will adopt it in this section, because it allows me to structure the emergence of the different grammars. This section starts with a discussion of the constraints relevant to negation (Section 3.1). Sections 3.2 through 3.5 offer an OT analysis of holophrastic negation, negation in the pre-basic, basic and post-basic variety respectively. Section 3.6 sums up the developmental path. Section 3.7 extends the analysis to other linking devices. Section 4 returns to the evolutionary perspective, and sketches a similar development for language genesis.

3.1 OT constraints governing negation

In earlier chapters, I have developed an analysis of negation in Optimality Theory. The main insights of that work on universal aspects of negation, and cross-linguistic variation can be used to model the L2 process of negation. The system is based on the balance between the faithfulness constraint FNeg and the markedness constraint *Neg:

- ◆ **FNeg**
Be faithful to negation, i.e. reflect the non-affirmative nature of the input in the output.
- ◆ ***Neg**
Avoid negation in the output.

FNeg is a faithfulness constraint, because it establishes a relation between the input and the output. *Neg is a markedness constraint, because it is exclusively output related. From the formulation of the constraints, it is clear that FNeg and *Neg are in conflict. If the message to be conveyed is negative, FNeg drives the speaker to use a negative form. However, *Neg drives the speaker to avoid negative forms, without

any regard for the meaning the speaker intends to convey. The OT grammar strikes a balance between the conflicting constraints by ranking them in a particular order. Weaker constraints may be violated in order to satisfy stronger constraints. The actual form the speaker chooses is the optimal form under a particular constraint ranking. L2 acquisition is a developmental process, during which the rankings gradually change. The reranking of constraints models the development of the grammar towards a ranking that corresponds with the grammar of native speakers of the target language. In Chapter 2, I defended the view that languages universally adopt the ranking $\text{FNeg} \gg * \text{Neg}$. This leads to the overt realization of negation in all languages, in accordance with Dahl's (1979) characterization of negation as a universal category. In this chapter, we will only be concerned with sentential negation, because the marker of sentential negation is acquired first. As far as the position of negation is concerned, a constraint that plays an important role in many languages is NegFirst:

- ◆ NegFirst (focus version)
Negation precedes its focus.

The tendency for negation to be expressed early in the sentence has been observed by Jespersen (1917). Dahl (1979) shows that negation has a 'leftist' tendency in the languages of the world. Horn (1989: 293) dubs the principle NegFirst, and describes it as the preference of negation to precede its focus (1989: 446). As a result of NegFirst, negation precedes the constituent it modifies, occurs early in the sentence, and occupies a preverbal position, etc. In this chapter, we are concerned with propositional negation, and its realization in utterances that constitute complete thoughts, and leave constituents aside. Given that verbs are the core predicative part in (full) sentences, the grammaticized version of NegFirst that we see play a role in natural language is often the one that requires negation to be preverbal:

- ◆ NegFirst (grammaticized version)
Negation precedes the (finite) verb.


Typologically speaking, NegFirst is a tendency, not a hard rule. Therefore, it works well as a soft, violable constraint, which can be ranked higher or lower in the

hierarchy in order to reflect the role it plays in the grammar (cf. Chapter 2 for discussion). In Section 4 below, we will argue that NegFirst as a syntactic constraint requiring negation to be preverbal naturally emerges as the unmarked setting for the position of negation in the sentence. The reason is that NegFirst as a grammaticized constraint is an extrapolation of the information structure that drives the protolanguage utterance structure. A model for this extrapolation is provided by the L2 acquisition of negation.

3.2 Holophrastic negation

In Section 1.4 above, I assumed that the L2 learner starts out with the markedness constraints ranked above faithfulness constraints. I model this by ranking a meta-constraint *Structure above a meta-constraint Faith. Under this setting, no language is produced, and no utterances are interpreted. This is the null stage of L2 acquisition. During the acquisition process, more and more faithfulness constraints are ranked about the corresponding markedness constraints, and comprehension and production follow. If we apply this idea to the faithfulness and markedness constraints related to negation, we expect the learner in the null situation to have the setting *Neg >> FaithNeg, and thereby not produce any output for negative utterance. The ESF data show that holophrastic negation is produced early on. According to Perdue, Benazzo and Giuliano (2002: 863), “it seems that a word for negation is essential.” This implies that learners switch to the ranking FaithNeg >> *Neg in the pre-basic variety. Tableau 1 models the generation of holophrastic negation. Note that the input meaning is written as *not*(p), rather than $\neg p$, because we are not committed to a truth-functional interpretation of negation at this stage.

Tableau 1: Generation of holophrastic negation

Meaning <i>not</i> (p)	Form	FaithNeg	*Neg
	(S)	*	
	no (S)		*

In holophrastic negation, *p* and *S* may remain implicit, so negation is typically anaphoric (cf. examples 5, 21 in Sections 2.3 and 2.5 above). Holophrastic negation may also be added to a complete utterance (cf. examples 6, 7 in Section 2.3 above), in which case *S* is overt. Given that FaithNeg >> *Neg is the universal ranking in natural language, the ranking posited in Tableau 1 may not come as a surprise. However, the early emergence of negation in L2 acquisition indicates the relevance of the function of negation for L2 speakers over many other features of the target language that are to be acquired. Holophrastic negation is typically realized by the target language expression for anaphoric negation, so *no* in English, *non* in French, *nein* in German, etc. (cf. Sections 2.3 and 2.5 above).

3.4 Negation in the pre-basic variety

Already in the pre-basic variety, negation is integrated in the utterance structure (cf. Section 2.3). In this stage, the utterances are organized on the basis of pragmatic principles ('Focus Last'), rather than rules of syntax. Pragmatic principles are easily formulated as violable constraints in an OT framework. Chapter 2 already introduced the constraint FocusLast:

◆ FocusLast

New information comes last in the utterance

Of course FocusLast is a very general constraint, which comes into play in word order in general. Here, we focus on the role of topic-focus articulation in the placement of negation. If we assume that FaithNeg is ranked higher than *Neg, and FocusLast is the relevant constraint determining word order, we arrive at the patterns *X+ SN* and *SN +X* described for the pre-basic variety (Giuliano 2004). If the input meaning construes *X* as the topic, and negation as the comment, *X+ SN* is the optimal form (Tableau 2). The same constraints in the same order guarantee that an utterance of the form *X+ SN* leads to the optimal interpretation in which *X* is topic, and negation is the focus (Tableau 3):

Tableau 2: X is topic (production of X+ SN)



Meaning $X_{\text{top}} \text{ not}_{\text{foc}}$	Form	FNeg	*Neg	FocusLast
	X	*		
	X SN		*	
	SN X		*	*

Tableau 3: X+NEG (interpretation of X as topic)

Form X SN	Meaning	FNeg	*Neg	FocusLast
	X	*		
	$X_{\text{top}} \text{ not}_{\text{foc}}$		*	
	$X_{\text{foc}} \text{ not}_{\text{top}}$		*	*

Negation is expressed in the pre-basic variety, because of the ranking $\text{FNeg} \gg \text{*Neg}$. The topic-focus structure of the input translates into linear order in the production (Tableau 2). Conversely, linear order is interpreted in terms of information structure (Tableau 3). The constraint FocusLast thus plays a role in OT syntax as well as OT semantics. We use *not* in the semantic representation for pre-logical negation, and use the index *foc* or *top* to mark the negation as being in focus, or being the topic in the topic-focus articulation of the sentence.

In Tableaus 4 and 5 we repeat the exercise for the production and interpretation of the SN + X utterances. The input meaning construes X as the focus of the utterance. The same constraints as in Tableau 2 lead to a different output on the basis of a different topic-focus structure in the input of Tableau 4. The difference in form is also perceived as a difference in meaning (Tableau 5), but of course the constraint ranking is the same as in Tableau 3.

Tableau 4: X constitutes the focus of negation (production)

Meaning <i>not</i> X _{foc}	Form	FNeg	*Neg	FocusLast
	X	*		
	X SN		*	*
☞	SN X		*	

Tableau 5: SN + X (interpretation of X as the focus of negation)

Form SN X	Meaning	FNeg	*Neg	FocusLast
	X	*		
	X _{top} <i>not</i> X _{foc}		*	
☞	<i>not</i> X _{foc}		*	*

The four tableaux sum up the two possible form-meaning pairs in the pre-basic variety. The ranking FNeg >> *Neg guarantees the expression of negative forms and the interpretation of these forms in terms of negative meanings. Besides FNeg and *Neg, we need FocusLast to relate word order variation to information structuring concepts like topic and focus.

The fact that negation in the pre-basic variety is not restricted to holophrastic negation, but interacts with topic-focus articulation indicates that negation is sensitive to focus in the early stages of L2 acquisition. Of course, the focus sensitivity of negation is a well-described phenomenon in semantics (cf. Rooth 1985, Kratzer 1989, and others). The standard view on focus operators is that they split the sentence into a background and a focus. Only the focused material is affected by the operator; background material remains outside of its scope. For negation, this is illustrated in (42), where the different parts of the sentence that can be associated with focus are marked with the subscript f:

- (42) Mary didn't buy a red sweater
- a. Mary didn't buy a [red]_f sweater. (She bought a green one)
 - b. Mary didn't buy a [red sweater]_f. (She bought a green vest)
 - c. Mary didn't [buy]_f a red sweater. (She borrowed one)
 - d. [Mary]_f didn't buy a red sweater. (Sue did)

The different readings in (42a-d) indicate that focus has truth-conditional effects. Negation is thus qualified as a focus operator that associates with focus to determine the truth conditions of the sentence. In the pre-basic variety, we see the focus-sensitive use of negation in Tableaus 4 and 5. The structure SN + X arises when X is in focus. However, we also find a different use, namely that in Tableaus 2 and 3. The structure X + SN arises when negation itself is in focus, and functions as a predicate over the topic X. The use of negation as a predicate is possible in the pre-basic variety, because the L2 speaker uses a nominalized structure at this stage. Verbs as designated expressions for predication do not appear until the basic variety. In the absence of a notion of lexical category in the pre-basic variety, all lexical items can be freely used as topic or focus in a two word utterance in which topic comes first and focus comes last. Negation is no exception, as the existence of X + SN alongside SN + X proves.

A concept of proposition is not required in order to understand the use of negation as relating to a focus. That is, the meanings represented in Tableaus 2 through 5 may be truth-functional in nature, but they need not be. If we adopt the more conservative position that they don't, we can still defend that a notion of pre-logical negation (written as *not*) can be felicitously used in a learner stage in which utterance structure is entirely driven by pragmatic principles governing information structure.

3.4 Negation in the basic variety

In the basic variety, the verb emerges as the kernel of the utterance. Argument structure (involving thematic roles like AGENT, THEME, GOAL) evolves along with the noun-verb distinction. Negation is pre-dominantly preverbal in this stage, according to Perdue, Benazzo and Giuliano (2002) and Giuliano (2004). That is, the overall

structure of negative utterances is (NP +) SN + V (+ Y), where Y=NP, PP or AdvP. This aligns with the early English L2 data from Wode (1981). Stoffel and Véronique (2003) show that preverbal *pas* is a regular, though not universal pattern in the learner's variety of Moroccan learners of French. Sanell's (2005) data show infrequent, but surprising patterns of preverbal negation in the L2 French of Swedish learners in the initial, post-initial, and intermediate stage. Giuliano (2004) qualifies the preverbal position of negation as an instance of 'natural' syntax.

In terms of the OT constraints advanced in Section 3.1, it is tempting to relate this pattern to the emergence of NegFirst as the relevant constraint governing the position of negation in the utterance. However, such a ranking cannot directly be linked to the preceding stage of the pre-basic variety, that we defined in terms of FocusLast and FNeg >> *Neg in Section 3.3. The reason is that FocusLast is a general pragmatic constraint, whereas NegFirst (grammaticized version) is an item specific, syntactic constraint. Under the assumption that L2 acquisition involves a gradual change in constraint ranking, the one cannot simply be replaced by the other. The L2 speaker faces two tasks: relate negation to the newly developed noun-verb distinction, and make the transition from information structure to syntactic structure. We model this as a development in two steps.

In the transition to the basic variety, a grammatical structure arises with the verb as the kernel of the utterance. In order to give negation scope over the utterance as a whole, the verb becomes the focus of negation. In two-word utterances involving negation, the structure SN + V is a direct successor of SN + X, and is primarily used to express negation of the verb, or by extension, negation of the VP, and of the utterance as a whole. So far, this can be handled by the existing constraint setting, as illustrated in Tableau 6, (to be compared to Tableau 4 in Section 3.3 above).

Tableau 6: V constitutes the focus of negation (production)

Meaning	Form	FNeg	*Neg	FocusLast
<i>not</i> V _{foc}				
	V	*		
	V SN		*	*
☞	SN V		*	

The introduction of a clear distinction between nouns and verbs, and the thematic roles evolving along with it triggers another development. In utterances expressing affirmative statements, the linear order NP + V (+ NP) becomes the standard format for predicate-argument structures in which the controller (the NP) is first and the focus/predicate (the V or V+NP) is last. Including negation in this format leads to a problem, because negation is neither the controller (it is not an agent), nor the predicate (negation does not have thematic argument structure). Dimroth et al. (2003) characterize expressions such as negation as links between topic and focus/predicate. The linear order NP + SN + V (+ NP) reflects the structure topic + link + focus. The emergence of propositional, focus sensitive operators involves a new category of expressions next to the verb-noun distinction that marks the transition from the pre-basic to the basic variety. The emergence of focus operators requires an integration of the operator-scope structure into the word order. Both information structure and operator-scope have a natural tendency to align with the left-right order of constituents. De Hoop and de Swart (2000) postulate a mirror principle $\alpha < \beta$, which models this. I rephrase it here in the following terms:

◆ **Mirror principle $\alpha < \beta$**

$\alpha < \beta$: topic < focus: operator < scope, i.e. the linear order of two syntactic constituents α and β corresponds to the order topic-focus in the information structure, which corresponds to the order operator-scope.

So far, the relation between word order and information structure has been captured by means of the constraint FocusLast. With the acquisition of scope bearing operators, the learner has to generalize this constraint to include scope bearing operators as spelled out in the mirror principle. Tableau 7 illustrates how the generalization of FocusLast to the mirror principle leads to the ranking NP + SN + V (+ NP):

Tableau 7: production of NP + SN + V (+ NP) (mirror principle)

Meaning $\neg x_{\text{top}} [V y]_{\text{foc}}$	Form	FNeg	*Neg	$\alpha < \beta$
	NP V NP	*		
	SN NP V NP		*	*
☞	NP SN V NP		*	
	NP V NP SN		*	*

According to the input meaning, the first argument (the agent) is the topic of the utterance. The verb cluster (V + second argument) is in focus. Negation is written as the truth-conditional negator \neg , taking wide scope over the proposition as a whole. Propositional negation typically affects the verb, or the verbal cluster as the kernel of the utterance. All candidates that realize negation in the form violate the constraint *Neg in order to satisfy the higher ranked constraint FaithNeg. The mirror principle then decides the position of negation in the utterance. A clause initial position of negation is less optimal than a preverbal position, in which the operator immediately precedes its focus. Under this constraint ranking, an input in which negation affects the verb induces placement of negation in a position immediately preceding the verb.

