NSM meets Minimalism. A Preliminary Minimalist Grammar of the English Natural Semantic Metalanguage

First part: Introduction and the Substantive Phrase

Francesco Zamblera

October 17, 2011

Abstract

This work describes a computational minimalist grammar of the English Natural Semantic Metalanguage. The computer program and the grammar module are freely available online. After introducing the NSM and the minimalist frameworks, the paper describes in some detail a minimalist grammar for the English "substantive phrases".

The second part, in preparation, will describe the clause and sentence grammar.

1 Introduction

This paper is the first part of a grammar for the English Semantic Metlanguage in minimalist terms. An implementation of the model described here is available online.[1]

Natural Semantic Metalanguage (NSM) and Minimalist Grammars (MG) represent two very different approaches to Universal Grammar (UG). The grammar described here is a preliminary attempt to build a bridge between these two paradigms.

To quote Hale (1994, p. 266), "the term 'preliminary' has to be taken seriously": both Minimalism and NSM are thriving and dynamic fields, and many analyses and technical details can soon become obsolete. Furthermore, my implementation has a number of ad hoc features which will have to be addressed in subsequent work. To quote Sapir (1921, pag. 38), "all grammars leak", and mine is no exception.

At the outset, I would like to point out some salient characters of this "meeting" between NSM and "Chomsky's structure-based conception of UG" (Goddard & Wierzbicka, 2002c, pag. 41):

[1] The main features of the implementation are described in Zamblera (Forthcoming).

- Computational Minimalist Grammars have provided the technical machinery for the description of the NSM, thus addressing what in NSM terms can be called the question of *allolexy*. This, MG can provide NSM with a tool for the investigation the *structural* aspects of the various natural-language incarnations of the semantic metalanguage;
- NSM, in turn, can provide minimalist research with a stock of (*material* and not only *formal*) universal items, namely, the *semantic primes*. The Minimalist Program investigates the question of language learning and the ultimate nature of language faculty (see e.g. Chomsky, 2005a,b); so, from a minimalist point of view, the fact that languages have not only a universal structure but, how Wierzbicka and colleagues have been showing, also *a universal set of lexical items*[2] and *expressions which are able to "generate" the whole conceptual stock of a language*, is surely significant;
- Goddard & Wierzbicka (2002c) describe the grammar of English NSM in terms of "relations" (attributive, subject-predicate, and so on). Trying to translate this into minimalist terms, I have identified, as a working hypothesis, Goddard and Wierzbicka's relations with the *functional heads* recognized by the so called "cartographic approach"[3]. This identification turned out to be very fruitful, as it led to a very restricted version of MG with some characteristics which I think could turn out to be sigificative for minimalist research:
    - First of all, I sharply distinguish between lexical and functional heads: in Stabler's computational implementation of minimalism, which I have basically adopted in this work[4], lexical and functional heads have the same status, but, as Chesi (2004) points out, current syntactic research ascribes them very different properties, and a computational approach should keep them apart.

      By identifying functional heads with Goddard and Wierzbicka's relations, *only functional heads come to have selectors and licensors*,[5] while lexical heads have neither. This means, in minimalist terms, that *only functional heads trigger merge and move* in the English NSM grammar;
    - I adopted a uniform structure for functional heads, which invariably select *one* complement and *one* specifier. In whis way, a functional head, as already recognized by Brody (2000), becomes very similar to a dependency in dependency grammar;
    - The "functional space" above the lexical categories is represented compactly, with a unique functional head (which translates one of

[2]Not lexemes but "Lexical units", that is, "pairings of a single specifiable sense with a lexical form" (Goddard, 2008b).

[3]Belletti (2004); Cinque (1999, 2002, 2006); Cinque & Rizzi (2009); Cinque (1999, forthcoming); Damonte (2004); Rizzi (1997).

[4]Stabler (1997, 2011a,b); Harkema (2001).

[5]See section 3 for these terms.

Goddard and Wierzbicka's relations into structural terms) which recursively builds the extended projection of the lexical head from the bottom-up, in accordance with the hierarchy established by the cartographic approach.

This can solve the problem, pointed out by Chesi (2004), of the optionality of adverbials and attributive modifiers (this point is discussed in section 3).

Such a "restricted" minimalist grammar, as I hope to show in this paper, is adequate for the (very) restricted subset of English represented by NSM.

It is still to be seen whether it will stand the test of a larger subset of English.

I would like to point out that describing NSM grammar in minimalist terms does not imply (at least for me) that a generative (minimalist) approach be the best or the most straightforward way to the grammar of NSM (neither am I claiming that it is not). Goddard & Wierzbicka (2002c) describe the grammar of English NSM in terms of "relations", which can also get translated into many frameworks, first of all, into a dependency format, or in some form of construction grammar.

Minimalism tries to get to the "atomic" structural building blocks of language[6] (such as features, lexical and functional heads, and the elementary *merge* operation); in particular languages, such minimal items conspire to build more complex constructions which, once built, can live a psychological life of their own.[7] In chemistry, some properties of matter are better described in molecular terms, and molecules are not denyed any reality just because they are made up of atoms (nor are atoms, for that matter); in the same way, we can describe, for example, words and their interplay, or word constructions, in a language, disregarding the fact that they are built from more elementary items by the iterate application of *merge* and *move*: if the shape of words can be ulimately a *syntactic* matter, as for example in Distributed Morphology,[8] yet "there is not, as a rule, the slightest difficulty in bringing the word to consciousness as a psychological reality" (Sapir, 1921, pag. 34).[9]

[6]Cf. the title of Baker (2001).

