How Semantics Dictates the Syntactic Vocabulary

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Abstract

In this paper I argue that the set of formal features that can head a functional projection is not given by UG but derived through L1 acquisition. I formulate a hypothesis that says that initially every functional category F is realised as a semantic feature [F]; whenever there is an overt doubling effect in the L1 input with respect to F, this semantic feature [F] is reanalysed as a formal feature [i/uF]. In the first part of the paper I provide a theoretical motivation for this hypothesis, in the second part I test this proposal for a case-study, namely the cross-linguistic distribution of Negative Concord (NC). I demonstrate that in NC languages negation has been reanalysed as a formal feature [i/uNEG], whereas in Double Negation languages this feature remains a semantic feature [NEG] (always interpreted as a negative operator), thus paving the way for an explanation of NC in terms of syntactic agreement. In the third part I discuss that the application of the hypothesis to the phenomenon of negation yields two predictions that can be tested empirically. First I demonstrate that negative markers X° can be available only in NC languages; second, independent change of the syntactic status of negative markers, can invoke a change with respect to the exhibition of NC in a particular language. Both predictions are proven to be correct. I finally argue what the consequences of the proposal presented in this paper are for both the syntactic structure of the clause and second for the way parameters are associated to lexical items.

1 Introduction

A central topic in the study to the syntax-semantics interface concerns the question what exactly constitutes the set of functional projections, or more precisely, what constitutes the set of formal features that are able to project. Since Pollock's (1989) work on the split-IP hypothesis many analyses have assumed a rich functional structure, consisting of a UG-based set of functional heads that are present in each clausal domain (Beghelli & Stowell (1997) for quantifier positions, Rizzi (1997) for the CP domain, Zanuttini (1997) for negation or Cinque (1999) for the IP domain). This approach has become known as the *cartographic* approach (cf. Cinque (2002), Rizzi (2004), Belletti (2004) for an overview of recent papers). Under this approach the set of functional projections is not taken to result from other grammatical properties, but is rather taken as a starting point for grammatical analyses.

An alternative view on grammar, standardly referred to as *building block grammars* (cf. Iatridou (1990), Bobaljik & Thrainsson (1998), Koeneman (2000), Neeleman (2002)), takes syntactic trees to be as small as possible. Obviously, in many cases there is empirical evidence for the presence of a functional projection in a particular clause, e.g. due to the presence of an overt functional head. The main difference between the building block grammar approach and the cartographic approach (in its most radical sense) is that in the first approach the presence of a particular functional projection in a particular sentence in a particular language does not imply its presence in all clauses, or all languages, whereas this is the basic line of reasoning under the latter approach (cf. Cinque (1999), Starke (2004)). However the question what exactly determines the amount and distribution of functional projections however remains open.

The question what constitutes functional projections and thus the set of formal features that are able to project is not only important for a better understanding of the syntax-semantic interface, but is also of acute interest to the study of parameters. Given Borer's (1984) assumption that parametric values are associated to properties of lexical elements, a view adopted in the Minimalist Program (cf. Chomsky 1995, 2000). For instance, the *Wh (fronting / in situ)* parameter follows from the presence of a [WH] feature on C° that either triggers movement of Wh terms to a sentence-initial position or allows them to remain in situ.

In the following section I provide some theoretical backgrounds and present my proposal in terms of syntactically flexible functional categories, arguing that a particular feature [F] can only be analysed as a formal feature able to create a functional projection FP if and only if there are (substantial) instances of doubling effects with respect to F present in language input during first language acquisition. After that, in section 3, I illustrate how the mechanism presented in section 2, works by discussing a case-study: negation and Negative Concord. In this section I demonstrate that negation is a syntactically flexible functional category: in Negative Concord languages negation is realised as a formal feature, in Double Negation languages it is not. Moreover I argue that Negative Concord should be analyse as a form of syntactic agreement and that the range of parametric variation can be derived from the different ways that negation can be formalised (or not) in a grammatical system. In section 4 two more consequences of the proposal of section 2 are discussed: (i) the syntax of (negative) markers and (ii) patters of diachronic change. Here I show that the hypothesis formulated in section 2 makes correct predictions, thus providing empirical evidence for it. Section 5 concludes.