As far as the semantics is concerned, the introduction of a noun-verb distinction implies that the L2 user has acquired lexical categories, as well as a concept of predicate-argument structure and thematic roles. Negation is outside the noun-verb distinction, and is a member of a separate category of linking expressions. Dimroth et al. (2003: 70) take linking expressions to validate the relation between the state of affairs described in the predication part of the utterance, and its topic. Negation gets a truth-functional interpretation, because the linking relation shows the conceptualization of the utterance as conveying a full-fledged proposition, based on predicate-argument structure. Negation is now conceived as a scope-bearing operator, involving semantic recursion. This is reflected in the interpretation we propose for the grammar of negation in the pre-basic variety:

Tableau 8: Interpretation of NP + SN + V (+ NP)

Form	Meaning	FNeg	*Neg	$\alpha < \beta$
NP SN V NP				
	$x_{top} [V y]_{foc}$	*		
\neg	$\neg x_{top} [V y]_{foc}$		*	
	$\neg x_{foc} [V y]_{top}$		*	*

In the structure NP + SN + V (+ NP), negation needs to be interpreted because of the high ranking of FNeg. The role of the mirror principle in the semantics is to interpret the part of the utterance that follows negation as its domain of application. This rules out the interpretation in which x (the agent) would constitute the focus of negation. The transition from the interpretation Tableaus 3 and 5 (Section 3.3) to the interpretation Tableau 8 reflects a major change in the conceptualization of utterances. In Tableaus 3 and 5, the semantics of negation is written in terms of the (pre-logical) negation NEG, because we had no evidence that truth-functional negation was involved. In Tableau 8, the semantics of negation is written in terms of the first-order logical connective \neg , because the validation of the relation between topic and predicate relies on the notion of a proposition with a truth-value.

Interestingly, NegFirst (focus version) is nothing but a particular instance of $\alpha < \beta$ in relation to negation. The identification of negation as a scope bearing operator in the basic variety, and the extension of FocusLast to the mirror principle $\alpha < \beta$ implies that the learner has adopted the constraints NegFirst (focus version) and FNeg $>> *$ Neg, as illustrated in Tableau 9:

Tableau 9: Production of NP + SN + V (+ NP) (NegFirst, focus version)

Meaning	Form	FNeg	*Neg	NegFirst _f
$\neg x_{top} [V y]_{foc}$				
	NP V NP	*		
	SN NP V NP		*	*
\neg	NP SN V NP		*	
	NP V NP SN		*	*

In parallel to the development of the structure NP + SN + V (+ NP), we find that the structure X + SN diminishes in use and gradually disappears, as shown in Section 2.3 above. This supports the view that in the basic variety, negation can no longer be viewed as a predicate or a comment on the topic expressed by X, because verbs emerge in this stage as the expressions of predication by excellence. In the learner's input to the production system, we still find SN X_{focus} (as in Tableau 4, Section 3.3) but no longer X_{topic} SN_{focus} (as in Tableau 2, Section 3.3). Once negation is no longer usable as a predicate, it is de facto conventionalized as a focus operator linking the topic and the predicate. Given that the use of negation as a focus operator is the typical situation in the target language (cf. 42), this restriction means that the L2 output gets closer to the target language production. This improves the communicative situation, and supports the development.

In sum, the introduction of a lexical noun-verb distinction pushes the learner to conventionalize negation as an expression that associates with focus, because it loses its status as a possible predicate. The conventionalization of negation as a focus operator is visible in the decreasing use of structures like X + NEG. With the noun-verb distinction in place, a new category of focus operators is introduced. This new category is embedded in the utterance structure thanks to a generalization of the FocusLast principle to the mirror principle. The emergence of the mirror principle is visible in the appearance of structures NP + SN + V (+ Y). The qualification of negation as an expression validating the link between topic and focus implies the identification of negation as a truth-functional operator that applies to propositions. Negation in the basic variety thus signals the emergence of the notion of proposition and semantic recursion in the conceptualization of utterances. This conceptual change is the foundation for the development of syntax.

3.5 Towards the post-basic variety

When the learner moves towards the post-basic variety, pragmatic word ordering principles are gradually giving away to syntactic orderings. NegFirst (grammaticized version) reflects a typologically unmarked variant of the placement of negation, because of the way word order mirrors information structure.

Tableau 10: Production of NP + SN + V (+ NP) (NegFirst, grammaticized version)

Meaning $\neg x_{\text{top}} [V y]_{\text{foc}}$	Form	FNeg	*Neg	NegFirst _g
	NP V NP	*		
	SN NP V NP		*	*
☞	NP SN V NP		*	
	NP V NP SN		*	*

Giuliano (2004) assumes that the L2 learner conceptualizes such an unmarked position as the first hypothesis to entertain about the placement of negation in the target language (cf. Section 2.4 above). We can refine her view here and assume that NegFirst (grammaticized version) comes naturally as the first hypothesis about the placement of negation for the L2 learner to entertain in the process from topic-focus articulation to syntactic structure based on a grammatical operator-scope configuration. The conventionalization of negation as an operator that associates with focus is the driving force behind this hypothesis.

Note that there is no change in output (production) in the switch from the mirror principle (Tableau 7) via NegFirst (focus version) (Tableau 9) to NegFirst (grammaticized version) (Tableau 10). Accordingly, it is difficult to determine whether occurrences of preverbal negation in the learner variety are driven by information structure (negation as a focus operator) or by syntax (negation as preverbal). But note that the grammaticized version of NegFirst plays a role in the syntax only, it does not affect the interpretation. Unlike NegFirst (focus version), which determines the interpretation of negative utterances as spelled out in Tableau 8, NegFirst (grammaticized version) does not play a role in interpretation, because it is a purely syntactic constraint, and the semantic scope of negation is not determined by strict adjacency anymore. The advantage of this grammaticalization process is that speakers become less dependent on linear order to determine interpretation. The disadvantage is that we need to spell out topic-focus articulation on top of word order to determine the interpretation of negative utterances, as argued with respect to example (42) above. Thus, the interpretive process spelled out in Tableau 8 is not enough anymore, and further semantic constraints need to come into play. Given that

the emphasis of this study is on early learner's varieties, we will not spell out the complete interpretation process of focus-sensitive negation in examples like (42), but see Hendriks (2004) for an OT analysis of focus in full language.

When the learner moves beyond the topic-link-focus structure and develops more complex syntactic structure, NegFirst can be tested as a syntactic hypothesis for the expression of propositional negation in the target language. It will turn out to work for languages like Italian and Spanish, but not for French, Dutch and German (cf. Chapter 2). Learners who have acquired the syntactic position for negation in their target language are free to express propositional negation with a negator in post-verbal position, because their word order structuring principles do no longer require operators to be adjacent to their scope.

Learners vary as to how fast they move from information structure to syntax, and how quickly they discover whether NegFirst is the a syntactic rule of the target language. The production may reflect this testing phase. What remains is the insight that preverbal negation marks the transition from a pragmatic utterance structure with no lexical categories (in the pre-basic variety) to a fully syntactic structuring of the utterance (in the post-basic variety). The fact that we find NegFirst effects in all the L2 production data discussed in Section 2 above gives us a glimpse of this process.

3.6 *The developmental path*

The developmental path of negation in L2 acquisition can be summed up as a series of OT grammars corresponding to the following five stages:

Table 1: five stages in the development of negation in L2 acquisition

Stage 0	*Structure >> Faith	no L2 production/comprehension
Stage 1	FNeg >> *Neg	holophrastic negation
Stage 2	FNeg >> *Neg, FocusLast	negation in pre-basic variety
Stage 3	FNeg >> *Neg, $\alpha < \beta$ / NegFirst (focus)	negation in basic variety
Stage 4	FNeg >> *Neg, NegFirst (grammaticized)	negation in post-basic variety (L2 of target languages with preverbal negation)

Stage 0 corresponds to the stage preceding the acquisition of the target language. In this stage, there is no linguistic output whatsoever in L2, so no output of negation either. Stage 0 corresponds with our hypothesis that in the initial stage of L2 acquisition, all markedness constraints are ranked above all faithfulness constraints (cf. Section 1.4 above). Gradually, faithfulness constraints emerge. Stage 1 models this for the emergence of holophrastic negation: FNeg is ranked above *Neg, which allows the expression of negation in L2. No combinatorics are available yet. In stage 2, the additional constraint FocusLast allows the structuring of utterances based on topic-focus articulation. No distinction is established between lexical categories, so all lexical items (including negation) can be placed in focus position or topic position. Accordingly, we find the structure X + SN as well as SN + X. The distinction between nouns and verbs in the basic variety leads to the introduction of a third category of linking expressions. In stage 3, the mirror principle captures the conventionalization of negation as a focus operator. As a result, the structure X + SN disappears, and we find SN + V as a typical instance of SN + X. Instances of preverbal negation in L2 varieties indicate the relevance of the mirror principle, because we find instances of preverbal negation even if the source language and/or the target language do not have preverbal negation in their grammar. The transition of the basic variety to the post-basic variety corresponds with a transition from pragmatic structuring of utterances to syntactic rules governing word order. The grammaticized version of NegFirst emerges as the first hypothesis to test about the syntactix of negation. Of course the examples do not reveal whether the preverbal position of negation was triggered by the focus-based or the syntax-based version of NegFirst. But on the basis of the data reported in Section 2 above, we may assume that the syntax-based version of the constraint only survives in those L2 post-basic varieties in which the target language has a high ranking of NegFirst in its grammar (i.e. languages like Spanish, Italian, cf. Chapter 2).

3.7 A generalization towards other linking devices

Independent support for the view on negation developed in this study is provided by the studies of Perdue, Benazzo and Giuliano (2002) and Dimroth et al. (2003), which do not only bear on negation, but study negation in relation to the L2 acquisition of focus particles like *only*, *also*, the iterative adverb *again*, temporal adverbs of contrast

like *already*, *still*, *no more*, modals, and markers of illocutionary force. Perdue et al. find that focus operators are acquired in a fixed order, with negation preceding additive and restrictive particles (*also*, *only*, and equivalents), which in turn precede the temporal items. For these latter, forms marking the iteration of an event (*again*) are used before temporal adverbs of contrast (*already*, etc.). Particles like *seulement*, *only* show up in the pre-basic variety in constructions PART + X, whereas *aussi*, *too* show up in constructions X + PART. In the basic variety, the first set of items shows up sentence initially, the second class sentence finally, whereas negation shows up preverbally. It is not until advanced stages of the post-basic variety that *seulement*, *only*, *aussi*, *too* find their place after the auxiliary and before the lexical verb. Perdue et al. argue that the pragmatic structure of the pre-basic variety only allows adjacency of the domain of application to the particle. The peripheral positions of the particle in the basic variety allow the particle to have scope over the entire sentence. It is not until the particles are fully integrated within the utterance that the particles can affect nonadjacent constituents.

In terms of the OT approach developed in this book, the observation that the development of focus particles closely follows the acquisitional path of negation means that the identification of negation as an operator, i.e. a separate category from nouns and verbs in the basic variety, leading to a generalization of FocusLast to the mirror principle $\alpha < \beta$ opens up the same route for a whole domain of focus sensitive operators. The development from pragmatic structure (pre-basic variety) to full syntactic structure (inflectional morphology and functional structure) in the post-basic variety is then mediated by the emergence of predicate-argument structure based on the verb-noun distinction, and operator-scope relations based on focus sensitive particles, modals, and markers of illocutionary force.

The conceptualization of negation and other focus particles as operators that scope over a proposition proves that the basic variety involves a stage in which the learner conceptualizes utterances as propositions. The analysis developed here thus supports the position defended by Perdue et al. (2002), Dimroth et al (2003) and others that semantic finiteness precedes morpho-syntactic finiteness in early L2 acquisition. For the pre-basic variety we cannot prove that utterances are conceptualized as propositions, as the meaning of negation in this stage can be described as affective or pre-logical. If truth-functional negation is the criterion for the

birth of propositions, and the emergence of propositions indicates the transition from protolanguage to language, we can characterize the basic variety as the location of this important step in the learner's development. The fact that other focus particles closely follow the development of negation supports this view.

4. Implications for language evolution

If restricted linguistic systems provide a “window” on language evolution, we can use the OT analysis to formulate a hypothesis about the emergence of semantic recursion in language genesis. I adopt the current stance in the literature that a certain primate conceptual structure pre-dates the emergence of language (cf. Tomasello and Call 1997, Jackendoff 2002, Hauser, Chomsky and Fitch 2002, Hurford 2003, Gärdenfors 2003, and others). Hurford (2003: 45) states that ‘While apes may perhaps not be capable of storing such complex structures as humans, it seems certain that they have mental representations in predicate-argument form.’ According to Gärdenfors (2003: 142), most layers of the human thought had emerged in evolution before we started to speak. I assume that social life is the driving force behind language in one way or another, whether for gossip (Dunbar 1998), hunting and teaching (Calvin & Bickerton 2000), planning future actions (Gärdenfors 2003) or otherwise. I am committed to the view that language emerged for communicative purposes. Communication has to do with the interaction between people, and is anchored to the outside world. Utterances convey a message between a speaker and a hearer. The OT analysis developed so far has its roots in this communication process, and allows us to capture both directions of optimization: production and interpretation.

If we take language to emerge from animal cognition, a gradual development is most likely (Tallerman 2006). The five main stages I postulate are the conceptual stage (before language emerges), the holophrastic stage (communication with single-word utterances), the protolanguage stage (communication with utterances structured by topic-focus articulation), language with semantic recursion (communication with sentences involving propositions and operators), and syntax-based language (communication with sentences structured by syntactic principles). It is outside the scope of my study to give a full description of all aspects relevant to each of these stages, so I will focus on the development of negation.

4.1 *Conceptual stage*

In terms of the OT analysis developed here, I assume that the (pre-linguistic) conceptual stage corresponds with a system in which all the markedness constraints are at the top of the ranking. In the conceptual stage, no linguistic output corresponds to the meaningful input. This is consistent with the observation that linguistic isolates do not develop a (first) language if not spoken to, even though they have the mind of a modern human being. Of course, I do not mean to say that all the faithfulness and markedness constraints that we use to describe modern, full languages were in place in the mind of the early humans. But we can assume that a proto-constraint that avoids any linguistic structure, say *Structure was ranked higher than a proto-constraint about input-output correspondences, say Faith, that would lead to the expression of some meaningful input into some linguistic form. Postulating a proto-constraint Faith only makes sense for cognitive agents who have enough of a mental representation to allow correspondences between an input meaning and an output form, and to have a communicative intention that drives the expression of some input meaning. I take this to be the case for early humans in the period leading up to the emergence of language.

The ranking *Structure >> Faith that we use to characterize the conceptual stage corresponds to stage 0 in L2 acquisition as spelled out in Table 1 in Section 3.6 above. The main difference between L2 acquisition and language genesis at this stage concerns the richness of the conceptual representation supporting the general faithfulness constraint. So the proto-Faith constraint in language genesis is much more restricted in terms of the input meanings it can support than the faithfulness constraints in modern language. As suggested already, I take pre-logical negation to be part of the pre-existing conceptual structure of early hominids, but not necessarily full truth-functional negation.

4.2 *Holophrastic stage*

In the step from the conceptual stage to the holophrastic stage, some aspect of the proto-faithfulness constraint moves above the proto-markedness constraint, and a concept gets expressed that was not expressed before. There is not need to assume this

to be a single transition. It can be a stepwise development during which the proto-constraints *Structure and Faith are gradually split up into versions of faithfulness and markedness related to all kinds of conceptual inputs, and formal outputs.