[7]This interplay between different-level structures is at work, for example, in Hudson's Word Grammar model (see e.g. Hudson, 2007).

[8]See e.g. Halle & Marantz (1993) and subsequent work.

[9]Cf. more fully Sapir (1921, pag. 33, Sapir's emphasis) on the matter of words: "Radical (or grammatical) element and sentence – these are the primary *functional* units of speech, the former as an abstracted minimum, the latter as the esthetically satisfying embodiment of a unified thought. The actual *formal* units of speech, the words, may on occasion identify themselves with either of the two functional units; more often they mediate between the two extremes, embodying one or more radical notions and also one or more subsidiary ones. [...] the radical and grammatical elements of language, abstracted as they are from the realities of speech, respond to the conceptual world of science, abstracted as it is from the realities of experience, and that the word, the existent unit of living speech, responds to the unit of actually apprehended experience, of history, of art." Note how Sapir's use of the terms *formal* and *functional* is perhaps the opposite of what we would do today.

In sum, a “minimalist” and, for example, a “dependency” approach to the grammar of NSM do not necessarily exclude each other.

This paper is organized as follows: after an introduction to NSM (section 2) and computational minimalist grammars (section 3), I describe in some detail my implementation of the “substantive phrase” in the English NSM grammar (section 4). Last, some conclusions and hypotheses for future work (section 5).

2 The Natural Semantic Metalanguage

Cliff Goddard defines NSM as

> a decompositional system of meaning representation based on empirically established universal semantic primes, i.e. simple indefinable meanings which appear to be present as identificable word-meanings in all languages (Goddard, 2008b, pag.1)

Some basic assumptions of NSM:

- “the fundamentals of language arise from the fundamentals of human thought, which are shared by all people and by all languages” (Goddard & Wierzbicka, 2002c). The two authors’ quotation from Roger Bacon (“Grammatica una et eadem est secundum substantiam in omnibus linguis, licet accidentaliter varietur”, ibidem) strikingly remembers Chomsky’s *Uniformity principle*:

  > In the absence of compelling evidence to the contrary, assume languages to be uniform, with variety restricted to easily detectable properties of utterances (Chomsky, 2001, pag. 2);

- We cannot escape from natural language(s) to describe meaning. Formalized systems used to describe meaning need themselves natural language to be understood and interpreted (by humans). That is, *natural languages are their (ultimate) own semantic metalanguages* (Goddard (2008b, pag. 3) speaks of “meta-semantic adequacy” of natural languages);

- When we define the meaning of a word, we must use other words which are simpler than the one we started from, otherwise we define nothing (*reductive paraphrasis*);

- There is a basic set of concepts, called *semantic primes*, whose meaning is undefinable; that is, there are no simpler words with which to paraphrase their meaning. These semantic primes are immediately understandable, without the need of any explanation;

- These semantic primes are *universal*, that is, expressable in every language, though eventually subject to language-particolar *allolexy* and/or *polysemy*:

- A word which expresses a semantic prime in a language can also have other meanings in that language (*polysemy*): for example, the Spanish word querer expresses the semantic prime WANT, but it also means *love*;
- In English, a "verbal" prime such as DO is represented by various items in *allolexical* variation (*do, does, did, done*);

A particular language can express a prime with a word or an affix or a syntactic construction, but, by hypothesis, *it is always possible to express a prime in every language*;

- These semantic primes can be combined in some basic ways. These combinations are again available in every language, though the syntactic and morphological realizations of these combinations again differ from language to language. For example, every language can combine the primes DO, SOMETHING, GOOD, to form the compound expression DO SOMETHING GOOD;

Thus, according to the NSM theory, UG basically comprises:

- a set of universal concepts, the *semantic primes*, and
- a set of combinatorial possibilities of the primes, that is, a set of *"conceptual" syntactic structures*.

Particular languages implement UG in their *lexical and grammar core*, specifying:

- for each prime, its allolexes and the contexts in which each allolex arises;
- for each syntactic type, the concrete syntactic structures which instantiate it.

2.1 The "NSM core" of a language

If we stick to the "NSM core" (primes and their universal syntactic combinations) of a language, we can construct sentences and texts which are perfectly translatable in every other language.

One such "semantic text"[10] is presented in fig. 1.

Such "semantic texts" offer very interesting possibilities for linguistic an cross-cultural research, for example:

- Lexical paraphrases (as the NSM explanation of *sad* above) can represent a powerful tool which can allow the lexicographer to avoid the problem of circularity;
- Cultural scripts can explain different patterns of (not only verbal) behaviour across different cultures in universally intelligible terms (Goddard, 2006)

[10] Cf. Goddard & Wierzbicka (2002a, pag. 80).

Figure 1: An English NSM text

X feels *sad*:

```
X feels something
sometimes a person thinks like this:
    I know that something bad happened
    I don't want things like this to happen
    I can't think now: I will do something because of this
    I know I can't do anything
because of this, this person feels something bad
X feels something like this
```

2.2 The Primes

In her first works, Wierzbicka started with a very limited number of hypothetical primes (14 in Wierzbicka, 1972). As the theory developed, it has known various "expanding phases": Wierzbicka (1988) already recognizes more than thirty. At present there are sixty-four proposed primes (Goddard, 2011).