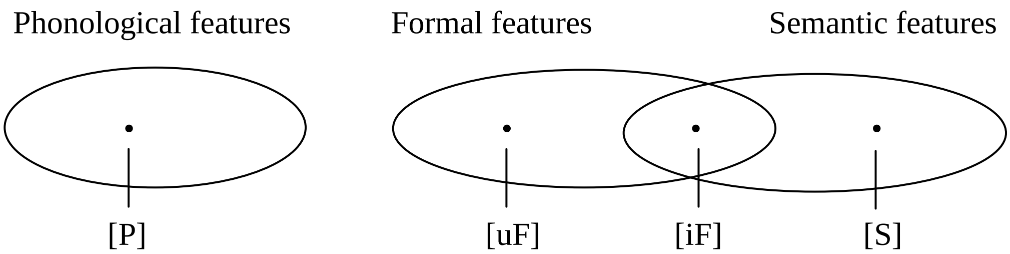
2 Formal features result from doubling effects

In the Minimalist Program (Chomsky 1995, Chomsky 2000, Chomsky 2001) Lexical Items (LIs) are assumed to be bundles of three kinds of features: phonological features, semantic features and formal features. In this paper the distinction between formal features and semantic features is of particular interest. First, I focus on the question as to what exactly are the differences between formal and semantic features. Second, the question rises how these differences can be acquired during L1 acquisition.

2.1 Formal features

As LIs consist of three different kinds of features, three different sets of features can be distinguished: the set of phonological features, the set of formal features and the set of semantic features. Following standard minimalist assumptions on the architecture of grammar, the set of formal features and the set of semantic features intersect, whereas the set of phonological features does not. This is illustrated in (1).

(1)



In the figure, the relations between the sets are illustrated. As the sets of formal and semantic features intersect, it follows that only some formal features carry semantic content. Therefore formal features have a value ±interpretable: interpretable formal features can be interpreted at LF, the interface between grammar and the (semantic) Conceptual-Intentional system; uninterpretable features do not carry any semantic content and should therefore be deleted in the derivation before reaching LF in order not to violate the Principle of Full Interpretation

(Chomsky 1995). Uninterpretable features ([uF]'s) can be deleted by means of establishing a checking relation with a corresponding interpretable feature [iF].

A good example of a formal feature is the person feature (a so-called φ-feature). It is interpretable on pronouns, but uninterpretable on verbs. This is the reason why finite verbs enter a relation with a subject, so that the uninterpretable person feature on the verb is checked against the interpretable feature on the subject and is deleted. A proper example of a semantic feature is genus (as opposed to gender), which does not trigger any syntactic operation. No feature has to be deleted, as genus can always be interpreted. The difference between formal features and semantic features thus reduces to their ability to participate in syntactic operations.

Now the following question arises: how can one know whether a particular feature is an interpretable formal feature [iF] or a semantic feature [F]? The final observation enables us to distinguish the two. From a semantic perspective the two are undistinguishable, as they have identical semantic content:

(2) $||X_{[iF]}|| = ||X_{[F]}||$

However, if one detects the presence of an uninterpretable formal feature [uF] in a sentence, there must be present an element carrying an interpretable formal feature [iF]. Hence an element Y carries an interpretable feature [iF] if (in the same local domain) an element carries an uninterpretable feature [uF] without yielding ungrammaticality (with Y being the only possible candidate to delete [uF]). In those cases Y must carry [iF] instead of [F], otherwise feature checking cannot have taken place. This question is of course not only relevant for the curious linguist, but plays also a major role in first language acquisition, as the language learner also needs to find out of which features a particular LI consists of.

2.2 Uninterpretable features and doubling effects

So, the question how to determine whether an LI carries a formal feature [iF] or a semantic feature [F] reduces to the question how to determine whether an LI carries a feature [uF]. If in a grammatical sentence an LI X carries a feature [uF] there must be an LI Y carrying [iF]. Hence, the question arises how uninterpretable features can be detected. This question is much easier to address: LIs carrying [uF]'s exhibit (at least) two properties that can easily be recognised (which already have been mentioned above) and are repeated in (3).

(3) a. A feature [uF] is semantically vacuous.

b. A feature [uF] triggers syntactic operations Move and Agree in order to be deleted.

At first sight there are three properties that form a test to recognise a feature [uF]: its semantic uninterpretability, the triggering of an operation Move and the triggering of an operation Agree. Below I argue that all of these three properties reduce to one single property: doubling.

First, although a feature [uF] is meaningless, it must establish a syntactic relationship with an element that carries [iF] and that therefore must have semantic content. This is illustrated in the following example with the person feature [i/u2SG]:

(4) a. Du kommst German
You come

b. $[_{TP}$ Du$_{[i2SG]}$ kommst$_{[u2SG]}$ $]$

In (4) it is shown that the information that the subject is a 2nd person singular pronoun is encoded twice in the morphosyntax: first by the choice of the subject *Du*, second by the person marker *–st* on the verbal stem.