Because of the basic function of negation in communication, there is strong conceptual pressure to express this concept. Given the asymmetry between affirmation and negation, and Horn's distribution of pragmatic labor (cf. Chapter 2), this leads to the marking of negation rather than affirmation. Accordingly, I expect the order FNeg >> *Structure to be achieved fairly early in the evolution of human language. Because negation is both syntactically and semantically marked, the faithfulness constraint FNeg is immediately mirrored by the markedness constraint *Neg, and we obtain the order FNeg >> *Neg. This is the ranking that we adopted for holophrastic negation in L2 acquisition (stage 1 in Table 1, Section 3.6).

The earliest expression of negation can be postulated to be holophrastic negation. Holophrastic negation can be interpreted as denial, rejection, refusal, disagreement, in other words as a general 'negative' attitude with regard to some proposal, request, action, etc. in the context of use. Holophrastic negation does not have to be interpreted as truth-functional negation, but can be viewed as affective, pre-logical negation (Section 1.2). Accordingly, it does not require cognitive capacities corresponding with recursion. Thus we are not making overly strong claims that might be incompatible with the more limited brain capacity of early humans.

Holophrastic negation is inherently context-dependent. 'No' only means something if the interlocutor knows what is under consideration in the situation of use. What negation bears on need not be linguistically overt (it can be an action, movement, or non-verbal communication act in the situation), but it is likely to be a communicative act. That is, holophrastic negation would be uttered in reaction to the actions, attitude or words of some other human being, rather than as part of inner thought, or as a reaction to a rainstorm, a falling rock, or an animal of prey approaching. In that sense, holophrastic negation is an important feature of communication as an interaction between two participants.

Holophrastic negation is potentially part of human language from the stage onwards where single forms were uttered with a single or a (deictically) complex meaning. Under the view that social life is the driving force behind language in one way or another, negation is likely to be part of the earliest stages of human communication. In all social settings, manipulation and negotiation play a role in the

gathering and distribution of food, in the hierarchy of power, in the distribution of labor, in shared gossip, in teaching children, etc. Communicative acts like requests, acceptance, disagreement and refusal/rejection are normal aspects of such social processes. That is not to say that refusal, disagreement and rejection could not be expressed non-verbally (cf. Horn 1989: 166). Gestures, general body language, tone and pitch of voice are all potential means for the expression of discoursal negation without the use of words, even today. But this only confirms that the concept of (pre-logical) negation pre-dates its linguistic expression. Once humans started using words, it is likely that they developed forms for the expression of the basic acts that constitute manipulation and negotiation processes in a social setting. In that sense, having a word for negation is an advantage even in the small lexicon of a (holophrastic) protolanguage.

4.3 Utterances structured by topic-focus articulation (protolanguage)

Under the assumption that holophrastic communication was successful in the social life of early hominids, we may assume there is evolutionary, environmental and/or cultural pressure driving the enrichment of language. For a while, this can be covered by a growing vocabulary. But once a certain threshold on the number of vocabulary items is reached, concatenation of symbols emerges as a more economical strategy by natural selection, as shown by Nowak et al. (1999, 2000). Communication based on concatenation of symbols is harder, because the speaker has to come up with a device for linear order (in spoken language, at least), and the hearer needs to have knowledge of multiple lexical items. However, it has the advantage of allowing speakers to formulate messages that were not learned beforehand. The advantages of this more complex form of communication only become clear when speakers want to communicate about larger sets of events. Nowak et al. take this to be the case only for humans.

Nowak et al. (1999, 2000) provide a model and a motivation for the linguistic systems of early hominids to switch from holophrastic communication to a system based on utterances that involve concatenation of symbols. Researchers differ in opinion as to how the move from holophrastic utterances to utterances combining multiple words is realized. Two opposing views are defended by Wray (1998, 2000) and Tallerman (2005 and references therein). Both Wray and Tallerman assume that a

holophrastic phase historically precedes the stage of language in which combinatorics arise. But Wray defends the view that the holophrastic message was fractioned into composing parts (holistic view), whereas Tallerman takes them to be reanalyzed as single words that can be combined to form complex utterances (synthetic view).

The fact that negation lends itself to a holophrastic use makes it possible to hypothesize that negation is already part of the holophrastic stage. As pointed out in Section 2.4 above, holophrastic negation in early L2 is realized by the expression of anaphoric negation in the target language: English *no*, French *non*, German *nein*. Although we find unanalyzed forms like *nepade* in L2 French, and *dont* in L2 English, these expressions do not arise in the holophrastic stage, but are part of the pre-basic or basic variety in which combinatorics are already in place (cf. Section 2.4). Thus, they cannot be taken to support Wray's claims. The fact that modern holophrastic negation, as we find it in early L2 isn't fractioned when complex utterances arise, but is reanalyzed as a single word that can be combined with other words to form an utterance based on topic-focus articulation might be taken to support Tallerman's synthetic view, rather than Wray's holistic approach. As far as the evolution of negation is concerned, my model fits in better with the synthetic view.

We have seen that the pre-basic variety organizes utterances on the basis of topic-focus articulation, which can be summed up with the pragmatic principle Focus Last. In this phase, there are no verbs yet in the learner's grammar. If we project this onto the protolanguage of early humans, along the lines defended by Jackendoff (2002) and the windows approach (Botha 2004), we can hypothesize that lexical categories didn't exist yet in the earliest stages of protolanguage. In the absence of a category distinction between noun-like expressions and verb-like expressions, any constituent can either function as a topic or as a focus, as a thing we predicate something of, or as a predicate of something.

If we assume that holophrastic negation pre-dates protolanguage, we need to see how negation is integrated in the newly developed linear order of concatenated symbols driven by topic-focus articulation. The functioning of negation in the pre-basic variety shows that negation takes its place in this structure just like other symbolic expressions. In the protolanguage stage, negation can either be the comment on some topic X (in the structure X + SN), or associate with some other element that functions as its focus (in the structure SN + X). The relevant constraints involved in the expression of negation in this stage are FNeg >> *Neg. The relevant constraint

governing the placement of negation in the utterance is FocusLast. Thus, the protolanguage system of negation is characterized by the same constraint setting as that of the pre-basic variety (stage 2 in Table 1, Section 3.6).

4.4 *Semantic recursion*

In terms of L2 acquisition, the introduction of a distinction between nouns and verbs gives rise to a grammar in which the verb functions as the kernel of the utterance. Thematic arguments (AGENT, THEME, GOAL, etc.) evolve along with the noun-verb distinction. The analogy with language genesis is that there is a stage following the protolanguage stage described in Section 4.2., which is characterized by the introduction of lexical categories such as nouns and verbs, and the development of predicate-argument structure as tied to these lexical category distinctions. Heine and Kouteva (2002: 394) identify this as the stage in which “there might have existed only two types of linguistic entities: one denoting thing-like time stable entities (i.e. nouns), and another one for non-time stable concepts such as event (i.e. verbs)”.⁷ Full, modern syntax need not be in place yet. Word order in NP V (+ NP) utterances can still be determined by pragmatic principles such as ‘Focus Last’.

As far as negation is concerned, the introduction of lexical categories and thematic arguments leads to the conventionalization of negation as a focus sensitive operator. Negation is neither a verb nor a noun, and predicate-argument structure is complemented with a status of operator linking topic and focus. According to Jackendoff (2002: 253), “at the one-word stage, relational words are pointless. But once multiple-symbol utterances are possible, many classes of “utility” vocabulary items offer themselves as design possibilities.” Jackendoff (2002: 253-255) mentions spatial relation terms, time terms, marks of illocutionary force and modality, but also negation and discourse connectors. He argues that relational vocabulary plays an important role in thought, because it becomes possible explicitly to wonder if *p* and suppose that *p*. In the terminology adopted here, it is crucial that the introduction of linking devices signals the emergence of semantic recursion. Once reflection on

⁷ Note that not all modern (full) languages have a clear noun-verb distinction. Salish languages have been claimed to have a general lexical category of predicative expressions (cf. Mithun 1999 for discussion). However, there is no doubt that Salish languages exploit thematic roles in predicate-argument structure. I conclude that the emergence of thematic arguments is crucial. It may co-evolve with a lexical noun-verb distinction, but it doesn’t have to.

propositions can be expressed, we can safely assume that a conception of utterances as denoting propositions is part of human cognition. Given the existence of holophrastic negation, and the continued presence of negation in protolanguage, we expect negation to be one of the earliest expressions of semantic recursion emerging in the genesis of natural language.

FocusLast is not enough to govern the placement of linking devices, but the mirror principle $\alpha < \beta$ permits a generalization of topic-focus articulation to include operator-scope structure. In this way, the conceptual shift from pre-logical to truth-functional negation is embedded within the information structure of the utterance. In terms of language genesis, the appearance of scope bearing operators correlates with the transition from protolanguage to language, because they put semantic recursion in place. Semantics precedes syntax (cf. Calvin and Bickerton 2000: 136) in the sense that the only word order structuring principles we need at this stage are pragmatic principles based on topic-focus articulation. The OT ranking we need to model this stage is FNeg >> *Neg for the expression of negation, and the mirror principle $\alpha < \beta$ or its item-specific instantiation NegFirst (focus) for the placement of negation in a pre-focus (typically pre-verbal) position. The constraint ranking for the stage of early language in which semantic recursion is in place thus corresponds with the ranking we adopted for the basic variety (stage 3 in Table 1, Section 3.6).

4.5 Towards a syntactic expression of negation

The mirror principle $\alpha < \beta$ provides a general mechanism to insert scope bearing operators in pragmatic word order. The focus-based version of NegFirst is a variant of $\alpha < \beta$ with regard to negation. The next phase of the development I postulate is a transition from pragmatic based word order to syntax. It is possible that phrase structure rules come into this process to govern the introduction of syntactic functions like subject and object. I have very little to say about this step in the evolutionary process, except that it cannot come into place until utterances are conceptualized as propositions carrying truth-values. The emergence of syntax leads to a weakening of the role of the mirror principle $\alpha < \beta$ in the structuring of utterances. As far as the placement of negation is concerned, we can assume a transition from the focus based version of NegFirst to the syntactic version of NegFirst, and assume that the pre-

verbal position is the first syntactic hypothesis to entertain about the placement of negation in a hierarchical phrase structure. The OT ranking we need to model this stage is $\text{FNeg} \gg *Neg$ for the expression of negation, and $NegFirst$ (grammaticized version) for the placement of negation in the pre-verbal position. The constraint ranking for the syntactic stage of early language thus corresponds with the ranking we adopted for the post-basic variety (stage 4 in Table 1, Section 3.6).

4.6 Genesis of negation

The five stages described in Sections 4.1 through 4.5 amount to a development from a pre-linguistic conceptual notion of pre-logical negation to a holophrastic negation, and from there to a further integration of the negator in the utterance structure. Once negation is recognized as an operator bearing scope of a proposition, we see truth-functional negation and the emergence of semantic recursion. As a consequence of this conceptual step, pragmatic principles of word order gradually give away to syntax. The evolutionary process we posit is summed up as follows:

Table 2: Genesis of negation

Stage 0	$*Structure > Faith$	conceptual stage
Stage 1	$FaithNeg \gg *Neg$	holophrastic stage
Stage 2	$FaithNeg \gg *Neg, FocusLast$	protolanguage
Stage 3	$FaithNeg \gg *Neg, \alpha < \beta /$ $NegFirst (focus)$	language with semantic recursion
Stage 4	$FaithNeg \gg *Neg,$ $NegFirst (grammaticized)$	emergence of syntax

At the zero stage, we have a conceptual representation of (pre-logical) negation, but no linguistic output. Proto-markedness constraints that ban structure are ranked above proto-faithfulness constraints that drive the user towards the expression of meaningful input, so there is no linguistic production. Reranking $FaithNeg$ above $*Structure$, and postulating a related markedness constraint $*Neg$ allows for the expression of negation in the holophrastic stage (stage 1). From a holophrastic stage, we move to a

protolanguage with combinatorics based on topic-focus articulation (stage 2). With the introduction of lexical categories, negation is conventionalized as a focus operator. The relation between information structure and word order has been generalized to include the operator-scope configuration (stage 3). Semantic recursion is in place, and this was the criterion we decided to use to characterize the transition from protolanguage to language. NegFirst (focus) is the operator specific instantiation of the mirror principle $\alpha < \beta$. The interpretation of utterances in terms of propositions carrying truth-values provides the basis for the emergence of syntax. It is not until syntax develops as a general ordering principle that the interpretation of NegFirst as ‘negation precedes its focus’ shifts to ‘negation is preverbal’ for propositional negation, and NegFirst (grammaticized version) enters the scene as the first syntactic hypothesis concerning the placement of negation (stage 4). From here on, grammaticalization runs its course, and we enter the normal diachronic development of negation spelled out as the Jespersen cycle (cf. Chapter 2).

Notwithstanding the difference in cognitive capacities between modern L2 learners and early humans, we can postulate that the development of early language proceeded in similar ways. In modern L2 learners, we can take the existence of a semantic propositional structure with a concomitant interpretation of negation as a truth-functional operator for granted, because the learners have a modern brain, and a mature knowledge of a full linguistic system (their L1). For early humans, we have to be more careful. Following Tomasello and Call (1997), Hauser, Chomsky and Fitch (2002), Jackendoff (2002), Hurford (2003) and Gärdenfors (2003) and others, we can assume that the cognitive capacity for predicative structures is available before language develops. I take the pragmatically based combinatorics in the protolanguage stage to reflect this pre-existing conceptual structure. In the evolution of language, the birth of the proposition is coupled with the emergence of truth-functional grammatical operators arising out of focus operators. In this way, the transition from protolanguage to full language is located in the emergence of semantic recursion. Semantics precedes syntax in the sense that semantic recursion can be expressed at a stage in which principles governing word order are still grounded in information structure (topic-focus articulation). Semantics drives syntax in the sense that syntactic rules about the placement of negation follow the emergence of lexical categories, and operator-scope configurations.

5. Conclusion

In this chapter, I have attempted to reconstruct the evolutionary stages preceding full language by emphasizing the relevance of semantic recursion to the debate. My point of departure was Horn's (1989: xiii) observation that no animal communication systems include negative utterances, whereas all human languages do. I postulated that the emergence of truth-functional negation could provide us with a criterion to decide whether a particular system of communication qualifies as a full language. I used early L2 acquisition as a "window" on language genesis, and used data on the acquisition of negation from the ESF project to model the emergence of semantic recursion in early stages of L2. The key turned out to be a conceptual step that added a notion of operator to the predicate-argument structure that emerges out of the verb-noun distinction. The introduction of an operator-scope structure reflects the emergence of semantic recursion, and thereby the birth of language. A grammatical notion of operator-scope is easily integrated in the utterance structure based on information structure. With semantic recursion in place, grammar develops beyond information structure, and the preverbal position emerges as the unmarked position for negation in the syntax. Once semantic operators are freed from the mirror principle, a dissociation of adjacency and semantic scope becomes possible. The reconstruction of this evolution in a sequence of constraint rankings indicates how the OT notion of 'emergence of the unmarked' can be used in developing hypotheses about language genesis.