It is interesting that the generative tradition has had a similar "expanding phase", which has concerned *functional heads*.

The primes are shown in table 1, taken from Goddard (2008b, page 33), with some modifications:

- I have added the "new entry" LITTLE/FEW;[11]
- I have "resurrected" the allolex "person," which recent NSM research tend to disfavour, preferring the expression "this someone" for previous "this person". I have done this mainly because of the impossibility of the allolex *someone* to cooccur with quantifiers: if *this someone* is perfectly intelligible, but *?one someone* and especially **two someones* seem definitely "out".[12]

2.3 Semantic Molecules

Semantic molecules are another interesting aspect of NSM.

Though many lexical items can be directly paraphrased down to semantic primes, this would be too cumbersome to do for many other terms. The NSM approach allows the use of non-prime words in explanation, but the following two conditions must be met:

- there must be no circularity;

[11] Goddard, p. c., July 2010.

[12] In English one can say "two people", but, in other language, for example Italian or Spanish, the equivalent of PEOPLE cannot used in this way.

Table 1: The semantic primes

Substantives:	I, YOU, SOMEONE/PERSON, SOMETHING/THING, PEOPLE, BODY
Relational substantives:	KIND, PART
Determiners:	THIS, THE SAME, OTHER/ELSE
Quantifiers:	ONE, TWO, LITTLE/FEW, SOME, MUCH/MANY, ALL
Evaluators:	GOOD, BAD
Descriptors:	BIG, SMALL
Mental predicates:	THINK, KNOW, WANT, FEEL, SEE, HEAR
Speech:	SAY, WORDS, TRUE
Actions, events, movement, contact:	DO, HAPPEN, MOVE, TOUCH
Location, specification, existence, possession:	BE (SOMEWHERE), THERE IS, HAVE, BE (SOMEONE/SOMETHING)
Life and death:	LIVE, DIE
Time:	WHEN/TIME, NOW, BEFORE, AFTER, A LONG TIME, A SHORT TIME, FOR SOME TIME, MOMENT
Space:	WHERE/PLACE, HERE, ABBOVE, BELOW, FAR, NEAR
Logical concepts:	NOT, MAYBE, CAN, BECAUSE, IF
Intensifier, augmentor:	VERY, MORE
Similarity:	LIKE/AS

- the non-prime words used in the explanation be actual words of the language under consideration. No “abstract predicates” are allowed.

Some non-prime terms constitute semantic molecules. They tend to recur in many explications, often in related semantic fields. The use of molecules in semantic explication structures the lexicon in interesting ways. For example, all “body-part” terms but *hands* need shape molecules as *round* and *long*. All such shape terms need in their explanations the molecule *hands*, which is directly paraphrasable into semantic primes, so there is no circularity. This interesting issue cannot be discussed further here; the interested reader is referred to Goddard (2010).

3 Minimalist Grammars

3.1 Chomsky’s Minimalist Program

NSM, as described in the previous section, represents a theory of universal grammar. A different approach to UG is represented by generative grammar.

NSM sentences are composed by semantic primes in particular syntactic configuration. For two leading syntaxicians as Cinque and Rizzi,

> clauses and phrases are formed by a lexical structure and a higher functional structure, both corresponding to elementary building blocks hierarchically organized. (Cinque & Rizzi, 2010, pag. 52).

NSM and UG focus, respectively, on the *semantic* and *structural* aspects of UG. Since its beginnings, Chomsky's theory of generative grammar has focused on the *computational* aspect of language competence, trying to explain

> the behavior of the speaker who, on the basis of a finite and accidental experience with language, can produce or understand an indefinite number of new sentences. (Chomsky, 1957, pag. 15)

From a computational point of view, language is therefore a *recursive* system, because an infinite number of utterances can be built with finite means (lexical items and their combinatorial properties). Now,

> The indispensable operation of a recursive system is Merge (or some variant of it) which takes two syntactic objects α and β and forms the new object $\gamma = \{\alpha,\beta\}$. (Chomsky, 2005a, pag. 3)

As Hornstein *et al.* (2005, p. 6) say at the very beginning of their textbook, "minimalism is not a theory so much as a program for research."[13]

Some basic assumption of minimalist:

- "syntactic structures must be ultimately built from lexical items" (Hornstein *et al.* , 2005, pag. 98);
- "structures are assembled by applications of the operations Merge and Move" (ibidem, pag. 122);
- *merge* is a binary operation which targets two items and forms a new item from them. The two items can come from the lexicon, or from a previous application of *merge*;
- "Unless some stipulation is added, there are two subcases of the operation Merge. Given A, we can merge B to it from outside A or from within A; these are external and internal Merge, the latter the operation called Move, which therefore also comes free, yielding the familiar displacement property of language." Chomsky (2005b, pag. 12) thus characterizes of *move* as "internal merge".
- Lexical items are bundles of features: phonological, semantic and morphological; the latter drive syntax, triggering the structure-building operations. For example, *move* "is implemented by setting a target P and a related category K to be moved to a position determined by P – P a *probe*