The example in (4) is already an example of the syntactic operation Agree as at some point in the derivation the verb's [u2SG] feature is checked against a corresponding [i2SG] feature. Without an Agree relation between *Du* and *kommst*, the sentence would be ungrammatical; if *kommst* did not have any uninterpretable person features at all, there could not have been triggered an Agree relation in the first place. Hence, if an Agree is a result of a doubling effect.

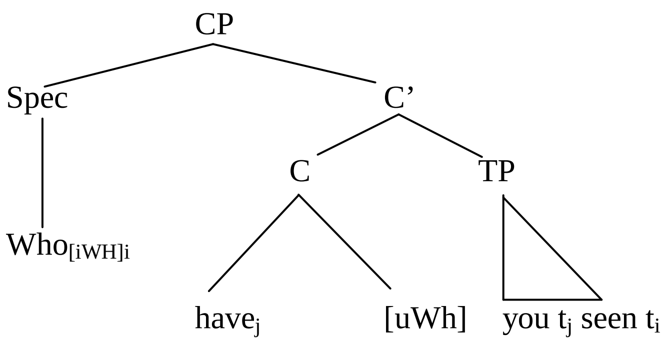
Such a relation is not restricted to two elements (one [iF], one [uF]), also multiple [uF]'s can establish a relation with a single [iF]. Ura (1996) and Hiraiwa (2001, 2005) refer to this phenomenon as *multiple Agree*. This is illustrated in (5) below for Swahili (Zwarts (2004)), which the noun class of the subject is manifested on multiple elements in the sentence.

(5) Juma a-li-kuwa a-ngali a-ki-fanya kazi Swahili
Juma$_1$ SU$_1$-PAST-be SU$_1$-still SU$_1$-PROG-DO work
'Juma was still working'

Both in (4) and (5) the manifestation of one semantic operator is manifested more than once, a phenomenon that is known as *doubling*.

Now, let us have a look at the operation Move. Checking requirements of uninterpretable features always trigger movement. It follows immediately that Move should follow from doubling properties, since Move is a superfunction of Agree (Move = Agree + Pied-piping + Merge). I illustrate this with an example taken from Robert & Roussou (2003). It has been argued that *Wh* fronting is triggered by an uninterpretable Wh feature [uWH] on C. By moving the Wh word, which carries an [iWH] feature, to Spec,CP, C's [uWH] feature can be checked against this [iWH]. This is illustrated in (6).

(6)



In (6) the question feature is present three times in total in the structure: as [iWH] on the Wh word, as [uWH] on C and as a deleted [iWH] on the trace. Given that the *Wh* term had to be fronted, it can be determined that C must contain an uninterpretable feature [uWH]. In other words, Move unfolds the presence of an uninterpretable feature [uWH] although this feature has not been spelled-out. Hence Move too results from a double manifestation of the Wh feature in the sentence. [1]

[1] It remains an open question why in (6) the checking relation cannot be established by Agree as well. Much debate is going on about this question. In some recent minimalist versions it is assumed that in English C° has an additional EPP feature that is responsible for the movement. For the moment I will not open this discussion. It should be noted however that Move is a superfunction of Agree and since doubling is a triggering force behind Agree, it is behind Move too.

Note that the presence of the [uWH] feature is visible as a consequence of the fact that movement of the *Wh* term is required. Hence, all visible properties of [uF]'s result from detectable doubling properties. Moreover, as we saw, it also works the other way round. Doubling is defined as an instance of multiple manifestations of a single semantic operator. As only one element may be the realisation of this semantic operation ([iF]) al other manifestations must carry [uF]. Thus, whenever there is doubling with respect to F, there is a [uF] present, and whenever a [uF] feature is present in a syntactic structure, there is doubling with respect to F.

Now we can reformulate the answer to the question asked above. How can an [iF] be distinguished from [F]? The answer is that whenever there is doubling with respect to F, there are (only) formal features ([iF]/[uF]). Following this line of reasoning, if there is no doubling with respect to F, there is no reason to assume that F is a formal feature. In those cases, every instance of F always corresponds to a semantic feature [F]. As mentioned before, the question is crucial for L1 acquisition, as every L1 learner needs to find out of which features a particular LI consists. Therefore I put forward the following hypothesis:

(7) *Flexible Formal Feature Hypothesis (FFFH)*

a. Every feature [F] is first analysed as a semantic feature ([F]).

b. Only if there are doubling effects with respect to F in the language input, [F] has to be reanalysed as a formal feature [i/uF].[2]

This hypothesis, if correct, has consequences for the architecture of grammar. It rejects the idea that the set of formal features is fixed by UG, and states that every semantic operator[3] in principle can be part of the syntactic vocabulary (i.e. the set of formal features) or remains within the realm of semantics. In this sense this hypothesis treats the formation of the set of formal features on a par with grammaticalisation. Before continuing the proposal and its consequences in abstract terms, I first provide a case-study which proves that this hypothesis makes in fact correct predictions.