Optimality Theory has other advantages for modeling language genesis. Because it is essentially non-modular in nature, it allows constraints from different linguistic modules (syntax, morphology, phonology, semantics) to interact in the selection of the optimal output. It also allows the constraint rankings relevant to language to be intertwined with other parts of human cognition. In our evolutionary scenario, this makes it possible to posit a gradual emergence of the language faculty, and we don't need to postulate a 'sudden' transition giving rise to 'real' language. In particular, our proposals support the frequentatist/functionalist view that language use drives grammaticalization (Jäger 2003, Van Rooy 2004, Haspelmath 2006).

Syntactic recursion is frequently taken to be the hallmark of human language (cf. Hauser et al. 2002). If the sketch given here of the evolution of negation is

plausible, the development of the semantic notion of proposition precedes the emergence of syntactic recursion, and might well be taken to be an important trigger for it. If the presence of semantic negation and syntactic recursion are indeed connected in the way suggested here, a possible implication is that the lack of syntactic recursion and the absence of truth-conditional negation in animal communication systems other than human language might both be rooted in a cognitive capacity that lacks semantic recursion. Accordingly, it might be worthwhile strengthening the semantic, conceptual dimension in the comparative research program on language evolution that Hauser et al. (2002) are suggesting.

Chapter 8

Conclusion and further perspectives

0. Summary of chapter

In this chapter, we sum up the most important results of the study on the expression and interpretation of negation carried out in this book. We consider their relevance for linguistic theory and, more broadly, a theory of human cognition. Finally, we discuss the implications of our work for future research. Four issues deserve attention: the syntax of negation, negation and focus, the relation between negative polarity and negative concord, and the distinction between negative doubling and negative spread.

1. Summary of research

Negation is a universal category of natural language (Dahl 1979, Chapter 3), and presumably of human cognition (Chapter 7). However, systems of negation in natural language vary, and reflect highly complex grammaticalization processes, as witnessed by the wide range of data gathered in the literature, and discussed in this book. It has proven extremely difficult to provide a unified view of negation, polarity and concord across different languages, dialects, and diachronic stages of a language as part of a general theory of human language and cognition. In the monograph, I hope to have provided the main ingredients of just such an analysis. In this section I sum up the most important results. Language variation and language evolution are important topics in current scientific research. The connections between Optimality Theory and Game Theory, with its applications in biology, economics, logic and information retrieval make it possible to situate this particular research project in the broader context of research on human cognition. Bi-directional OT focuses on the communicative process between users of a language, and is embedded in a pragmatic theory on speaker-hearer interactions. These aspects make me believe that the project did not only lead to new results on negation, typology and evolution, but benefits the interdisciplinary field of cognitive science that linguistics is part of. The embedding in this broader perspective is the topic of Section 2 below. Of course, there is always more to be done, and there are numerous

possible extensions of the research reported on in this book. In Section 3 below, I sketch some potential lines of investigation.

1.1 Negation as a universal category of natural language

The starting point of our study is the observation that all natural languages have ways to express negation, i.e. something that corresponds to the first-order logical connective \neg . In English, this would be *not*. We take it to be a universal feature of human cognition that speakers are able to conceptualize the meaning $\neg p$ as well as p , and want to express both affirmation and negation in their mother tongue. The analysis developed in Chapter 3 is rooted in the observation that there is an asymmetry between the expression of p and its negative counterpart $\neg p$ in that negation is always overtly marked, but affirmation usually takes the ‘zero’ marker or a simpler expression. The asymmetry is illustrated for English in (1a) and (1b):

- (1) a. It is raining.
- b. It is *not* raining.

The complexity in expression is related to the semantic markedness of negation. Under strong evolutionary pressure, languages form optimal systems of communication. One feature of optimal communication is that natural languages respect Horn’s (1984) division of pragmatic labor. According to this principle, unmarked meanings pair up with unmarked forms, and marked meanings with marked forms. Zeevat and Jäger (2002), Jäger (2003) and Mattausch (2005, 2006) develop an evolutionary model which derives Horn’s (1984) division of pragmatic labor from frequency asymmetries. In our application of this model to negation, we start from the position that negative meanings are relatively infrequent compared to affirmative meanings. Under this assumption, an evolutionary stable system of communication arises in which the use of marked forms for unmarked meanings is avoided, because it violates the general economy constraint which avoids structure. Accordingly, zero or simple forms are used for affirmation, and more complex forms are used for negation. If we translate this in terms of the faithfulness and markedness constraints familiar from Optimality Theory (Smolensky and Legendre 2006), we can formulate the two constraints FNeg and *Neg as follows:

- ◆ **FaithNeg**

Be faithful to negation, i.e. reflect the non-affirmative nature of the input in the output.

- ◆ ***Neg**

Avoid negation in the output.

Under evolutionary pressure, we obtain the universal ranking $\text{FNeg} \gg \text{*Neg}$. Under the assumption that all human speakers want to distinguish between affirmative and negative statements in their language, this derives the observation that negation is a universal category of natural language (Dahl 1979) from evolutionary pressure.

1.2 Integration of negation in the sentence structure

The universal ranking $\text{FNeg} \gg \text{*Neg}$ imposes strong limits on the possible variation we find in natural language. This ranking requires negation to be overtly expressed. However, the ranking $\text{FNeg} \gg \text{*Neg}$ leaves a wide range of variation as to the means by which negation is expressed, and the integration of the negation marker in the grammar of a particular language. The variation Chapter 3 focuses on concerns the position of the negation marker with respect to the verb. Building on Jespersen (1917, 1924, 1933), we distinguish three main possible constructions: preverbal negation, post-verbal negation, discontinuous negation. The general markedness constraint *Neg and the faithfulness constraint FNeg are complemented with two faithfulness constraints governing the placement of negation in the sentence: NegFirst and FocusLast .

- ◆ **NegFirst**

Negation precedes the finite verb.

- ◆ **FocusLast**

New information comes last in the sentence.

A high ranking of NegFirst leads to preverbal negation, a high ranking of FocusLast leads to post-verbal negation. If both NegFirst and FocusLast outrank *Neg , a system with

discontinuous negation arises (typically with one marker in preverbal position, and the second one in post-verbal position). A typology of languages arises as the result of reranking the three constraints with respect to each other. We can interpret this typology in a synchronic as well as a diachronic perspective. The three main phases of the Jespersen cycle are thus accounted for. Intermediate stages are handled by an extension towards stochastic Optimality Theory. The ordinal ranking of standard OT is abandoned in stochastic OT, and replaced by a continuous ranking of constraints. The result is that constraints have overlapping ranges. Overlapping ranges of constraints in the rankings corresponding with the three main phases of the Jespersen cycle account for intermediate systems in which a preverbal negation is always obligatory, but a post-verbal marker is optional, or a post-verbal negation is always obligatory, but a preverbal marker is optional. Such intermediate phases are diachronically unstable according to Haspelmath (1997). It is likely to assume that languages stabilize on an ordinal ranking after a while.

1.3 *Neg-expressions*

We claim that all languages have ways to express propositional negation. Many languages also have nominal or adverbial expressions negating the existence of individuals having a certain property. In English, this would be *nobody*, *nothing*, *never*, *nowhere*. We call them negative indefinites, or Neg-expressions. Their syntactic and semantic properties are studied in Chapter 4. If we assume that knowledge of first-order logic is part of human cognition, we might expect negative indefinites to behave alike across languages. From empirical research carried out in typology and descriptive linguistics, we know that this is not the case. The key issue is that languages make use of the same underlying mechanisms, but exploit the relation between form and meaning in different ways.

Neg-expressions resemble the marker of sentential negation in their capacity to satisfy FNeg. Jespersen (1917) notices that negation is frequently attracted to an argument. The constraint NegAttract captures this tendency.

◆ **NegAttract**

Realize (clausal) negation on an indefinite in argument or adjunct position

Whether or not a language realizes negation on an indefinite, rather than on the marker of sentential negation depends on the ranking of NegAttract with respect to other constraints

governing the expression of negation. Chapter 4 focuses on negative indefinites (Neg-expressions) across languages. We distinguish two main classes of languages: double negation languages and negative concord languages. In double negation languages such as English, the combination of two negative indefinites gives rise to a double negation reading (2a). In negative concord languages such as Romance, Slavic, Greek, Hungarian, Afrikaans, and many others, the combination of two Neg-expressions leads to a single negation reading (2b).

- | | | | |
|-----|----|---|-----------|
| (2) | a. | Nobody has said nothing. | [English] |
| | | $\neg\exists x\neg\exists y \text{ Say}(x,y)$ | |
| | b. | Nessuno ha detto niente.
Nobody has said nothing.
'Nobody has said anything.' | [Italian] |
| | | $\neg\exists x\exists y \text{ Say}(x,y)$ | |
| | c. | Nobody has said anything. | [English] |

The proper way to say in English what the Italian sentence (2b) expresses would be (2c), rather than (2a). English *any* is not a Neg-expression, but an NPI, though (cf. Chapter 1, Sections 3 and 4, and this chapter, Section 3.3 below). Chapter 4 proposes a bidirectional OT analysis that captures the syntax-semantics interface of Neg-expressions in both classes of languages. In negative concord languages, the functional motivation that favors marking of 'negative variables' prevails. Double negation languages value first-order iteration. The bi-directional set-up is essential, for syntactic and semantic variation go hand in hand. More precisely, the analysis relies on de Swart and Sag's (2002) analysis of negative concord in terms of polyadic quantification. In this analysis, all Neg-expressions contribute semantic negation, and are stored in an N-store when the sentence is parsed. Interpretation takes place at the clausal level. A sequence of Neg-expressions can be interpreted in two different ways upon retrieval from the N-store. Iteration corresponds to function application, and leads to a double negation reading. Resumption involves the construction of an n-ary negative quantifier, binding all the variables of the Neg-expressions in the sequence. The typology is built on four constraints. The two familiar constraints FNeg and *Neg come into play in the expression and interpretation of sentential negation as well as Neg-expressions. The two new constraints are a syntactic faithfulness constraint MaxNeg and a semantic faithfulness constraint IntNeg.

◆ **MaxNeg**

Mark ‘negative variables’ (i.e. mark indefinites in argument or adjunct position that are interpreted in the scope of an anti-additive operator such as negation, as formally negative.)

◆ **IntNeg**

Force Iteration (i.e. interpret every Neg-expression in the input form as contributing a semantic negation at the first-order level in the output.)

FNeg is universally ranked higher than *Neg. MaxNeg, IntNeg and *Neg can be reranked with respect to each other. A negative concord language has the bidirectional grammar MaxNeg >> *Neg >> IntNeg. A double negation language has the bidirectional grammar IntNeg >> *Neg >> MaxNeg. Other rankings are unstable. In these bi-directional grammars, the choice between resumption and iteration in the semantics is explicitly related to the functional desirability of marking negative variables in the syntax. As a result, neither a purely syntactic, nor a purely semantic analysis of negative concord, but a true syntax-semantics interface of negation and negative indefinites emerges. Languages vary in the ranking of these constraints synchronically as well as diachronically. Thus the OT analysis offers a theory of cross-linguistic variation as well as language change.

Once the markedness of negation, and the functional motivation for Neg-expressions is in place, we can study the interaction of the marker of sentential negation and negative indefinites in Chapter 5. Chapter 4 maintains the view, advanced by de Swart and Sag (2002) that negative concord is primarily a relation between negative indefinites. The marker of sentential negation is not driving negative concord (as it is in many existing analyses of negative concord). When it co-occurs with a Neg-expression, FNeg is satisfied by the Neg-expression, and the marker of sentential negation typically functions as a scope marker. Three possible language classes are distinguished: languages in which Neg-expressions never combine with the marker of sentential negation, languages in which they sometimes do, and languages in which they always do. In the first class, a high ranking of *Neg blocks the presence of the marker of sentential negation. After all, Neg-expressions contribute semantic negation, so FNeg is satisfied. Given that the basic role of a marker of sentential negation is to satisfy FNeg, it is redundant in sentences in which other expressions that have additional functions (such as Neg-expressions contributing a variable binding a particular argument

position) assume that role. *Neg then works as an economy constraint, and rules out the use of a marker of sentential negation in combination with a Neg-expression as suboptimal. We can only expect the presence of the marker of sentential negation to be licensed in combination with a (sequence of) Neg-expressions in a certain configuration if the negation marker is needed to satisfy other faithfulness constraints. In languages like Spanish, Italian, European Portuguese, the constraint NegFirst plays a role. In these languages, preverbal Neg-expressions do not combine with a negation marker (2b, 3b), but post-verbal Neg-expressions require the presence of a preverbal negation marker (3a).

- (3) a. Mario **(non)* ha parlato di *niente* con *nessuno*. [Italian]
 Mario **(SN)* has talked about *nothing* to *nobody*.
 b. *Nessuno* (**?non*) ha parlato con *nessuno*.
 Nobody (**?SN*) has talked with *nobody*.

A high ranking of the constraint NegFirst in Italian accounts for the fact that negation needs to be in preverbal position, whether expressed by the marker of sentential negation (3a) or by the negative indefinite.

The third class of languages always requires the presence of a marker of sentential negation in a sentence expressing negation, independently of the presence of Neg-expressions. We find this situation in Greek, Hungarian, Slavic, Afrikaans, Rumanian, and many other languages.

- (4) a. Nimeni **(nu)* a venit. [Rumanian]
 nobody **(SN)* has come.
 ‘Nobody came’
 b. **(Nu)* a venit nimeni.
 **(SN)* has come nobody.
 ‘Nobody came’

None of the existing constraints takes care of this situation, so we define a new syntactic faithfulness constraint MaxSN.

◆ MaxSN

A negative clause must bear a marker of sentential negation.

A high ranking of the constraint MaxSN is responsible for the obligatory presence of the negation marker *nu* in Rumanian, independently of the preverbal (4a) or post-verbal (4b) position of the Neg-expression.

The eight constraints *Neg, FNeg, NegFirst, FocusLast, NegAttract, MaxNeg, MaxSN and IntNeg account for the full range of variation we find in the expression and interpretation of negation in a wide range of languages discussed in Chapters 3 through 5. Among these constraints, we find one core markedness constraint, namely *Neg. *Neg aims at avoiding negation in either form (generation) or meaning (interpretation), so it is operative in OT syntax as well as OT semantics. The other seven constraints are faithfulness constraints. FNeg operates on both forms and meanings, just like *Neg. IntNeg is the only semantic faithfulness constraint that we need. The interaction between MaxNeg, *Neg and IntNeg forms the core of our bidirectional grammar. The ranking of these three constraints determines whether a language exemplifies double negation or negative concord. NegFirst, FocusLast, NegAttract, MaxNeg and MaxSN are all syntactic constraints, which involve the relation between a meaningful input and a particular output form. The asymmetry between syntactic and semantic constraints indicates that a large amount of the cross-linguistic variation we find in the domain of negation is due to the way negation is expressed. However, the expression of negation cannot be separated from its interpretation. The study of the interaction of negative indefinites and the marker of sentential negation in Chapter 5 is crucially embedded in the bidirectional OT analysis developed in Chapter 4. The ranking of FNeg >> *Neg is universal, but all other constraints can be reranked with respect to each other, which gives rise to the typologies described in Chapters 3 through 5.