[13]And, (ibidem), "It would very exciting if in minimalism did in fact promote a research environment in which various alternatives, equally "minimalist" yet substantailly different, theories of grammar thrived, as it would then be possible to play these alternatives off against one another to the undoubted benefit of each." We can observe that NSM was "minimalist" from the outset (Wierzbicka (1972) managed to do lexical analysis with only 14 primes!), and has remained minimalist in its attempt to find the minimal common core of all languages.

that seeks K" (Chomsky, 2001, pag. 4). This probe-goal relation exists because the probe P has some features which must agree with corresponding features of the goal.[14]

- I will not use the concepts of *phases* in whis work (cf. Chomsky, 2001, 2005a), but rather build PF and LF at each application of *merge* and *move*, as in Stabler (1997); Harkema (2001); Wojdak (2005). A different proposal for a computational implementation of minimalism which makes crucial use of phases and top-down derivation is presented in Chesi (2004, 2007).

With the Minimalist Program, Chomsky's generative grammar shifts again its attention from syntactic *representations* to syntactic *derivations*. The representational view was dominant in the "Principles and Parameters" framework, which shifted towards the minimalist programs in the early nineties. A derivational framework is computationally more appealing than one in which some very general principles can build ungrammatical structures, which are then filtered out by indepentent principle.[15] Stabler's computational version of minimalism stands very close to Chomsky's definitions, using *merge* and *move* directly. As this model is the starting point of my implementation, it will be now surveyed.

3.2 Stabler's Computational Minimalism

A computational minimalist grammar consists of a *lexicon*. The structure-building operations *merge* and *move* are triggered by features of lexical items, and apply universally.

A lexical item is thus a bundle of features. Each item has three types of features:

syntactic features, which determine the morphosyntactic properties of the lexical item, and trigger the two operations of *merge* and *move*. For example, an inflection head like English *-s* will have among its features `=v`, thus triggering merge with a verb (which has feature `v`) to form a structure $[_i v \;\; -s]$;

phonetic (PF) features, represented by a string of characters. I prefer to call these features **morpho-phononetic**, because my implementation allows for "abstract" PF representations containing *variables*, which correspond to variables in the syntactic features (this use of variables, which implements agreement, is exemplified in section 4.3.3);

semantic (LF) features, which will be represented as an uppercase LF predicates. *Merge* operations compose semantic features, so that the LF of the

[14] "We therefore have a relation Agree holding between α and β, where α has interpretable inflectional features and β has uninterpretable ones, which delete under Agree" (Chomsky, 2001, pag. 3).

[15] Cf. Chesi (2004) for a discussion of this point.

head takes as its argument the LF of the merged item (complement or specifier).

3.3 Syntactic features

There are four kinds of syntactic features, grouped in two sets:

1. **Categorial features**

base features like `v`, `a`, `n`. Each lexical item has one and only one base feature, which determines to which word class it belongs;

selectors like `=v`, `=a`, `=n`. An item with selector $=f$ can merge with an item whose categorial feature is f. Both f and $=f$ are deleted after merge.

One of the things I have added to Stabler's model is the use of *level numbers* in bases and selectors: an item with selector `feature:i` can merge with an item whose base is `feature:j` (where i and j are integers) only if $i \geq j$.

2. **Movement-related features**

licensors represented as `+f` (or, in my implementation, also as `+f:val`), together with

licensees trigger the *move* operation. An item with $+f$ on the top of the tree will attract an item lower in the syntactic tree, whose first feature is$-f$, if there is no other subtree with the feature$-f$ (*shortest move constraint*).

If these features have values (represented as `+f:val1`, `-f:val2`),[16] *move* applies only if the values can match.

Values and the use of variables both as values of features and in PF representations, are another addition to Stabler's model, which allows for a simple implementation of morphological agreement.

To check the feature `val1` against `val2`, the following procedure is applied:

- if neither `val1` nor `val2` are variables, they match only if they are identical (so e.g. $-f_{gender} : masc$ matches $+f_{gender} : masc$ but not $-f_{gender} : fem$). If they do not match, there will be no *move*;
- if both are variables, they are unified: after *move*, `val1` = `val2`, and when either will be assigned a value (by later movement operations), the other will automatically assume the same value;

[16] Both base/selectors and licensors/licensees use the notation $feature : value$, but with a different meaning.

- either one of `val1`, `val2` is a variable and the other an actual value, the variable is assigned that value. So e.g. $+f_{gender} : \$gen\$$ and $-f_{gender} : masc$ match, and the variable $\$gen\$$ is assigned the value *masc*.[17]

When a variable is assigned a value, all instances of that variable in the morphophonological and morphosyntactic features will be assigned that value. In this way, even if the two features get deleted by *move*, their values can persist if there are other instances of that variable.

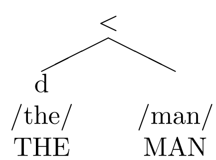
Let us see how this works in practice: in the two (very simplified) English lexical items:

1) `PF: /the/, LF: THE, F: =n d`
2) `PF: /man/, LF: MAN, F: n`

the `=n` feature of item 1 selects the `n` feature of item 2, so *merge* can apply, deriving the new item 3, after the `=n` and `n` feature have been erased:

3) `PF: /the man/, LF: THE(MAN), F: v`

or, in the familiar tree format,[18]

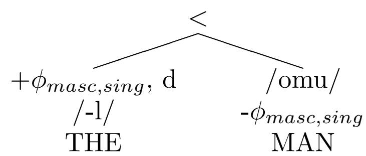


Now let us consider Rumanian *omu-l* "the man" (lit. MAN-THE). The article is suffixed to the head noun, and it agrees with it in gender (cf. *fat-a* GIRL-THE") and number (cf. *oameni-i* MEN-THE).