3 Case study: Negation and Negative Concord

The case study to test the FFFH presented above concerns negation. Doubling with respect to negation is clearly detectable, since two semantic negations always cancel out each other. If two negative elements do not cancel out each other, but yield one semantic negation, at least one of the two negative elements must be uninterpretable. This phenomenon is well described and known as Negative Concord (NC).

One can distinguish three different types of languages with respect to multiple negation: (i) Double Negation (DN) languages, in which two negative elements always cancel out each other; (ii) Strict NC languages, in which every clause-internal negative element (both negative markers and n-words[4]) yields only one semantic negation; and (iii) Non-strict NC languages, where either a preverbal n-word or a preverbal negative marker establishes an NC relation with a preverbal n-word. However, a negative marker in this type of languages may not

[2] The FFFH is not a hypothesis for an L1 acquisition theory. It is motivated by learnability requirements and should, if correct, count as a prerequisite for L1 acquisition theories.

[3] For a discussion about what exactly constitutes the class of semantic operators the reader is referred to von Fintel (1995), Keenan & Stabler (2003) and Roberts & Roussou (2003: ch. 5).

[4] The term *n-word* is due to Laka (1990) and defined in Giannakidou (2002) as elements that seem to exhibit semantically negative behaviour in some contexts, but semantically non-negative behaviour in other contexts.

follow preverbal n-words. An example of a DN language is Dutch, an example of a Strict NC language is Czech and an example of a Non-strict NC language is Italian, as is illustrated in (8)-(10) below.

(8) a. Jan ziet *niemand* Dutch
Jan sees n-body
'Jan doesn't see anybody'

b. *Niemand* zegt *niets*
N-body says n-thing
'Nobody says nothing'

(9) a. Milan *(*ne*)vidi *nikoho* Czech
Milan NEG.saw n-body
'Milan didn't see anybody'

b. Dnes *(*ne*)volá *nikdo*
Today NEG.calls n-body
'Today nobody calls'

c. Dnes *nikdo* *(*ne*)volá
Today n-body NEG.calls
'Today nobody calls'

(10) a. Gianni *(*non*) ha telefonato a *nessuno* Italian
Gianni NEG has called to n-body
'Gianni didn't call anybody'

b. Ieri *(*non*) ha telefonato *nessuno*
Yesterday NEG has called n-body
'Yesterday nobody called'

c. Ieri *nessuno* (**non*) ha telefonato (a *nessuno*)
Yesterday n-body NEG has called to n-body
'Yesterday nobody called (anybody)'

In Dutch, two negations cancel each other out, and thus every negative sentence contains only one negative element. This is either the negative marker *niet* or a negative quantifier, as illustrated below. Note that the locus of the negative operator at LF does not coincide with its relative position at surface structure, but this is due to quantifier raising (independent from negation) in (11) or V2 in (13). Hence there are no doubling effects with respect to negation. As a result from the FFFH it follows that negation in Dutch is not formalised (or grammaticalised): the only negative feature [NEG] in Dutch is a semantic feature.

(11) Jan doet *niets* $\neg\exists x.[\mathbf{thing'}(x) \,\&\, \mathbf{do'}(\mathbf{j}, x)]$
[NEG]
Jan does n-thing

(12) *Niemand* komt $\neg\exists x.[\mathbf{person'}(x) \,\&\, \mathbf{come'}(x)]$
[NEG]
N-body comes

(13) Jan loopt *niet* $\neg\mathbf{walk'}(\mathbf{j})$
[NEG]
Jan walks NEG

Things are different, however, in NC languages. Let us start by discussing the Non-strict NC language Italian. In Italian postverbal n-words obligatorily need to be accompanied by the negative marker *non* or a preverbal n-word. This means that a large part of negative sentences in the L1 input consists of sentences such as (14).

(14) Gianni *non* ha visto *nessuno* $\neg\exists x.[\mathbf{person'}(x)\ \&\ \mathbf{see'}(\mathbf{g}, x)]$[5]
[iNEG] [uNEG]
Gianni NEG has seen n-body

Since (14) contains more than one negative element, but only one negation in its semantics, only one of the negative elements can be semantically negative and the other one must be semantically non-negative. The latter element must therefore carry an uninterpretable formal negative feature [uNEG], and negation being formalised in this language the negative operator carries [iNEG] and not [NEG]. Negation must take scope from the position occupied by *non*. *Non* thus carries [iNEG] and *nessuno* carries [uNEG]. This distribution cannot be reversed, since otherwise a sentence such as (15) is expected to be grammatical, contra fact.