1.4 Double negation readings in negative concord languages

Chapter 6 builds on the results obtained in Chapters 3 through 5, and discusses the possibility of expressing double negation (i.e. $\neg\neg p$) in negative concord languages. Affixal negation and multiple clause constructions are the easy cases. Affixes are not stored in the N-store, so they never participate in negative concord. Resumption, and polyadic quantification more in general operates within the boundaries of a single clause (de Swart and Sag 2002), so multiple clause constructions generally do not allow negative concord. More complex cases involve the ambiguities that arise with a sequence of Neg-expressions as in (5).

Conclusions and Perspectives

- (5) Personne n'a rien payé. [French]
 Nobody SN has nothing paid.
 = No one has paid anything. [NC]
 = Everyone has paid something. [DN]

Languages that display such ambiguities have a grammar that combines features from a double negation and a negative concord language. A stochastic OT analysis in which the syntactic ranking is that of a negative concord language, but the interpretive constraints have an overlapping range accounts for ambiguities with a sequence of Neg-expressions in French, Rumanian, Welsh, etc. The most complex cases involve the combination of a Neg-expression and a marker of sentential negation in cases where this should be ruled out by the grammar, such as (6).

- (6) a. Il n'est pas venu pour rien. [DN]
 he SN is SN come for nothing.
 'He did not come for nothing.'
- b. C'est pas rien. [DN]
 it is SN nothing.
 'It is not nothing.' (= It is quite something.)

Chapter 6 offers an account of double negation readings in weak bidirectional OT. The basic insight is that *pas* is not necessary in examples like (6a) and (b) in order to express negative concord. The economy constraint *Neg thus rules out such sentences as suboptimal expressions of a single negation reading. The presence of *pas* in (6) indicates a special interpretation as the superoptimal combination of a marked form (Neg-expression plus *pas*) and a marked interpretation (a double, rather than a single negation reading). Such special double negation readings are rare, because double negation is highly marked in the semantics of all languages. However, they have been attested in French, and are found in Afrikaans, Welsh, and Italian, as well. Interestingly, existing accounts of negation and negative concord in the literature have difficulty accounting for the type of examples illustrated in (6), but they fall out naturally from the OT analysis. The appeal to violable constraints, stochastic orderings and weak bidirectionality makes it possible to integrate such exceptional cases with the analysis of main patterns of double negation and negative concord.

1.5 Genesis of negation

Chapter 3 used evolutionary bidirectional OT in order to derive the universal ranking of FNeg >> *Neg from frequency asymmetries in a hypothesized corpus. Chapter 7 takes a more empirical approach to evolution. In line with the “windows” approach to evolution (Botha 2005), we study negation in early L2 acquisition as a potential window on the genesis of negation. Negation in early L2 acquisition shows a gradual development from holophrastic negation via a prelogical negation and focus-based negation to the truth-conditional connective \neg . This acquisitional path is projected onto language genesis. Under the assumption that language developed from prelinguistic thought, the expression of holophrastic negation is postulated to be an early development in language genesis. Because of the basic function of negation in communication, there is strong conceptual pressure to express this concept. Having an expression for refusal, rejection, disagreement is taken to be an advantage, even in a limited lexicon. The emergence of combinatorics requires the integration of the prelogical negation in the utterance structure of a protolanguage. Under the assumption that the earliest organization of two-word utterances relies on principles of information structure, negation can be either a topic or a focus. The introduction of lexical categories such as nouns and verbs, and the development of predicate-argument structure as tied to these lexical category distinctions signals the emergence of language. The conventionalization of negation as a focus sensitive operator leads to the conceptualization of negation as semantic recursion. The empirical study of negation in early L2 acquisition, and its mapping onto language genesis mirrors the results obtained in Chapter 3 from the computational modeling in an evolutionary OT model based on empirical data. The first main step in the development of negation is the emergence of the ranking FNeg >> *Neg. The second step is the integration of negation in the utterance structure, leading to the emergence of semantic recursion and NegFirst. Chapter 8 provides support for the analysis outlined in Chapters 3 through 6, by showing how frequent typological patterns may have their roots in an evolutionary development of human cognition and natural language.

2. Embedding into a broader theory of cognition

The analysis developed in this book is primarily a linguistic account of the range and limits of the expression and interpretation of negation found in natural language. The use of Optimality

Theory as the analytical framework implies that our proposals are explicitly embedded in a broader theory of human cognition. As pointed out in Chapter 2, OT is a linguistic theory rooted in a cognitive architecture based in neural computation. The view that well-formedness is grounded in optimization principles relies on the connectionist view of the brain that is common in cognitive neuroscience. Chapter 3 shows that we can use an evolutionary version of Optimality Theory to derive universal features of negation, and ground the ranking $\text{FNeg} \gg *Neg$ we find in all natural languages in optimal communication. This ranking is viewed as an instantiation of general principles of optimal communication, as captured by Horn's division of pragmatic labor. Furthermore, the analysis developed in Chapter 4 is the first full analysis of double negation and negative concord which roots typological variation not exclusively in the syntax or in the semantics, but in the syntax-semantics interface. The recent development of bidirectional OT as a model of speaker-hearer interactions allows the formulation of a bidirectional grammar of negation which make forms and meanings mutually dependent on each other. The strong implication of this analysis is that the variation we find in natural language is guided by principles of optimal communication. The extensions of this grammar in Chapters 4 and 6 show the power of the bidirectional OT approach in capturing typologies that have mostly been well described, but have hardly been accounted for in full so far. At the same time, the approach highlights the economy principle encoded in $*Neg$ as a core principle of language structure, language use and human cognition. Finally, the empirical study of negation in early L2 acquisition, and its implications for language genesis provide an embedding of the linguistic analysis into the broader concern with language evolution. The emergence of preverbal negation as the unmarked position for negation highlights important features of human cognition, as it signals semantic recursion in language.

3. Perspectives for further research

The main aim of the book was to explore the range and limits of cross-linguistic variation in the expression and interpretation of negation. A clear focus tightens the argumentation, and preserves coherence, but it also necessarily implies that certain research questions, by themselves interesting and relevant, are set aside or discarded. In this section, I want to list a number of issues that were not, or not fully explored in this book, but that are connected in various ways to the main line of research developed here. Four issues come up that could directly lead to extensions of the current work: the syntax of negation, the integration of negation with information structure, the distinction between negative doubling and negative

spread, and the relation between negative concord and negative polarity. I discuss relevant research questions, tentative answers, and suggestions for elaboration in the next four subsections.

3.1 The syntax of negation

Given that the primary aim of this book was to describe the syntax-semantics interface of negation, a full analysis of the syntax of negation is outside the scope of this study. Even though the number of syntactic constraints in this book is much higher than the number of semantic constraints (cf. Section 1 of this chapter), it is obvious that the syntactic analysis of negation developed so far needs to be worked out in more detail. As far as word order is concerned, the constraints NegFirst and FocusLast capture the distinction between preverbal and post-verbal negation (Chapter 3). These constraints focus on the position of the negation marker and the main verb, and leave the interaction of negation with other material (auxiliaries, the subject, the object, and adverbials) to be explored more thoroughly. A section on complications in the post-verbal domain offers a refinement of NegFirst (Chapter 3, Section 4.3, Chapter 5, Section 7), but it is clear that post-verbal negation requires more investigation, and the current formulation of NegFirst and FocusLast is insufficient to capture the cross-linguistic variation that we find, even in European languages. As an example, we discuss some Swedish data from Sells (2000, 2001), that suggest that NegFirst needs to be embedded in a more sophisticated syntactic theory than we develop in this book.

Swedish is a V2 language, just like Dutch and German. At first sight, NegAttract seems to have a high ranking in Swedish, just like it does in Dutch or German, as illustrated by the data in (7a, b) (from Sells 2000, 2001). The data in (7c-e) show that the situation is more complex, though.

- (7) a. Ingen såg mig. [Swedish]
Noone saw me
'No one saw me.'
- b. Jag såg ingen.
I saw no one
'I didn't see anyone.'
- c. *Hon hade sagt ingenting.
she had said nothing

- d. Hon hade inte sagt någonting.
 she had not said anything
 ‘She had not said anything.’
- e. Hon hade ingenting sagt
 she had nothing said
 ‘She had not said anything.’

Sells (2000, 2001) defends an analysis of the Swedish clause in which the finite verb resides in I, and non-finite verb forms are in the VP. Under that analysis, the data in (7) can be accounted for by the claim that negative indefinites need to be outside the VP. In (7a), the negative indefinite is in subject position, so its position outside the VP is obvious. In (7b), the negative indefinite follows the finite verb, but is outside the VP domain. (7c) is ungrammatical because the past participle is in the VP, which implies that *ingenting* is in the VP too. We can view this as a conflict between NegAttract and the requirement for negation to be expressed outside the VP. As we noticed in Chapter 3, NegFirst seems to be a general pattern corresponding with a family of constraints, rather than single constraint. Suppose we adopt a special version of NegFirst, called NegFirst (VP) requiring negation to be expressed outside the VP:

◆ **NegFirst (VP)**

Negation precedes the VP.

There are two ways to resolve the conflict between NegAttract and NegFirst(VP) in configurations that contain a past participle in VP. Either negation is expressed by a marker of sentential negation, and the argument is realized as an indefinite (7c), or the negative indefinite is scrambled over the participle, so that it takes scope over the VP (7d). Scrambling involves a marked word order. In an OT analysis, the position of *ingenting* to the left of the participle in (7d) involves a violation of some constraint penalizing marked word order. Let us call this constraint *Mark. If we assume that the ban against marked word order is as strong as the desire to attract negation to the indefinite, we obtain two optimal candidates, as spelled out in Tableau 5.

Tableau 5 Negative Attraction and NegFirst (VP) in Swedish (production)

Meaning $\neg\exists x$ have- seen(she,x)	Form	FNeg	NegFirst(VP)	*Neg	NegAttr	*Mark
	Hon hade sagt någonting She had said anything	*				
	Hon hade sagt ingenting She had said nothing		*	*		
☞	Hon hade inte sagt någonting She had SN said anything			*	*	
☞	Hon hade ingenting sagt She had nothing said			*		*
	Hon hade inte sagt ingenting She had SN said nothing			**		

The example of Swedish shows that NegFirst interacts with other parts of the grammar governing clause structure. Given that a full theory of syntax is beyond the scope of this book, we limit ourselves to this tentative analysis of the tension between NegFirst, Neg Attraction and standard word order in Swedish. The example confirms the claim made in Chapter 3 (Section 4) that NegFirst is a general pattern in natural language, which corresponds with a family of constraints, rather than a single constraint.

A more elaborate study of the position of negation should also take into account the different word orders we find in main and subordinate clauses. Germanic languages are well known for displaying V2 in main clauses, and SOV in subordinate clauses. In Chapter 3 (Section 5), it was argued that diachronic developments affecting the placement of negation may work more slowly in subordinate clauses than in main clauses. The German examples in (7) illustrate that NegFirst is respected in subordinate clauses, but not in main clauses.

- (7) a. Der Hans hat nichts gesagt. [German]
the Hans has nothing said
‘Hans said nothing.’
b. Ich glaube daß Hans nichts gesagt hat.
I believe that Hans nothing said has
‘I believe that Hans said nothing.’

Besides the distinction between main/subordinate clauses, the distinction between finite/non-finite clauses can play a role in the placement of negation. For French, this is illustrated in (8). Borsley and Jones investigate the role of finiteness in Welsh, on the basis of examples like (9).

- (8) a. Je n’ai pas invité Julie. [French]
I SN have SN invited Julie
‘I didn’t invite Julie.’
b. Il m’a prié de ne pas appeler la police.
He me.dat has asked to SN SN call the police
‘He asked me not to call the police.’
- (9) a. Nid yw hi ’n gweithio heno. [Formal Welsh]
SN be.PRES.3SG she PROG work tonight
‘She is not working tonight.’
b. Dw i ’n gisgwyl [i Mair beidio â mynd i Aberystwyth].
Be.PRES.1sg I PROG expect to Mair SN with go to Aberystwyth
‘I expect Mair not to go to Aberystwyth.’

In finite clauses, *ne..pas* emerges as discontinuous negation (8a), but in nonfinite constructions, both *ne* and *pas* precede the infinitival complement (8b). *Beidio* in (9b) is analyzed as a non-finite verb expressing negation. Negative verbs were excluded from our investigation in Chapter 3, but obviously, we cannot claim to have a full analysis of negation in a language like Welsh until we know more about the role of negative verbs. Accordingly, the analysis of Welsh negation and negative indefinites proposed in Chapter 5 (Section 7) is a preliminary version, and requires more investigation. Negative verbs have been understudied

in linguistic theory, but compare Kaiser (2006) for an analysis of negative auxiliaries in Finnish.

This book ignored all speech acts other than assertion. In particular, we did not study the use of negation in questions or in imperatives. Imperatives have played an important role in syntactic studies of negation (cf. Zanuttini 1996, Zeijlstra 2004), so it would be worth exploring an extension of the OT syntax in this direction. As far as the use of negation in questions is concerned, it is obvious that semantic as well as syntactic and intonational considerations play a role here (cf. Horn 1989, Krifka 2001, 2003, Ladusaw 2004 for discussion). The literature on the syntax of negation covers a wide range of languages, and a wealth of data is available to investigate synchronic and diachronic variation. This book only discusses the main patterns, but hopefully a refinement of the syntactic constraints will be possible, and will produce results strengthening the analysis developed so far.

3.2 Negation and focus

A more precise analysis of negation and word order is not only relevant for syntactic considerations. In many languages, the position of the negation marker is flexible, and has implications for the focus of negation. In Germanic languages, the position of negation is particularly flexibly in the middlefield (Jacobs 1991 for German) (10).

- (10) a. daß *nicht* viele Linguisten freiwillig jeden zweiten Tag duschen
 that SN many linguists voluntarily every second day shower
 b. daß viele Linguisten *nicht* freiwillig jeden zweiten Tag duschen
 c. daß viele Linguisten freiwillig *nicht* jeden zweiten Tag duschen
 d. daß viele Linguisten freiwillig jeden zweiten Tag *nicht* duschen

Jacobs represents the meaning of the sentences in (10) as in (10'):

- (10') a. NOT (VIELE LINGUISTEN (FREIWILLIG (JEDEN ZWEITEN TAGE (DUSCHEN))))
 b. VIELE LINGUISTEN (λx (NOT (FREIWILLIG (JEDEN ZWEITEN TAGE (x DUSCHEN))))
 c. VIELE LINGUISTEN (λx (FREIWILLIG (NOT (JEDEN ZWEITEN TAGE (x DUSCHEN))))
 d. VIELE LINGUISTEN (λx (FREIWILLIG (JEDEN ZWEITEN TAGE (NOT (x DUSCHEN))))

There is a strong correspondence between the linear order of constituents in (10), and the scope of negation in (10'). According to Jacobs, when a constituent X occurs in the semantic scope of negation, X follows Y in the linear structure. According to Dahl (1979), the placement of negation is sensitive to focus in Russian as well. In languages with less flexible word order, the focus of negation may be fixed with the help of intonation. English is a well known example of a language in which emphatic stress can help to determine the focus of negation.

- (11) a. Colyn did not buy the blue sweater.
b. Colyn did not buy the BLUE sweater (she bought the green one).
c. Colyn did not buy the blue SWEATER (she bought the blue skirt).
d. Colyn did not BUY the blue sweater (she stole it).
e. COLYN did not buy the blue sweater (Kevin did).