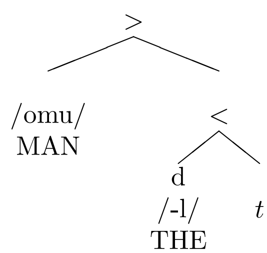
1) PF: /-l/, LF: THE, F: =n, $+\phi_{masc,sing}$, d.
2) PF: /omu/, LF: MAN, F: n, -$\phi_{masc,sing}$.

as before, *merge* applies:

[17]Variables are represented as the same character string as the name of the feature, with \$ added at the beginning and at the end.
[18]Instead of a categorial label, Stabler uses arrows that point to that merged item which is the head of the construction.



And then, *move* will check gender and number agreement, and yield the correct word order:



Before turning to the description of the English NSM grammar, some words must be said about the “Cartographic Approach”, which gives to the Minimalist Program a clear cross-linguistic, typological perspective, and whose findings have been abundantly used in this grammar.

3.4 The “Cartographic Approach”

Cinque & Rizzi (2010, pag. 51) define the approach as

> the attempt to draw maps as precise and detailed as possible of syntactic configurations.

Some basic assumptions of the cartographic approach:

- There is a great number of “functional items” which mediate the relation between lexical items (especially nouns and verbs) and various specifiers (adverbs, tense-aspect-mode affixes and/or particles). These items have their entry in the lexicon as the properly “lexical” items;
- In many languages, some of these items are “voiced” (mostly by an affix or some type of inflection), but most of them are “silent”. However, their presence can be detected by word order properties of their specifiers (like adverbs, attributive adjectives, circumstances);
- These functional heads are universal (according to the strong version of this hypothesis, which is the one endorsed in Cinque (1999) and subsequent work: this means that each language has the full stock of functional heads at its disposition. From a language learning perspective, this means that the child does not learn them – they are there already);[19],

[19]Cfr. also Sigursson (2004) for a discussion of this point.

- These functional heads are organized in a "functional space" above the lexical head, and come in a fixed and universal order.

With the cartographic approach, Minimalism takes a typological perspective: as explicitly acknowledged by Cinque & Rizzi (2010, pag. 59),

> Crucial to the cartographic approach is the evidence coming from comparative and, more broadly, typological studies. These alone may help singling out the variety (and the limits) of the functional lexicon of UG.

The cartographic approach is "minimalist," in the sense that "Each head expresses a single property, we do not have complex heads simultaneously assigning to their dependents the complex of properties 'patient of the verb *and* topic of the clause': natural languages opt for local simplicity [...] " (Cinque & Rizzi, 2010, 62).

In this grammar, I have tried to implement the order of functional heads discovered by the cartographic approach, at various levels:

- in the complements and circumstances of verbs (cf. Damonte, 2004);
- in the noun phrase (cf. among others Scott, 2002; Cinque, 2009);
- in the functional space of the verb (Cinque, 1999);
- in the "left periphery" (Rizzi, 1997, and subsequent work).

4 The English NSM Grammar

4.1 The entries of the lexicon

The minimalist grammar of English NSM consists of a lexicon, which encodes the semantic primes and the English instantiation of their "conceptual syntax".

Each entry in the lexicon consists of:

1. An upper-case string representing the meaning of the prime (e.g. DO, HAPPEN, TIME) or the relation intended (e.g. F:ATT is the functional head translating the attributive relation). This is the **LF** representation of the item;
2. A string representing the morpho-phonetic form (**PF**);
3. A set of morphosyntactic features, of the four types surveyed above (section 3.3).

The lexicon is represented as a python dictionary, a data strcuture which pairs keys and values.

The LF is key to each entry. For example, the prime BODY is represented as:

Table 2: Types of entries in the lexicon

Lexical:	$Cat_{Base}\ \ -f_i*$
Functional:	$=Cat_{Spec}\ \ +f_i*\ \ =Cat_{Compl}\ \ +f_j*\ \ Cat_{Base}\ \ -f_k*$
Functional (pre-merged Spec):	$=Cat_{Compl}\ \ +f_j*\ \ Cat_{Base}\ \ -f_k*$

```
'BODY'   :  ['body-$num$', 'n:1', '-num:$num$']
```

If two different entries happen to have the same LF, they are represented as follows:

```
'OTHER_1' : ['other', 'a:18', '-pred:NOT+pred'],
'OTHER_2' : ['else', 'a:18', '-pred:pred'],
```

There are two types of entries, *lexical* and *functional*:

- A **lexical entry** (as the one for BODY above) encodes a semantic prime. These entries have only base and, optionally, licensee features;
- A **functional entry** encodes a conceptual relation between primes. Functional entries have not only base and (optional) licensee features, but also selectors and (optional) licensors. We can distinguish two types of functional entries:
  - *Full functional entries* have two selectors (one for a specifier and one for a complement), and can license movement. I will conventionally represent the LF of these heads with a prefix **F:**.
  - *"Spec-Head" structures* are simply functional heads already merged in the lexicon with a specifier. These heads have only a selector, the one for the complement. Their LF starts with the prefix **f:**.