(15) *Gianni ha visto *nessuno*
Gianni has seen n-body
'Gianni hasn't seen anybody'

Non's [iNEG] feature also enables it to express sentential negation. This is shown in (16) where *non* functions as the negative operator.

(16) *Non* ha telefonato Gianni $\neg\mathbf{call'}(\mathbf{g})$
[iNEG]

The fact that *non* is the carrier of [iNEG] and n-words carry [uNEG] seems to be problematic in one respect, namely that Italian also allows sentences such as (17). Here *non* is absent (and must not even be included). Hence all overt negative elements carry [uNEG].

(17) *Nessuno* ha telefonato a *nessuno* $\neg\exists x\exists y[\mathbf{person'}(x)\ \&\ \mathbf{person'}(y)\ \&\ \mathbf{call'}(x, y)]$
[uNEG] [uNEG]

However, given the grammaticality and the semantics of the sentence, one element must have [iNEG]. Basically, there are two ways out. Either one analyses n-words as being lexically ambiguous between negative quantifiers and non-negative indefinites (cf. Herburger (2001)), but this would render (15) grammatical. The other way out is to assume that negation is induced by a (phonologically) abstract negative operator ($Op_{\neg}$), whose presence is marked by the overt n-words. Then (17) would be analysed as follows:

(18) $Op_{\neg}$ *nessuno* ha telefonato a *nessuno*
[iNEG] [uNEG] [uNEG]

This analysis is supported by the fact that if the subject n-word is focussed and the negative marker *non* is included, the sentences achieves a DN reading. Hence, apart from the presence of *non*, a second negative operator must be at work.

(19) $Op_{\neg}$ *nessuno* non ha telefonato a *nessuno*
[iNEG] [uNEG] [iNEG] [uNEG]

Hence, given the fact that in Italian not every instance of negation is semantically negative, negation is formalised and every negative element carries a formal negative feature: n-words carry [uNEG] and the negative marker *non* and $Op_{\neg}$ carry [iNEG].

In Czech, the application of the FFFH leads to slightly different results. First, since Czech is an NC language, negation must be formalised and n-words are attributed a feature [uNEG]. However the (default) assumption that the negative marker carries [iNEG] cannot be drawn

[5] For clarity reasons tense is neglected in all these readings

on this basis yet. The negative operator could also be left abstract. Hence, for the moment the value of the formal feature of the negative marker in (20) is left open.

(20)	Milan	*ne*vidi	*nikoho*	¬∃x.[**person**'(x) & **see'**(**m**, x)]
		[?NEG]	[uNEG]	

In Italian we saw that *non* must be the negative operator, since negation takes scope from the position that it occupies. Consequently, no n-word is allowed to surface left from this marker (with the exception of constructions like (19)). However, in Czech n-words are allowed to occur both to the left and to the right of the negative marker. This means that negation cannot take scope from the surface position of *ne*. The only way to analyse *ne* then, is as a negative marker that carries [uNEG] and which establishes a feature checking relation (along with the n-words) with a higher abstract negative operator:

(21)	*Op*$_\neg$	*Nikdo*	*ne*volá	¬∃x.[**person'**(x) & **call'**(x)]
	[iNEG]	[uNEG]	[uNEG]	

As a final consequence, single occurrences of *ne*, cannot be taken to be realisations of the negative operator, but markings of such an operator. In (22) the negative marker indicates the presence of *Op*$_\neg$, which on its turn is responsible for the negative semantics of the sentence.

(22)	Milan	*Op*$_\neg$	*ne*volá	¬**call'**(**m**)
		[iNEG]	[uNEG]	

Hence, in Czech even the negative marker is semantically non-negative. Czech and Italian thus differ with respect to the formalisation of negation to the extent that the negative marker in Italian carries [iNEG], whereas the negative marker in Czech carries [uNEG]. Note that this corresponds to the phonological status of the two markers: in Czech the negative marker exhibits prefixal behaviour, thus suggesting that it should be treated on a par with tense/agreement morphology. Italian *non* is a (phonologically stronger) particle, that can be semantically active by itself.