If we pronounce the sentence with neutral intonation, as in (11a), negation scopes over the entire proposition. With emphatic stress on specific constituents, the scope of negation can be narrowed down that constituent. The rest of the sentence becomes background information. We get a contrastive reading in (11b-e). In the absence of syntactic or phonological indications of the focus of negation, the scope of this operator is usually fixed with the help of contextual information. The role of negation as a focus operator is made explicit in Chapter 7, but a full analysis of the syntax-semantics interface of negation and focus in the OT framework developed here has not been developed in this book. However, it is clear that such a development is urgently needed, for instance in order to account for the distribution of Neg-expressions in Hungarian.

Hungarian is a language with relatively free word order. Hungarian has a designated position immediately preceding the verb, in which we find incorporated nominals (Farkas and de Swart 2003), but also negation and focus expressions. Example (12) is from Puskás (2006).

- (12) Pál nem evett. [Hungarian]
Paul.NOM SN eat.PAST.3SG
'Paul did not eat.'

Hungarian is a strict negative concord language. The presence of *nem* is required when the Neg-expression occurs in preverbal (13a) as well as post-verbal position (13b) (de Groot 1993, Puskás 2006).

- (13) a. Pál senkivel nem beszélt.
 Paul nobody.INSTR SN speak.PAST.3SG
 ‘Paul didn’t speak with anybody.’
- b. Pál nem beszélt senkivel.
 Paul SN speak.PAST.3SG nobody.INSTR
 ‘Paul didn’t speak with anybody.’

The obligatory presence of *nem* in all sentences containing a Neg-expression indicates that Hungarian is a strict negative concord language. In our OT system, the grammar of Hungarian involves a highly ranked constraint MaxSN.

Sequences of Neg-expressions can occur in preverbal and/or postverbal position (14a, b from Puskás 2006 and Surányi 2006). In elided contexts, they have negative force in the absence of a negation marker (14c, from Puskás 2006).

- (14) a. Senki sehova nem jött el.
 nobody.NOM nowhere.to SN come.PAST.3SG PREF
 ‘Nobody came along anywhere.’
- b. Senkivel nem beszél semmiről
 Nobody.instr SN speak.PAST.3SG nothing.DELAT
 = He didn’t speak about anything with anybody. [NC]
 = He didn’t speak with anybody about nothing. [DN]
- c. A: Kit láttál? B: Senkit.
 A: Who.ACC see.PAST.2SG B: nobody.ACC
 A: ‘Who did you see? B: Nobody.’

The *s*-pronouns qualify as Neg-expressions rather than NPIs, because they are negative in isolation (for instance as the elliptical answer to a question, 14c), and because they allow a double negation reading as well as a negative concord interpretation in contexts like (14b) (Cf. Chapter 6, Section 5).

Surányi (2006) points out that besides the series of *s*-pronouns illustrated in (13) and (14), Hungarian has a series of *sem*-expressions, which also participate in negative concord, but show a slightly different behavior. There are three important differences between *s*-pronouns and *sem*-expressions. First, *sem*-expressions display a preverbal/postverbal asymmetry, as illustrated in (15).¹

- (15) a. Nem érkezett senki sem.
SN arrive.PAST.3SG nobody.NOM SEM
'There hasn't arrived anybody.'
- b. Senki sem jött el sehova.
nobody.NOM SEM come.PAST.3SG PREF nowhere-to
'Nobody came along anywhere.'
- c. *Senki sem nem jött el.
nobody SEM SN come.PAST.3SG PREF
- d. Senki sem ma nem jött el. [DN]
nobody SEM today SN come.PAST.3SG PREF
'Nobody is such that it's today that he did not come along.'

With the post-verbal *sem*-expression in (15a), the presence of the preverbal marker *nem* is obligatory, whereas the preverbal *sem*-expression in (15b) does not require the support of *nem*. In fact, it would be ungrammatical to add *nem* in most cases, as illustrated by (15c). The only way to render the combination of a preverbal *sem*-expression and the preverbal negation marker *nem* felicitous is by according the sentence a double negation reading. The data in (15a-d) support the view that negation needs to be expressed pre-verbally in Hungarian. In our OT system, this implies a high ranking for NegFirst. The patterns in (15) are similar to those we have observed for Italian (cf. Chapter 5, Section 3). However, Italian is a non-strict negative concord language, and on the basis of the data in (13) and (14), we have just established the status of Hungarian as a strict negative concord language. This is the first puzzle raised by *sem*-expressions. The second puzzle involves the behavior of multiple *sem*-expressions. Preverbal *sem*-expressions can co-occur with post-verbal *s*-expressions (15b) as well as *sem*-expressions (16a) under a negative concord reading. However, it is impossible to have more than one *sem*-expression in preverbal position (16b). It is possible to combine *s*-

¹ Surányi (2006) glosses the *sem* par of the *sem*-expressions as SEM. I follow his glosses, even though I adopt a different semantics of *s*-pronouns and *sem*-expressions, as will become clear shortly.

expressions with *sem*-expressions in the preverbal domain, as long as the *sem*-expression is the last one in the sequence (16c).

- (16) a. Senki sem jött el sehova sem.
 nobody.NOM SEM come.PAST.3SG PREF nowhere-to SEM
 ‘Nobody came along anywhere.’
- b. *Senki sem sehova sem jött el.
 nobody.NOM SEM nowhere-to SEM come.PAST.3SG PERF
- c. Senki soha sehova sem jött el.
 nobody.NOM never nowhere-to SEM come.PAST.3SG PERF
 ‘Nobody ever came along anywhere.’

Surányi’s account of the differences in distribution between *s*-pronouns and *sem*-expressions relies on a characterization of *sem*-expressions as carrying logical negation, and of *s*-pronouns as non-negative. This route is closed to us, for *s*-pronouns are clearly Neg-expressions, according to the criteria of elided answers (14c), and possible double negation readings (14b). Accordingly, *sem*-expressions as well as *s*-pronouns carry semantic negation in our analysis. However, Surányi’s basic insight is that there is a lexical distinction between *s*-pronouns and *sem*-expressions. This view can be reinterpreted in our OT framework in the following way. Hungarian is a negative concord language, so we assign it the grammar MaxNeg >> *Neg >> IntNeg. Suppose furthermore that, in the OT syntax, we adopt the ranking {MaxSN, NegFirst, MaxNeg} >> *Neg. Accordingly, all negative sentences need to involve a marker of sentential negation (*nem* in 13, 14), and negation needs to be expressed preverbally (cf. the contrast between 15a and b). This grammar treats Hungarian as a strict negative concord language, so the syntax and semantics of *s*-pronouns as Neg-expressions is taken care of. As far as *sem*-expressions are concerned, we follow Surányi’s proposal that they incorporate negation. The particle *sem* historically derives from the merger of *is* ‘also’ and *nem* ‘not’ (Surányi 2006: 281). Thus, *sem*-expressions are close to minimizers, which, in Hungarian, are also preferably constructed with *sem*, as shown in (17).

- (17) Egy cseppet sem érdekli Pétert.
 A drop.ACC SEM interest.3SG Peter.ACC
 ‘It doesn’t interest Peter a bit.’

Conclusions and Perspectives

Given the historical origin of *sem* as *is* ‘also’ plus *nem* ‘not’, Surányi (2006: 306) claims that *sem*-expressions grammaticalize the scalar nature of n-words by means of an appended scalar additive particle. It is by no means unusual to find that the diachronic source of a Neg-expression involves an additive scalar particle, as emphasized by Haspelmath (1997, p. 222). However, the same particle *sem* is also incorporated in the series of *s*-pronouns. The important assumption we need to make is that the diachronic source of the two series of Neg-expressions is the same, but synchronically the *s*-series has lost its sensitivity to focus, whereas *sem*-expressions have maintained it (so far). If the *sem* particle is still compositionally present in the *sem* expressions, we can take this to imply that *sem*-expressions satisfy MaxNeg as well as MaxSN. Under this assumption and the ranking {MaxSN, NegFirst, MaxNeg} >> *Neg, this derives the data in (15a-c), as illustrated in Tableaux 1 and 2. Under the assumption that *s*-pronouns do not satisfy MaxSN, the insertion of preverbal *nem* is required, as illustrated in Tableau 3.

Tableau 1: Post-verbal *sem*-expressions with preverbal *nem* (production)

Meaning $\neg\forall\exists x$	Form	MaxSN	NegFirst	MaxNeg	*Neg
	<i>V senki sem</i>		*		*
	<i>nem V</i>			*	*
☞	<i>nem V senki sem</i>				**

Tableau 2: Preverbal *sem*-expression without *nem* (production)

Meaning $\neg\exists xV$	Form	MaxSN	NegFirst	MaxNeg	*Neg
☞	<i>senki sem V</i>				*
	<i>nem V</i>			*	*
	<i>senki sem nem V</i>				**



Tableau 3: Preverbal *s*-pronoun with *nem* (production)

Meaning $\neg\exists xV$	Form	MaxSN	NegFirst	MaxNeg	*Neg
	<i>senki V</i>	*			*
	<i>nem V</i>			*	*
\Rightarrow	<i>senki nem V</i>				**

Even though they satisfy MaxSN as well as MaxNeg, post-verbal *sem*-expressions require the presence of a preverbal marker of negation *nem*, because of the high ranking of NegFirst. Tableau 1 illustrates that (15a) is the optimal candidate in this configuration. Preverbal *sem*-expressions satisfy MaxNeg, MaxSN and NegFirst. The insertion of *sem* incurs an unnecessary violation of *Neg in this configuration, as illustrated in Tableau 2. Thus, (15b) emerges as the optimal candidate. Unlike *sem*-expressions, *s*-pronouns do not satisfy MaxSN, as shown in Tableau 3. The high ranking of this constraint in Hungarian requires the insertion of *nem* in preverbal as well as post-verbal position, as illustrated in (13a, b). Whether or not a particular item satisfies the constraint MaxSN is a lexical matter, as argued in Chapter 5 (Section 6) with respect to the French particles *ne* and *pas*. If we postulate that *sem*-expressions satisfy MaxSN, but *s*-pronouns do not, we situate the distinction between the two classes of Neg-expressions in the lexicon, but in a different way from Surányi (2006).

The double negation reading of a sequence of *s*-pronouns illustrated in (14b) requires an extension of the OT analysis with a stochastic component, as outlined in Chapter 6 (Section 4). The double negation reading of a combination of a preverbal *sem*-expressions and a marker of sentential negation (15d) cannot be derived in the strong bidirectional OT grammar of a negative concord language, but it follows under the weak bidirectional OT analysis adopted in Chapter 6 (Section 5). The insertion of an extra marker of sentential negation created a marked form, which pairs up with a marked double negation meaning. The bidirectional Tableau 4 illustrates.

Tableau 4 Hungarian [*sem+nem*, DN] in weak bi-directional OT

Input [f,m]	MaxNeg	MaxSN	NegFirst	*Neg	IntNeg
f ₁ : <i>sem</i> ; f ₂ : <i>sem+nem</i> m ₁ : $\neg\exists xV(x)$; m ₂ : $\neg\neg\exists xV(x)$					
[<i>sem</i> , $\neg\exists xV(x)$] 				**	
[<i>sem</i> , $\neg\neg\exists xV(x)$]				***	
[<i>sem+nem</i> , $\neg\exists xV(x)$]				***	*
[<i>sem+nem</i> , $\neg\neg\exists xV(x)$] 				****	

The form-meaning combination [*sem*, $\neg\exists xV(x)$] constitutes a strongly optimal pair, under the bidirectional OT grammar of Hungarian. Neither [*sem*, $\neg\neg\exists xV(x)$], nor [*sem+nem*, $\neg\exists xV(x)$] constitute strongly optimal pairs. Given that the single negation reading is a better interpretation of the *sem* form, and the *sem* form is a better expression of the single negation reading, these pairs lose against the strongly optimal pair [*sem*, $\neg\exists xV(x)$]. The form-meaning combination [*sem+nem*, $\neg\neg\exists xV(x)$] does not take part in this competition, because it involves both a different form, and a different meaning. In a second round of optimization it emerges as a superoptimal pair. Hungarian then aligns with French, Afrikaans, Welsh, etc. as far as the treatment of double negation readings are concerned.

Interestingly, we can use the lexical semantics of *sem*-expressions to account for their restricted use in the preverbal domain. If *sem*-expressions involve an appended scalar additive particle, it is quite possible that this restricts the use of these expressions to the immediately preverbal position, in which focus markers naturally appear in Hungarian. The view that *sem*-expressions appear in the focus/operator position of Hungarian is supported by the fact that we typically find that the verbal prefix (*el* in the examples in 13-16) in post-verbal, rather than preverbal position. Farkas and de Swart (2003: Chapter 4) use the post-verbal position of the verbal prefix in incorporation constructions as an argument that the preverbal bare nominal lives in a special syntactic position, which is used as a diagnostics for an incorporation construction. In (18a), the prefix *fel* is in the preverbal position, but in the presence of an incorporated nominal in (18b), it is in post-verbal position.

- (18) a. Mari fel-olvasott Petinek.
 Mari up-read.PAST Peti.DAT
 ‘Mari read aloud to Peti.’
- b. Mari kínai lampionat szerelt fel a plafonra.
 Mari Chinese lantern.acc set up the ceiling.on
 ‘Mari set up a Chinese lantern on the ceiling.’

The post-verbal position of *el* in the examples in (13)-(16) suggests that the preverbal *sem*-expressions in these sentences live in the same special preverbal position that the incorporated nominal occurs in (18b). If other preverbal position in Hungarian do not allow focus operators, this could very well block the multiplication of preverbal *sem*-expressions (16c). It would also force them to be the last one in a sequence of Neg-expressions (16d). Many languages block special indefinites in the scope of negation from appearing in the preverbal domain for focus reasons, according to Haspelmath (1997: 316-317). A broader embedding of the theory of negation in a theory of focus and word order is called for in order to account for the precise restrictions that Hungarian is subject to, but the general lines are available. In the post-verbal domain, there is no special focus or operator position, but focus operators are not blocked from the post-verbal domain. Suányi (2006) provides the following example of multiple focus involving a preverbal *sem*-expression, where focus is indicated with capitals.

- (19) SENKI SEM szavazott végül CSAK JÁNOSRA.
 nobody.NOM SEM vote.PAST.3sg finally only János-for
 ‘Finally, nobody voted for only Janós.’

If focus sensitive operators like *csak* ‘only’ can occur in the post-verbal domain in Hungarian, we may postulate that *sem*-expression with an appended additive scalar particle may also occur here. If the preverbal/postverbal asymmetry involving *sem*-expressions indeed involves the special preverbal focus/operator/incorporation position in Hungarian, we do not need to posit anything extra for the post-verbal domain. All we need is a language-specific constraint restricting the preverbal occurrence of *sem*-expressions to the special position immediately preceding the verb. Given that this constraint is clearly sensitive to the enriched lexical semantics of *sem*-expressions involving scalarity, additivity, and a focus particle, the Hungarian data make it clear that a closer interaction between the analysis of focus and of negation is required in order to describe the data in this language. This conclusion is likely to

extend to many other languages in which word order is sensitive to information structure. Along these lines, Kaiser (2006) offers an interesting study of negation and information structure in Finnish.