In Stabler's model, each item first selects the complement, and then its specifiers (there can be more than one of them).

Given the one-to-one correspondence between a functional head and its specifiers, recognized by the cartographic approach, I have found it advantageous to let *functional heads merge first with their (unique) specifier.* The Spec-Head structure is then merged with the complement. This is a departure from the traditional view followed by Stabler.

Table 2 summarizes the different types of lexical entries.

LF representations are compounded by *merge* operations: when a fiunctional head `F` merges with a complement `X` and a specifier `Y`, the LF `F(Y,X)` is formed.[20]

[20] As the program uses reverse-Polish notation, the structure `F(Y,X)` is actually represented as `X Y F`.

4.2 The Clause

"The basic unit of NSM syntax is analogous to the clause, namely, a combination of a "substantive phrase" with any one of a range of "predicates" and some additional elements determined by the nature of the predicate" (Goddard & Wierzbicka, 2002c, pag. 42).[21]

The "additional elements" are determined by the valency of the predicate. Thus, for example, the prime DO requires a substantive complement (DO SOMETHING, DO GOOD THINGS) and can also select a patient (DO SOMETHING TO SOMEONE/SOMETHING) a comitative (DO SOMETHING WITH SOMEONE) and an instrument (DO SOMETHING WITH SOMETHING).

Clause can also contain elements like temporal adjuncts (Goddard & Wierzbicka, 2002c, pag. 64), locational adjuncts (ibidem, p. 67) the "causal adjunct" BECAUSE OF THIS (ibidem, p. 77). Existential sentences constitute a separate type.

We will now look at substantive phrases.

4.3 The Substantive Phrase

A substantive phrase consists minimally of a *substantive* prime, with optional attributive modifiers, quantifiers and determiners.

From a structural point of view, I will distinguish "noun-like" substantive primes and their allolexes from "pronoun-like" ones.[22] We shall begin from "noun-like" primes, as they can project a full noun phrase, while their "pronoun-like" equivalent, SOMETHING and SOMEONE, cannot occur with quantifiers and have special word-order properties.

4.3.1 Nouns

Table 3 lists the "noun-like" primes from the English grammar file.

"Noun-like" primes have a common pattern:

- F-features consist of the base `n:1`, the "bottom" of the extended projection of the noun phrase, and the licensee feature `-num` which triggers number agreement.
- PF-features are an abstract representation which, for most substantive, includes the variable `$num$`, shared with the `-num` feature. This variable can assume two values: ONE and SOME.

[21] We must observe from the outset that the authors speak of "substantive phrases" and "predicate phrases," not of NPs and VPs. That is because the grammar of the primes that they describe, exemplifying with English material, is a universal "conceptual" grammar of the combinatorial possibilities of the primes. This allows for languages in which there are no constituents as NP or VP, and that nonetheless can express, for example, the meanings SOMETHING GOOD or DO SOMETHING.

The following discussion, being centered on English, will also employ the structural terms "noun phrase" and "verb phrase".

[22] As we have seen, NSM considers the basic allolexes to be "something" and "someone" rather than "thing" and, especially, "person".

Table 3: Substantives (I)

```
'PEOPLE' :  ['people', 'n:1', '-num:SOME'],
'THING'  :  ['thing-$num$', 'n:1', '-num:$num$'],
'PERSON' :  ['person-$num$', 'n:1', '-num:$num$'],
'BODY'   :  ['body-$num$', 'n:1', '-num:$num$'],
'PLACE'  :  ['place-$num$', 'n:1', '-num:$num$'],
'TIME'   :  ['time', 'n:1', '-num:ONE'],
'KIND'   :  ['kind-$num$', 'n:1', '-num:$num$'],
'PART'   :  ['part-$num$', 'n:1', '-num:$num$'],
```

In the entry for PEOPLE, the value is already instantiated to SOME, as "people" in English triggers plural agreement. In other primes, like for example THING, the value is not specified, and represented by the variable `$num$`.

This variable, once instantiated by a higher head that triggers number agreement, will pass its value (ONE or SOME) to the PF (in the case of THINGS, the PF will become `thing-ONE` or `thing-SOME`; PF-readjustment rules will turn these into *thing* and *things* respectively). In the next two sections we will see how this works.

4.3.2 Evaluators, Descriptors and the "Attributive Relation"

NSM recognizes four "adjectives": two evaluators, GOOD and BAD, and two descriptors, BIG and SMALL (table 4).

Table 4: Evaluators and Descriptors

```
'P:GOOD'  :    ['good', 'a:16', '-pred:pred'],
'P:BAD'   :    ['bad', 'a:16', '-pred:pred'],
'P:BIG'   :    ['big', 'a:14', '-pred:pred'],
'P:SMALL' :    ['small', 'a:14', '-pred:pred'],
```

The four adjectival primes in English can be both attribute and predicate. Their representation is very simple: they only have the categorial feature `a:level`. The "level" number is an index into Scott's hierarchy (thus, starting from the bottom up, *compound element* = 1, *material* = 2, and so on), and it will be explained in a moment.

While substantives are probably an open class in every language, "in many languages, adjectives constitute a closed, often quite small, class of elements" (Cinque & Rizzi, 2010, pag. 58).