The application of the FFFH also drives in the direction of analysing NC as a form of syntactic agreement, a line of reasoning initially proposed by Ladusaw (1992) and adopted by Brown (1996) and Zeijlstra (2004). It should be noted however that these are not the only accounts for NC. Other accounts treat NC as a form of polyadic quantification (Zanutttini (1991), Haegeman & Zanuttini (1996), De Swart & Sag (2002)) or treat n-words as Negative Polarity Items (cg. Giannakidou 2000). The latter approaches both face problems, many of them addressed in the literature (cf. Zeijlstra (2004) for an overview). Unfortunately, space limitations prevent me here from addressing these issues here. The reader is referred to Zeijlstra (2004) for a discussion of how most of these problems can be explained away in a syntactic agreement approach of NC. Moreover, in the next section I discuss two consequences that follow from the syntactic agreement approach that is induced by the FFFH. These provide additional evidence for this explanation of NC.

A final point must be made regarding the range of variation that languages exhibit with respect to the expression of negation. Although I did not discuss every possible type of NC language (optional NC was left out of the discussion), the languages above cover the entire range of variation that one may expect: either every negative element is formalised as carrying a [uNEG] feature (Czech), or no element at all has been formalised (Dutch), or only some elements have been assigned [iNEG] while others have been assigned [uNEG] (Italian). All other kinds of NC languages could be analysed in the same manner. This means that the entire range of parametric variation with respect to the interpretation and expression of negation follows from the proposal in (7).[6] Consequently, adopting (7) a parameter such as the NC parameter (a language exhibits/does not exhibit NC) or a subparameter responsible for the Strict vs. Non-strict NC distinction is a derived notion, not directly following from UG but as a by-product of a simple learnability mechanism.

4 Consequences

The FFFH and the exact analysis of NC in terms of syntactic agreement make several predictions that I discuss in this section. First I argue that the status of the negative feature (formal or semantic) has some consequences regarding the appearance and distribution of the negative projection (NegP after Pollock (1989)). Second I argue that the FFFH makes correct predictions about the consequences of diachronic change with respect to the obligatorily or optional occurrence of the negative marker.

4.1 Negative features and projections

Now let us look at the relation between the formal status of negative features and the syntactic status of negative markers. Negative markers come about in different forms. In some languages (Turkish) the negative marker is part of the verbal inflectional morphology; in other examples the negative marker is a bit stronger. Italian *non* is a strong particle, and the Czech particle *ne* is weak.[7] German *nicht* on the other hand is even too strong to be a particle and is standardly analysed as an adverb. Examples are in (23)-(25).

(23) John elmalari ser*me*di[8] — Turkish
John apples like.NEG.PAST.3SG — (affixal)
'John doesn't like apples'

(24) a. Milan *ne*volá — Czech
Milan NEG.calls — (weak particle)
'Milan doesn't call'

b. Gianni *non* ha telefonato — Italian
Gianni NEG has called — (strong particle)
'Gianni didn't call'

(25) Hans kommt *nicht* — German
Hans comes NEG — (adverbial)
'Hans doesn't come'

Note also that it is not mandatory that a language has only one negative marker. Catalan has a strong negative particle *no* and an additional optional negative adverbial marker (*pas*)

[6] This leaves open many possibilities, e.g. about the number of negative markers, their syntactic status, their position in the clausal structure, etc. Several of these issues are discussed in the next sections. It is important however that the range of variation with respect to negation is restricted by two constraints: (i) a language has the possibility to express negation (for reasons of language use rather than grammatical reasons) and (ii) negation can, but does not need to be formalised.

[7] I refrain from the discussion whether Czech ne should be analyses as a clitical, prefixal or as a real particle. It will become clear from the following discussion that the outcome would not be relevant for the final analysis in terms X°/XP status.

[8] Example from Ouhalla (1991), also cited in Zanuttini (2001)

whereas in West Flemish the weak negative particle *en* is only optionally present, next to the standard adverbial negative marker *nie*. Standard French even has two obligatory negative markers (*ne* … *pas*), as demonstrated in (26).

(26) a. *No* serà (*pas*) facil — Catalan
NEG be.FUT.3SG NEG easy
'It won't be easy'

b. Valère (*en*) klaapt *nie* — West Flemish
Valère NEG talks NEG
'Valère doesn't talk'

c. Jean *ne* mange *pas* — French
Jean NEG eats NEG
'Jean doesn't eat'

I adopt the standard analysis that negative affixes and weak and strong negative particles should be assigned syntactic head (X°) status, whereas negative adverbials are specifiers/adjuncts, thus exhibiting XP status (cf. Zanuttini (1997a,b), Rowlett 1998, Zanuttini (2001), Merchant 2001, Zeijlstra 2004).