3.3 Negative concord and negative polarity

The relation between negative concord and negative polarity has been addressed in Chapter 1 (Section 4) and Chapter 4 (Section 3). Given that the focus of the book is on the expression and interpretation of negation, and negative polarity items are not Neg-expressions, a full analysis of negative polarity is outside of the scope of this book. However, a more thorough investigation of the relation between NPIs and n-words is called for. For one thing, it is well known that languages can have a double negation grammar or a negative concord grammar in different stages of their historical development (cf. Jespersen 1917, Haspelmath 1997, de Swart and Sag 2002, and others). Negative polarity items which strengthen negation and later develop into n-words often play a role in this process. In the framework of OT, constraint re-ranking can be used to capture typological variation as well as diachronic change. Constraint re-ranking in diachronic change is likely to be gradual, and should not involve the resetting of too many constraints at the same time. This may seem hard to relate to the bi-directional grammar developed in Chapter 4 (Sections 5 and 6). It was argued in Chapter 4 that only systems that have MaxNeg and IntNeg ranked on either side of *Neg reflect fully balanced systems. For diachronic change, this implies that in the bi-directional grammar two constraints (one operative in the syntax, one in the semantics) need to switch place. Of course, the ambiguities with sequences of Neg-expressions, analyzed in Chapter 6 (Section 4), and illustrated in (5) and (15b) above can be taken as evidence in favor of the role overlapping constraints play in diachronic change. However, the effects of these overlapping constraints are exclusively played out in the semantics, and we have not provided evidence for similar stochastic rankings in the syntax of Neg-expressions. A complete model of diachronic change is outside the scope of this book, but a few speculative remarks on the relation between negative concord and negative polarity at the syntax-semantics interface are appropriate here.

In many analyses, negative concord is taken to be a version of negative polarity. Thus, Ladusaw (1992) takes n-words to be negative polarity items that are somehow ‘self-licensing’. This allows n-words to be licit in elliptical answers and in subject position (cf. Chapter 1, Section 4). Szabolcsi (2004) turns this picture around. She proposes a new account of the relation between English *some-no-any*, based on insights from Moltmann (1995), Postal

(2000a,b), and de Swart & Sag (2002). The key step is to interpret sentences like (20a, b) in terms of resumption:

- (20) a. Nobody said anything.
 b. No man talked with any man but Bill.
 c. *I didn't always say anything.

According to Szabolcsi, *nobody* and *anything* form a resumptive quantifier $No_{x,y}$ in (20a). The binary resumptive quantifier licenses the exception phrase in (20b). The intervention of a scope-bearing operator such as *always* blocks the construction of the resumptive quantifier and leads to ungrammaticality (20c).

De Swart & Sag's analysis of negative concord and Szabolcsi's treatment of negative polarity *any* show clear similarities: both rely on the semantics of resumption in a polyadic quantifier framework. According to Szabolcsi, this is a natural move: "Treating negative polarity and negative concord with the same semantic device seems quite natural. After all, they are variations on the same meaning." (Szabolcsi 2004: Section 8.3). The only difference is that negative polarity items need to be licensed, whereas n-words are 'self-licensing'. Under Szabolcsi's treatment, this means that with the polarity item *any*, the formation of a resumptive quantifier is mandatory, and this calls for a licenser. With n-words, resumption only arises if a sequence of n-words is found in the N-store.

Szabolcsi's analysis is attractive for various reasons. First, it allows a natural account of the free mixing of negative polarity items and n-words in sentences like (21) (from Muller 1991) and (22) (from Ponelis 1985, quoted by Van der Wouden 1994):

- (22) a. Personne n'a rien dit à personne. [French]
 Nobody SN has nothing said to no one
 b. Personne n'a rien dit à qui que ce soit.
 Nobody SN has nothing said to anyone
 c. Personne n'a dit quoi que ce soit à personne.
 Nobody SN has said anything to no one
 d. Personne n'a dit quoi que ce soit à qui que ce soit.
 Nobody SN has said anything to anyone
 'Nobody said anything to anyone.'

- (23) a. Sy is met niks ooit tevreden nie. [Afrikaans]
 She is with nothing ever happy SN
 ‘She is never happy with anything.’
 b. Niemand is ooit tevrede nie.
 Nobody is ever content SN
 ‘Nobody is ever satisfied.’

If negative polarity items like *qui que ce soit*, *ooit* and n-words like *personne*, *niemand* both contribute to a resumptive quantifier, the semantics of all sentences in (22) and (23) involves the triadic quantifier $NO_{x,y,z}$. The truth-conditional equivalences of the four sentences in (22) is thereby explained.

Second, Szabolcsi’s analysis allows an easy transition between a double negation language using negative polarity items to a negative concord language using n-words, which could facilitate diachronic change. When French *rien*, *personne*, etc. emerge in Old/Middle French as expressions that strengthen the preverbal negative particle *ne*, they naturally appear in a context that satisfies their licensing conditions, namely in the c-command domain of *ne*. The lexical bleaching which shifts their interpretation from regular NPIs to the type of NPI that requires resumption, affects the semantics, not the syntax. Once the resumptive semantics is in place, the next change the negative polarity item needs to undergo is to loosen up its condition of licensing, so that it can stand alone, and occur in subject position. In an intermediate stage, the item may already have adopted quite a few features of an n-word, but still allow for negative polarity uses. Negative polarity uses of n-words are rare in French (Muller 1991) and in Greek (Giannakidou 1998), but relatively frequent in Italian (Zanuttini 1991) and Spanish (Herburger 2001).

Szabolcsi’s insights can be modeled in the OT framework by means of different versions of the constraint MaxNeg. The intuition behind this constraint (Chapter 4, Section 5) is that Neg-expressions mark the focus of negation, by using a special form of the indefinite that occurs in an argument position within the scope of negation. Up to now, we have assumed that marking involves a negative form, so we adopted the following formulation:

◆ **MaxNeg**

Mark ‘negative variables’ (i.e. mark indefinites in argument or adjunct position that are interpreted in the scope of an anti-additive operator such as negation, as formally negative.)

Accordingly, every form that satisfies the requirements for MaxNeg and FNeg incurs a violation of *Neg at the same time. But suppose now that we have a weaker form of MaxNeg, let us call it MaxPol, which requires negative variables to be marked with a ‘special’ polarity sensitive form:

◆ **MaxPol**

Mark ‘negative variables’ (i.e. mark indefinites in argument or adjunct position that are interpreted in the scope of an anti-additive operator such as negation with a special polarity sensitive form.)

The concept of MaxPol is broader than that of MaxNeg. The special polarity sensitive form that satisfies MaxPol could be an n-word or a polarity item. In the first case, it would incur a violation of *Neg, in the second case it would not. Languages with a high ranking of MaxPol block the use of regular indefinites under negation: these indefinites become positive polarity items.² English could then be characterized as a language that adopts the ranking {MaxPol, IntNeg} >> *Neg. Although the ranking of MaxPol >> *Neg in the syntax favors the use of a ‘special’ polarity sensitive form of the indefinite under negation, the ranking IntNeg >> *Neg in the semantics makes sure this form is not overtly negative, and does not incur a violation of *Neg. In a DN language such as English, the use of an overly negative form would lead to a double negation interpretation, and the original single negation meaning would not be recoverable. As a result of the bidirectional setting, we can explain why standard English uses negative polarity items, not n-words to mark negative variables.

The Jespersen cycle of diachronic change relates the weakening of negation to the use of items that mark the focus of negation. Negative polarity items are one attested source of expressions that reinforce negation (Haspelmath 1997). In the OT system, this process can be viewed as a change in ranking from *Neg >> MaxPol to MaxPol >> *Neg in the OT syntax. The next diachronic stage models the change from a negative polarity system to a negative concord system. This step corresponds with a change in the licensing status of the item, i.e. a

² A language which uses regular indefinites under negation ranks MaxPol below a constraint blocking multiplication of forms with the same (indefinite) meaning. I will assume some such an economy constraint exists but will not propose a formulation here. Note that MaxPol is formulated for strongly negative contexts, created by anti-additive operators. Of course, NPIs occur in a much wider range of monotone decreasing or non-veridical contexts (cf. Ch 1, Section 3), so other constraints triggering the use of these expressions have to be formulated. However, the diachronic development from NPIs to n-words takes place in contexts involving anti-additivity or anti-morphism, so the restriction of MaxPol is appropriate for the issue at hand.

change from a ‘special’ not necessarily negative indefinite to a Neg-expression, which incurs a violation of *Neg in the OT syntax. This change in the lexical status of the ‘special’ indefinite correlates with a change in ranking in terms of OT semantics from IntNeg >> *Neg to *Neg >> IntNeg, in order to preserve the single negation meaning. An intermediate stage of overlapping interpretive constraints (*Neg 0 IntNeg) can facilitate the transition. The overlap between IntNeg and *Neg affects ‘special’ polarity sensitive forms that are on their way to be perceived as n-words (i.e. items like French *personne*), not items that remain polarity items even in the next stage of the development (i.e. items like French *quoi que ce soit*). Which items develop into n-words is a lexical matter, and cannot be predicted. Negative concord languages that have lost the possibility of using negative polarity items in anti-additive contexts have restricted their syntactic constraint from MaxNegPol to MaxNeg.

Negative concord languages can switch to a double negation system in two steps. The first step is to allow overlap between the semantic constraints *Neg and IntNeg, which leads to the type of ambiguities we have seen for French, Hungarian, Welsh, etc. in Chapter 6 (Section 5). If there is too much overlap, the system loses its stability, because {MaxNeg, IntNeg} >> *Neg is not a stable grammar, as we saw in Chapter 4 (Section 6). The only way this instability can be remedied is to reduce the overlap, and return to a negative concord system or to raise IntNeg and demote MaxNeg at the same time. This brings us back to a double negation system. The Jespersen cycle of double negation/negative concord can be summarized as a system with 6 stages.

Table 1: the Jespersen cycle of negative polarity/negative concord

Stage 1	IntNeg >> *Neg >> {MaxNeg, MaxPol}	regular indefinites under negation
Stage 2	{IntNeg, MaxPol} >> *Neg >> MaxNeg	weakening of negation, strengthening with polarity items
Stage 3	MaxPol >> IntNeg 0 *Neg >> MaxNeg	polarity items developing into n-words
Stage 4	MaxPol >> *Neg >> {MaxNeg, IntNeg}	free mixing of polarity items and n-words
Stage 5	MaxNeg >> *Neg >> {IntNeg, MaxPol}	‘strict’ negative concord, excluding polarity items
Stage 6	MaxNeg >> *Neg 0 IntNeg >> MaxPol	ambiguities with sequences of Neg-expressions

The cycle starts with a double negation system (Stage 1), but given the fact that the cycle repeats itself, we could have started anywhere. Dutch and German use regular indefinites in anti-additive contexts (cf. examples in Chapter 4), so they constitute Stage 1 languages. The negative polarity items they use are not grammaticalized as a necessary support of a weak negation. The emergence of MaxPol above *Neg induces a strengthening of negation by means of polarity items (Stage 2). The obligatory presence of *any*-pronouns in anti-additive contexts characterizes English as a Stage 2 language, in line with Szabolcsi's (2004) analysis of examples (20a, b). When the interpretive constraint IntNeg is lowered, certain NPIs start oscillating between a denotation in terms of existential quantification, or as Neg-expressions (Stage 3). In Stage 4, n-words and polarity items freely mix, but the lexical status of individual items as either an n-word or an NPI is fixed. Greek is a good example of a Stage 4 language: it uses n-words as well as NPIs (24a) in anti-additive contexts, but it excludes existential readings of n-words (a Stage 3 characteristic) in all monotone decreasing contexts (24c, d), except with non-veridical *before* (24b) (examples from Giannakidou 1997).

- (24) a. Dhen idha tipota/ TIPOTA [Greek]
 SN saw.1SG anything/nothing
 'I didn't see anything.'
- b. O papus pethane prin na dhi
 the grandfather died.3sg before SUBJ see.3SG
 kanena/KANENA apo ta egonia tu.
 any/ none from the grandchildren his
 'My grandfather died before seeing any of his grandchildren.'
- c. Pijes pote/*POTE sto Parisi?
 Went.2SG ever/never in-the Paris
 'Have you ever been to Paris?'
- d. I Ilektra ine poli kurasmeni ja na milisi se kanenan/*KANENAN.
 the Electra be.3SG very tired for SUBJ talk.3SG to anyone/ no one
 'Electra is too tired to talk to anybody.'

Ambiguities between single/double negation readings of sequences of Neg-expressions (a Stage 6 characteristic) are not discussed by Giannakidou (1997, 2002, 2006), who suggests they are not available in Greek. Watanabe (2004) confirms Giannakidou's claims for Japanese, which is also a strict negative concord language.

The fact that languages like Italian, Spanish and Catalan still allow NPI uses of *n*-words, as has been established by Zanuttini (1991), Vallduví (1994), Herburger (2001) suggests that these negative concord languages are basically in Stage 4, but may have an overlap with the ranking corresponding to the previous stage (Stage 3). Italian examples have been provided in Chapter 1 (Section 4). The following examples of NPI uses of Spanish *n*-words are from Herburger (2001).

- (25) a. Dudo que vayan a encontrar nada. [Spanish]
 doubt.1SG that will.3SG.SUBJ find nothing
 ‘I doubt that they will find anything.’
 b. Es demasiado tarde para ir a ninguna parte.
 Is too late for go to nowhere
 ‘It is too late to go anywhere.’

Similar data have been reported for other Romance languages.

In Stage 5, we only find *n*-words, because MaxPol has been restricted to MaxNeg. Slavic languages may be classified as Stage 5 languages. Progovac’s (1994) study of Serbo-Croatian shows that this language contains two sets of expressions that occur in negative statements, the *ni*-pronouns in (26a), and the *i*-pronouns in (26b).

- (26) a. Marija ne voli ni(t)koga. [Serbo-Croatian]
 Mary SN loves nobody
 ‘Mary doesn’t love anyone.’
 b. Milan ne tvrdi [da Marija poznaje it(k)koga].
 Milan SN claims that Mary knows anyone
 ‘Milan does not claim that Mary knows anyone.’

The *ni*-pronoun occurs in the same clause as the negation marker *ne* (26a), and cannot be licensed long distance (27a). The *i*-pronouns are incompatible with clause mate negation (27b), and appear with superordinate negation only (26b).

- (27) a. *Ne verujem da Marija voli ni(k)koga. [Serbo-Croatian]
 SN claim that Mary loves nobody

- b. *Milan ne poznaje i(t)koga.
 Milan SN knows anyone.

We can explain these facts if we assume with Progovac that *ni*-pronouns are n-words, and *i*-pronouns are NPIs. If we furthermore take Serbo-Croatian to be a stage 5 negative concord language, the distributional patterns in (26) and (27) follow as a blocking effect of NPIs in contexts where n-words are favored. The high ranking of MaxNeg (not MaxPol) in Stage 5 languages means that n-words are preferred over NPIs whenever possible. N-words can be used in a context like (26a). Because of the ranking MaxNeg >> MaxPol, n-words are preferred over NPIs. Given that (27a) is a suboptimal candidate, it is blocked by the grammar. N-words cannot be licensed long distance, because of the clauseboundedness of negative concord. This restriction has its roots in the interpretation of negative concord as resumptive quantification, an instance of polyadic quantification. Given that polyadic quantification is generally clausebound, the ungrammaticality of (27a) does not come as a surprise. Because n-words are blocked in this environment (at least under a single negation reading of the sentence) by a constraint that is ranked above MaxNeg, MaxPol becomes relevant in the context of (26b), suggesting the ranking MaxNeg >> MaxPol >> *Neg >> IntNeg for Serbo-Croatian. The use of an NPI satisfies MaxNegPol, but a regular indefinite would not. Accordingly, the NPI in (26b) is the optimal candidate.