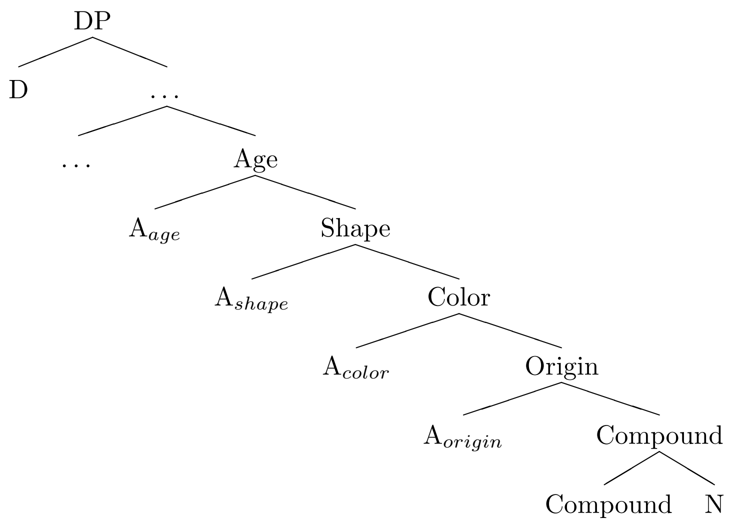
After Cinque (1999) showed that adverbs are specifiers of functional heads which belong to the extended verbal projection, adjectives too were shown to be stacked and merged above the head noun in a fixed order.[23]

[23]The variations in word order that we observe in typological studies have be shown to

Scott (2002, pag. 114, his (47)) summarizes the *merge* order in the noun phrase as follows (I have added an asterisk to the projections for which there is a semantic prime in NSM):

> *DETERMINER > ORDINAL NUMBER > *CARDINAL NUMBER > *SUBJECTIVE COMMENT > ?EVIDENTIAL > *SIZE > LENGTH > HEIGHT > SPEED > ?DEPTH > WIDTH > WEIGHT > TEMPERATURE > ?WETNESS > AGE > SHAPE > COLOR > NATIONALITY/ORIGIN > MATERIAL > COMPOUND ELEMENT > NP

In cartographic studies, each category is supposed to project a functional head of its own. So, the structure of the noun phrase would be something like:[24]



In order to get a structure like this with Stabler's implementation, we would need a series of functional heads as the following:

=N =N Compound

=Compound =A_{origin} Origin

=Origin =A_{color} Color

...

As discussed in Chesi (2004), this would cause trouble:

- all functional projections would always have to be present in every noun phrase, so that the simple phrase *this person* would contain some twenty empty functional heads between the determiner and the head noun;

---

depend on a simple interaction between the universal order of *merge* and two kinds of *move*. This interesting issue cannot be pursued further here, cf. Cinque (1999) and Cinque (2009) for adverbs and adjectives respectively.

[24] In the following tree I use Brody's "telescoped" notation, with funtional heads Age, Shape etc. serving as heads and maximal projections at the same time. Cf. Brody (2000).

- each category of adjective should have an empty item, in order to account for their optionality. This proliferation of empty *lexical* heads would not be positive, both conceptually and computationally.

To overcome these ptoblems, I have used a unique "AttP," which translates structurally Goddard and Wierzbicka's "attributive relation" (Goddard & Wierzbicka, 2002c, pag. 44), and takes on the "level number" from the adjective:

```
'F:ATT'  :  ['', '=a:X', '=n:X', '+num:$num$', '+pred', 'n:X+1', '-num:$num$'],
```

The head F:ATT selects an adjective as specifier (=a:X) and a noun projection as complement (=n:X). After selecting the specifier, the variable X assumes the level-number of it, so, for example, merging with GOOD (`a:16`) $x \leftarrow 16$; `=n:X` becomes `=n:16` too. The complement can thus be any noun projection with level number lower or equal than 16. This double *merge* yields a noun projection of a higher level number (n:X+1), thus capturing the fact that each single attributive phrase (EvidentialP, SizeP, etc.) is not recursive, but can merge only once: in our example, the base of the merged structure is `n:17`, and no more EvalP will be able to merge with the structure, nor any modifier of lower level.

Let us follow in detail the derivation of the NP fragment "good thing".

1. We start from the three lexical items:

```
'THING'  :  ['thing-$num$', 'n:1', '-num:$num$'],
'GOOD' : ['good', 'a:16']
'F:ATT'  :  ['', '=a:X', '=n:X', '+num:$num$', '+pred', 'n:X+1', '-num:$num$']
```

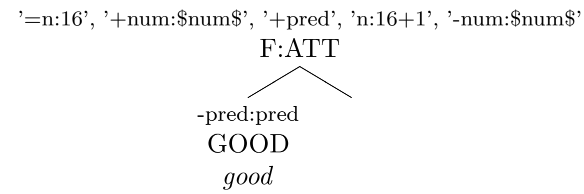
2. The functional head F:ATT PF-features, represented as the (empty) string `''`.[25]

   After PF, a string of morphosyntactic features follow. In such a string, the *first* feature (=a:X in the F:ATT head) is the one which is *active*. After it has triggered the relevant operation, it gets deleted from the string, and the one who was second in the string (in this case, =n:X) becomes the first and active one. In this way, features get checked and deleted one by one.