The difference between X° and XP markers has influence on functional structure. X° negative markers must (by definition) be able to project themselves, yielding a clausal position Neg°. On the other hand, XP negative markers may occupy the specifier position of a projection that is projected by a (possibly abstract) negative head Neg°, Spec,NegP (as is the standard analysis for most adverbial negative markers), but this is not necessarily the case. It could also be an adverbial negative marker that occupies an adjunct/specifier position of another projection, for instance a *v*P adjunct position. In that case it is not necessary that there is a special functional projection NegP present in the clausal structure (it is not excluded either).

Now the question follows: when is a negative feature able to project? Giorgi & Pianesi (1997) addressed this question in terms of their feature scattering principle, arguing that 'each feature can project a head.' However, given the modular view on grammar in which features are divided in different classes, the question emerges which kind of features can head a projection. One would not argue that every lexical semantic feature or every phonological feature might have its own projection. Feature projection is a syntactic operation, and should thus only apply to material that is visible to syntax. Hence, the most straightforward hypothesis is that only formal features can project. This means that a feature can only head a projection if [F] has been reanalysed as a formal feature [i/uF].

Consequently, it follows immediately that the availability of a negative projection NegP in a particular language then depends on the question whether negation has been reanalysed as a formal feature [i/uNEG] in this language. This makes the following prediction: only languages that exhibit doubling effects with respect to negation (i.e. only in NC languages) NegP may be available. This claim can easily be tested as it has been argued above, that X° negative markers occupy a Neg° position, whereas adverbial negative markers do not have to occupy a Spec,NegP position. The prediction following from this is that only in the set of NC languages one can find negative markers X° (see (27)).

(27) a. NC: [u/iNEG]/[X]
[u/iNEG] X

b. Non-NC: [X]
[NEG] [X]

In Zeijlstra (2004) this prediction has been tested for a threefold empirical domain (a sample of 267 Dutch dialectal varieties, a sample of 25 historical texts, and a set of 25 other languages from different families) and been proven correct.[9] This provides empirical evidence for the FFFH.

4.2 Negation and diachronic change

Since Jespersen (1917) it is known that a large majority of languages has developed with respect to the expression of negation. These changes concern both the syntax of the negative marker and the occurrence of NC. As follows from the previous subsection, these two phenomena are not unrelated. In this subsection, I first discuss how the FFFH applies to the Spanish development from a Strict NC into a Non-strict NC language. Second, I exemplify the change from Dutch from an NC language into a DN language.

4.2.1 Spanish: from Strict NC to Non-strict NC

Old Spanish was a Strict NC language, where a subject n-word was allowed to precede the negative marker *no*, as is shown for 11th century Spanish in (28).[10]

(28) Qye a myo Cid Ruy Diaz, que *nadi no* diessen posada 11th Cent Spanish[11]
That to my lord Ruy Diaz, that n-body NEG gave lodging
'that nobody gave lodging to my lord Ruy Diaz'

Given the fact that the language input during L1 acquisition contained expressions of the form in (28) the negative marker was assigned a formal feature [uNEG]. However, at some point speakers began to omit the negative marker *no* in constructions such as (28), analysed as (29). This change is not surprising, since the negative marker in these constructions did not contribute to the semantics of the sentence (the fact that there is an abstract negative marker located in a higher position than *nadi* follows from the presence of this subject n-word). Hence the L1 input had the form of (30) with an increasing relative frequency of instances of (31). At a certain point the absence of cases of *no* following *nadi* was thus robust that the cue that forces the language learner to assign *no* the feature [uNEG] disappeared. As a result *no* was always the highest element in a negative chain and therefore *no* got reanalysed as [iNEG] leading to the judgements in (32). Note that this reinterpretation of *no* is correctly predicted by the FFFH.

(29) $Op_{\neg}$ nadi no
[iNEG] [uNEG] [uNEG]

(30) $Op_{\neg}$ nadi (no)
[iNEG] [uNEG] [uNEG]

(31) $Op_{\neg}$ nadi
[iNEG] [uNEG]

(32) a. *No* vino *nadie* Modern Spanish

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[9] Two kinds of exceptions have been found. First, Standard English, being a non-NC language allows for the negative marker *n't* ,which behaves like a negative head. Possibly this is related to the fact English is on its way of transforming itself into an NC language (cf. Zeijlstra (2004)). Alternatively, English negation can be said to exhibits doubling effects, as it may trigger movement (negative inversion). Second, a number of Southeast Asian languages lack n-words. In those languages however, it can be shown that negative markers trigger Move, thus exhibiting a doubling effect as well.

[10] For an overview of the development of Spanish negation, see Herburger (2001) and references therein.

[11] Example taken from Herburger (2001).