This blocking account of NPIs by n-words extends to other pure negative concord languages. Surányi (2006) points out that Hungarian has two series of pronouns showing up in negative environments, the *s*-pronouns (*senkit* ‘nobody’, *semmit* ‘nothing’, *sehova* ‘nowhere’) and the *vala*-pronouns (*valaki* ‘anybody’, *valami* ‘anything’). The *s*-pronouns allow negative interpretations in isolation, and participate in negative concord, so they are properly characterized as Neg-expressions. The *vala*-pronouns occur in a wide range of non-veridical contexts, and are classified as NPIs. According to Surányi, *vala*-NPIs cannot be clausemate to negation. Unfortunately, Surányi doesn’t provide examples illustrating the relevant contrasts, but if this is true, the blocking effects we find in Hungarian are similar to those we find in Serbo-Croatian, and they lead us to postulate a Stage 5 grammar for Hungarian as a pure negative concord language.

In Stage 6, the overlap between interpretive constraints leads to ambiguities with sequences of Neg-expressions. Eventually a collapse into the double negation system of Stage 1 becomes an option. It is not strictly necessary to go through Stage 5 before reaching Stage 6. Given the ambiguities we find in French and Welsh (both Stage 4 languages), it is quite

possible to have overlapping interpretive constraints in a system that freely mixes n-words and negative polarity items (Stage 4). Note that NPI uses of n-words in French are rare, and conceived as archaic, which provides evidence that French is further advanced in the cycle than Italian or Spanish.

Szabolcsi's proposals rely on a semantics of *any* that involves no more than $\neg\exists$ as the semantic input. The 'bleached' semantic of *any* is crucial in identifying whether negative polarity and negative concord involves the same mechanism of resumption. As Szabolcsi points out, many polarity items have a referential semantics or trigger implications so that they are not as 'bleached' of meaning as the word *any*. Szabolcsi's system is not constructed to account for negative polarity items that clearly induce widening or scalar implicatures. The constraint MaxNegPol does not come into play in these cases either, for they relate to a different input about which the constraint MaxNegPol has nothing to say. In specific cases, it may be hard to decide whether a polarity item has a lexical semantics of its own or whether it is completely 'bleached' of meaning. Vlachou (2006) claims that the French polarity item *qui que ce soit* is not synonymous to *personne* as it implies a notion of widening that is absent from the n-word. In the light of the Hungarian data discussed in Section 3.2 above, it may not be necessary to adopt total bleaching for NPIs/n-words in order for Szabolcsi's analysis to go through, so there seems to be room to reconcile the two analyses. If we treat *qui que ce soit* as sufficiently 'bleached' in the sense that Szabolcsi (2004) uses the term, we can classify French as a Stage 4 language, in which NPIs and n-words freely mix in negative statements. This would account for the truth-conditional equivalences between (21a-d) above.

Obviously, this sketch of the Jespersen cycle of negative polarity/negative concord is fairly schematic and the details still have to be worked out. More research is required in order to classify the relationship between negative polarity and negative concord, and the role this relationship plays in the diachronic development of negative indefinites. However, the tentative diachronic path in Table 1 might already shed light on some curious observations that have been made about West Flemish (Haegeman 1995, Haegeman and Zanuttini 1996).

The system of negation in West Flemish is quite complex, and involves a preverbal and a post-verbal negation marker, as well as n-words. As outlined by Haegeman and Zanuttini (1996), the preverbal enclitic *en* by itself is unable to express negation (29a), and it needs to be doubled with the post-verbal marker *nie* (29b). This indicates that *nie* is the bearer of semantic negation. The preverbal enclitic *en* is optional; (29c) can also be used.

- (29) a. *Valère en-eet dienen boek. [West Flemish]
 Valère SN has that book
 b. Valère en-eet dienen boek nie.
 Valere SN has that book SN
 ‘Valère doesn’t have that book.’
 c. Valère eet dienen boek nie.
 Valere has that book SN
 ‘Valère doesn’t have that book.’

The patterns in (2) confirm that West Flemish is in an intermediate stage between discontinuous negation and post-verbal negation (cf. Chapter 3, Section 5). West Flemish is a negative concord language. N-words can bear semantic negation by themselves (29a), or spread over multiple Neg-expressions (29b). Both *en* (29c) and *nie* (29d) are compatible with n-words, but the presence of neither particle is obligatory (29a, b).

- (29) a. da Valère niemand kent. [West Flemish]
 that Valère nobody knows
 ‘that Valère doesn’t know anybody.’
 b. K’een an niemand niets gezeid.
 I have to nobody nothing said.
 ‘I didn’t say anything to anyone.’
 c. K’en-een an niemand niets gezeid.
 I SN have to nobody nothing said.
 ‘I didn’t say anything to anyone.’
 d. K’een t niemand nie gevraagd.
 I have it nobody SN asked
 ‘I didn’t ask anyone.’

The examples in (29a-d) are easily accounted for in our framework. If *niemand* and *niets* are analyzed as Neg-expressions, and West Flemish has the ranking MaxNeg >> *Neg >> IntNeg of a negative concord language, the Neg-expressions contribute semantic negation (29a), but combine to express resumptive negation (29b). An overlapping range between MaxSN and *Neg in the OT syntax allows for the optional presence of a marker of sentential negation besides the n-word. In West Flemish, both the enclitic *en* (29c), and the post-verbal marker

nie (29d) can fulfill this role. West Flemish thus emphasizes the independence of MaxSN and NegFirst (cf. Chapter 5, Section 4). Interestingly, the discontinuous negation in West Flemish follows a diachronic path different from that of standard French, as discussed in Chapter 5 (Section 6). The post-verbal marker of negation *pas* does not participate in negative concord in standard French. We argued that *pas* did not satisfy MaxSN, and is therefore blocked by the economy constraint *Neg. However, we pointed out that this is a specific lexical restriction on *pas*. Other Romance languages (Occitan, Valdovain) allow post-verbal markers of negation to participate in negative concord. So there is nothing unusual per se about the fact that West Flemish post-verbal *nie* satisfies MaxSN, and participates in negative concord, as in (29d). Note that the only instance of post-verbal *nie* that satisfies MaxSN is the *nie* that follows the Neg-expressions (29d). If *nie* precedes the Neg-expression, a double negation reading ensues, as in (30a) and (b).

- (30) a. Valère (en) eet nie niets kuopt.
 Valère (SN) has SN nothing bought.
 ‘Valère has never bought nothing.’
 b. da Valère nie niets kuopt.
 that Valère SN nothing buys
 ‘that Valère doesn’t buy nothing.’

The double negation reading of (30a) and (b) is accounted for under the weak bidirectional OT analysis developed in Chapter 6 (Section 5). The fact that the post-verbal *nie* is tied to a particular position in (29d) supports the view that its presence is licensed by the syntactic constraint MaxSN. After all, the markers generated by MaxSN function as scope markers that are typically tied to a particular position.

Examples like (31a) and (b), in which a Neg-expression combines with discontinuous negation constitute a puzzle for our analysis.

- (31) a. K’en-een t niemand nie gevraagd. [West Flemish]
 I SN have it nobody SN asked
 ‘I didn’t ask anyone.’
 b. K’en-een niets nie gezien.
 I SN have nothing SN seen
 ‘I have’t seen anything.’

If the only reason why the marker of sentential negation is present in a sentence containing a Neg-expression is to satisfy MaxSN, we would expect one marker (either *en* as in 29c, or *nie* as in 29d) to be sufficient. The post-verbal marker *nie* follows the Neg-expression, so it is in the ‘standard’ position, and it not expected to give rise to a double negation reading (cf. 30). The presence of additional markers should be blocked by the economy constraint *Neg. Even in negative concord languages, in which the expression of negation is multiplied in the sentence, negative expressions are not generated randomly, let alone redundantly. The system developed so far, does not seem to account for the combination of a Neg-expression and discontinuous negation we see in (31). There are different approaches we could take to explain the data in (31). One would be to assume that our set of constraints is not complete, and the two negation markers are licensed by two different faithfulness constraints above *Neg, rather than the one (MaxSN) we appealed to so far. In order to strengthen this line of argumentation, we should have more data of this type, though. So far, I have only come across data from West Flemish that show this pattern, and one language may not be enough to legitimate a complication in our constraint system. Moreover, it is not clear to me whether the alternations between (29a-d) and (28b, c) are instances of free variation, or whether they are tied to particular speakers, regional dialects or generations. The alternative approach we will explore here is that the data in (29) and (31) indicate that *niemand* and *niets* oscillate between Neg-expressions and NPIs. In varieties in which (29a), (b) and (c) are well-formed, we have strong evidence that *niemand* functions as a Neg-expression, contributing semantic negation. In varieties in which (29d) is well-formed, *niemand* might either function as a (strict) NPI (leaving the licensing of semantic negation to *nie*), or as a full-fledged Neg-expression (leaving the licensing of *nie* to the high ranking of MaxSN).³ Varieties in which (31a) and (b) are well-formed treat *niemand* and *niets* as NPIs that combine with discontinuous negation.

³ The status of 'strict' NPI implies that we find no occurrences of the items in monotone decreasing contexts that are not anti-additive. Thus, non-negative interpretations are excluded in contexts like (i) and (ii) (from Watanabe 2004 and Haegeman 1997).

- (i) Ee-je niemand gezien? [West Flemish]
Have-you nobody seen
'Did you see no one?'
- (ii) Oa-j tegen niemand klaapt, goan-k jen buten smiten.
If-you against nobody talk go-I you out throw
'If you talk to no one, I will throw you out.'

The restriction to strongly negative contexts implies that the hypothesis that *niemand* and *niets* can function as NPIs in contexts like (29d) relies on indirect evidence (namely the presence of *nie* besides *en*). This might be viewed as a weak point, but obviously, a status as strict NPI also favors the transition to a full-fledged n-word in the diachronic development of the language.

The preverbal enclitic *en* is then licensed by the high ranking of MaxSN, and the post-verbal *nie* by FNeg, just like we assumed for discontinuous negation in written French (cf. Chapter 5, Section 7). Under this analysis, West Flemish is in an intermediate stage between Stages 3 and 4 of the diachronic development postulated in Table 1. Further empirical research will have to show what the distribution is of the patterns in (29), (30) and (31) in relation to different regional varieties of West Flemish, and whether the patterns are stable across generations of speakers.

Clearly, the patterns of variation in West Flemish need more empirical research, but they indicate that we might see the Jespersen cycle of negative polarity/negative concord at work. Of course, not all n-words are historically traced to negative polarity items (cf. Haspelmath 1997), so other diachronic paths are possible as well. Hopefully, the speculative remarks made in this section provide the starting point of a more thorough investigation.

3.4 Negative doubling and negative spread

One of the issues that was not addressed in this book in so many terms is the distinction den Besten (1986) establishes between negative doubling and negative spread. Negative spread is defined as the situation in which the negative feature of negative indefinites is distributed over any number of indefinite expressions. Negative doubling occurs if the negation marker is doubled by some other negative expression (either a negative indefinite, or a second negation marker). Under negative doubling, negation is not necessarily spread over all indefinites. Den Besten hypothesizes that Afrikaans is a language in which we find negative doubling, but not negative spread. The status of this hypothesis is unclear, for we find sentences like (32a, b), as well as (33a,b) (all quoted in van der Wouden 1994).

- (32) a. Sy is nêrens ooit tevrede nie. [Afrikaans]
 She is nowhere ever happy SN.
 ‘She is never happy anywhere.’
 b. Niemand is ooit tevrede nie.
 nobody is ever satisfied SN
 ‘Nobody is ever satisfied.’

- (33) a. Permissie het hy nog nooit van geniemand gevra nie.
 Permission has he yet never of nobody-at all asked SN
 ‘He has never asked anyone’s permission yet.’
- b. Ek krij geen hulp van niemand nie.
 I get no help from nobody SN
 ‘I don’t get any help from anybody.’

The data in (32) and (33) could indicate that Afrikaans is a Stage 4 language in the classification sketched in Table 1 in Section 3.3 above. However, (32) could also indicate that Afrikaans displays negative doubling, rather than negative spread. Under the OT analysis developed in this book, there are several ways to handle a negative doubling language. One option would be the following. So far, we have only studied the role of MaxSN in languages that have the ranking MaxNeg >> *Neg >> IntNeg of negative concord languages. If we rank MaxSN and MaxNeg above *Neg, we obtain a strict negative concord language (Greek, Slavic, Hungarian, etc.). Afrikaans was also argued to display strict negative concord, for the sentence-final marker *nie* is obligatorily present in all negative sentences. Suppose now that we maintain the high position of MaxSN, and of NegAttract, but lower MaxNeg in the ranking. The grammar FNeg >> {MaxSN, NegAttract} >> *Neg >> {MaxNeg, IntNeg} could be the ranking of a negative doubling language if the expression satisfying MaxSN is not the one satisfying FNeg. In Afrikaans, it is clear that sentence-final *nie* does not satisfy FNeg, but it does satisfy MaxSN. This explains why sentence-final *nie* is present in all negative sentences, but has to be doubled by medial *nie* in the expression of propositional negation (34).

- (34) Ek het hom nie gesien nie.
 I have him SN seen SN
 ‘I haven’t seen him.’

Sentence-medial *nie* is the bearer of semantic negation in (34). Its presence is not required in examples (32) and (33), because here the Neg-expression functions as the bearer of semantic negation. The use of the Neg-expression over a marker of sentential negation in (32) is favored by the highly ranked constraint NegAttract. We conclude that the grammar FNeg >> {MaxSN, NegAttract} >> *Neg >> {MaxNeg, IntNeg} in combination with the assumption that sentence-final *nie* satisfies MaxSN, but not FNeg, derives the status of Afrikaans as a

negative doubling language. Further empirical investigation of the type of examples in (32) and (33) should determine whether Afrikaans is indeed a negative doubling language or whether it exemplifies negative spread as well. This investigation is beyond the scope of this book. What the exercise in reranking of constraints teaches us is that there are a number of rankings that are theoretically possible, but that have not been fully explored in this book. They mostly involve more lexical/syntactic possibilities for variation, for the semantic variation across languages is exhaustively investigated. However, a closer look at more unusual patterns might shed light on the syntax-semantics interface as it is explored in natural language.

4. Conclusion

The conclusion to the concluding chapter of this book need not be long. I enjoyed exploring the phenomenon of negation across a wide range of languages, finding patterns, and being surprised by unexpected and fascinating complications. I am grateful for the support and feedback I received from colleagues, Utrecht University, NIAS, and the audiences who were exposed to these ideas at conferences and workshops. I hope the reader will find some inspiration in the views and ideas developed here, and will use them to develop bigger and better theories of natural language negation, or cross-linguistic semantics in any empirical domain.

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