NEG came nobody
'Nobody came'

b. *Nadie* (**no*) vino
NEG came nobody
'Nobody came'

4.2.2 Dutch: from NC to DN

Similar observations can be made for Dutch. Middle Dutch was a language that used two negative markers *en/ne* … *niet* to express sentential negation, as shown in (33). However, as (34) shows, in most cases which contained an n-word only the preverbal negative marker *en/ne* was present.

(33) Dat si *niet en* sach dat si sochte[12] Middle Dutch
That she NEG NEG saw that she looked.for
'That she didn't see what she looked for'

(34) Ic *en* sag *niemen* Middle Dutch
I NEG saw n-body
I didn't see anybody

As in most languages exhibiting two negative markers, one of them disappears. 16th and 17th century Holland Dutch in most cases left out the preverbal negative marker *en/ne*, and only exhibited *niet*. As a consequence of this development, the presence of *en/ne* also lost ground in constructions with n-words, resulting in expressions like (35).

(35) Ic sag *niemen* 17th Cent. Dutch
I saw n-body
I didn't see anybody

Hence, the language input contained less and less constructions as the ones in (36), but more and more expressions in which an n-word was the only negative element in the sentence. As the cue to assign n-words a [uNEG] feature vaguely disappeared, n-words were no longer reanalysed as [uNEG], but kept their semantic [NEG] feature (37).[13]

(36) a. *Op*$_{\neg}$ en niemen
[iNEG] [uNEG] [uNEG]

b. *Op*$_{\neg}$ niemen en
[iNEG] [uNEG] [uNEG]

(37) Ic sag *niemen*
[NEG]

To conclude, the two developments described above show exactly how a change in the syntax of negative markers leads to a change in the interpretation of multiple negative expressions. Note that these latter changes follow completely from the FFFH and no other additional account has to be adopted.

12 Lanceloet 20042.

13 Similarly, the negative marker *niet* also did not get reanalysed anymore, thus keeping its [NEG] feature.

5 Conclusions

In this paper I first I argued on theoretical ground that the set of formal features, i.e. the set of features that can head a functional projection, is not provided by UG, but is a result of L1 acquisition. Only those semantic features that exhibit (overt) doubling effects are formalised (or grammaticalised). This has been formulated in the FFFH. Consequently, as only formal features can project, the number of functional projections FP that a particular grammar has at its disposal is limited by the FFFH. Each grammar, based on the language input during L1 acquisition, makes a particular choice of semantic operators that can be realised as FP's. Thus clausal structure is subject to cross-linguistic variation and not a UG-based template.

In the second part of this paper I applied the FFFH to the domain of negation. Negation is a semantic operator that differs cross-linguistically in the way it surfaces in morphosyntax. Languages differ with respect to whether they exhibit doubling effects (known as NC) and thus the result of this application is that only in NC languages, negation is formalised. In DN languages negation is not realised as a formal feature.

The claims about the flexible formal status of negation are empirically testable. Not only requires it an analysis of NC in terms of syntactic agreement (cf. Zeijlstra (2004) who shows that such an analysis solves many problems that other analyses have been facing). It also makes correct predictions about the syntactic status of negative markers and the diachronic relation between the syntax of negative marker(s) and the occurrence of NC. First, it is shown that only NC languages may exhibit a negative marker Neg°. Second, it follows that if the (optional) negative marker for independent reasons ceases to occur in particular contexts, this may influence the overt doubling effects and therefore alter the status of the language as a (Strict) NC language.

The FFFH, which is not only theoretically but also empirically well motivated, has consequences for the notion of parametric variation. Parametric variation seems not to be derived from the different ways that a functional head can be marked (cf. Roberts & Roussou (2001) for a proposal along these lines), but to follow from how a particular semantic operator is marked: either as a formal feature or not. If marked through some formal feature then a number of different options remain open: it may be manifested by an overt lexical head, it may trigger Move or Agree, etc. In any case, the parametric space can be said to follow from the FFFH in combination with general syntactic mechanism. This has been illustrated for a few possible ways to express sentential negation in section 3 (NC) and 4 (negative markers).

Finally, the proposal presented above allows formulating predictions in terms of typological implications, which can be tested empirically. This is an interesting result, as with Newmeyer (2004) the question whether typological implications count as linguistic evidence has recently become subject of debate. I hope to have shown in this paper that typological implications can be used a testing mechanism for different proposal concerning the status of formal features.

Of course, the FFFH is still programmatic in nature. It seems to make correct predictions for negation, but it should be evaluated for a number of other functional categories in order to determine its full strength. However, I think that the evidence provided in this paper sheds more light on exactly how semantics dictates the syntactic vocabulary.

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