   In our example, The functional head merges first with the specifier GOOD: the feature =a:X merges with the base feature a:16 of the entry GOOD.

   As we have seen, an important side effect happens before =a:X and a:16 are erased: the variable X gets the value 16 *in all its instances*. Thus we get the Spec-Head structure:

[25] In this case, PF features are empty, that is, the item has no overt representation. This fact is irrelenvant for the following discussion.



whose base is n:16+1, that is, n:17. Lower level adjectives now won't be able to merge any more, thus implementing the hierarchy of functional heads in the NP recognized by the cartographic approach, as we have seen.

As computational minimalism uses a great deal of movement and of covert functional heads, tree notation tends to become unwieldy even for very small segments. A more compact alternative, used in computational minimalist works such as Harkema (2001), is *chain notation.*

The previous tree can be represented as follow:

```
 -- lf:  P:GOOD F:ATT
#1  -- pf:  ''
    -- f:  [':', '=n:16', '+num:$num.2$', '+pred', 'n:17', '-num:$num.2$']
----------
#2  -- pf:  'good'
    -- f:  [':', '-pred:pred']
```

- LF representation is affected only by *merge*, so successive movements will not change it. Therefore, it can be represented on the top of the tree as a string;[26]

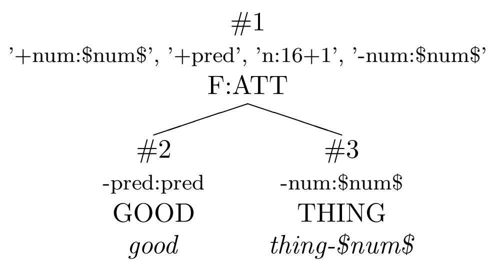
- PF and F representations are split in two subtrees, #1 and #2, because the `-pred` licensee of the adjective will cause it to move further, so its PF cannot be concatenated to the PF of the functional head.[27]

After these observation, let us turn again to the derivation:

3. The Spec+Head compound formed above has `=n:16` as its active feature, so it can *merge* with the complement. Merge is possible, because the "level number" of the selector is greater than that of the base (16 vs 1). The base of the merged item and the selector of the merger are deleted. Thus we have:

[26]The string represents a predicate-argument structure in reverse-Polish notation, equivalent to `F:ATT(P:GOOD,_)`.

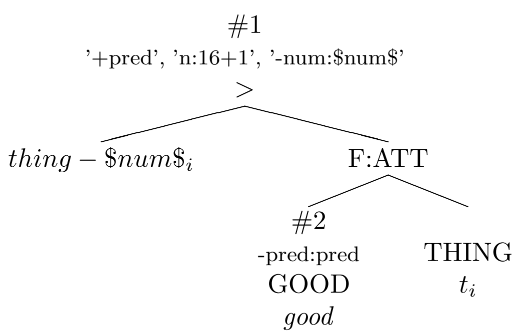
[27]In this particular case, one of the PFs being empty, nothing bad would happen.



In chain notation, all subtrees must be kept apart, because both the noun and the adjective have licensees, so further movement will take place:

```
 -- lf:  THING P:GOOD F:ATT
#1  -- pf:  ''
    -- f:  [':', '+num:$num.2$', '+pred', 'n:17', '-num:$num.2$']
----------
#2  -- pf:  'thing-$num.1$'
    -- f:  [':', '-num:$num.1$']
----------
#3  -- pf:  'good'
    -- f:  [':', '-pred:pred']
```

4. Now the active feature is a licensor, `'+num:$num$'`, in tree #1. As the complement THING has a matching licensee (`-num:$num$` in tree #2) as its active feature, *move* can happen:

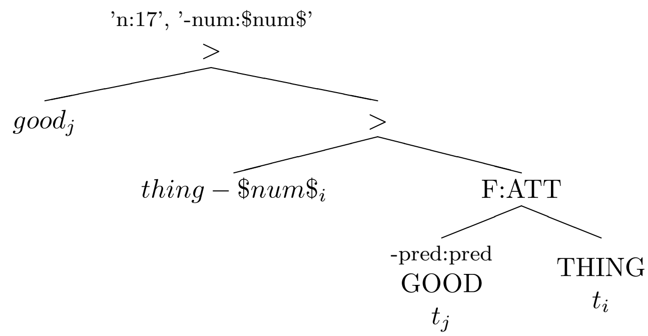



```
 -- lf:  THING P:GOOD F:ATT
#1  -- pf:  'thing-$num.1$ '
    -- f:  [':', '+pred', 'n:17', '-num:$num.1$']
----------
#2  -- pf:  'good'
    -- f:  [':', '-pred:pred']
```

5. The last step is another *move*, triggered by the '+pred' feature:

Table 5: Attributive relations – Examples

good people	f:SOME+UNSP(F:ATT(P:GOOD, PEOPLE))
good things	f:SOME+UNSP(F:ATT(P:GOOD, THING))
bad people	f:SOME+UNSP(F:ATT(P:BAD, PEOPLE))
bad things	f:SOME+UNSP(F:ATT(P:BAD, THING))
big things	f:SOME+UNSP(F:ATT(P:BIG, THING))
small things	f:SOME+UNSP(F:ATT(P:SMALL, THING))
very good people	f:SOME+UNSP(F:ATT(f:VERY(P:GOOD), PEOPLE))



Both *good* and *thing-num* have no more features, so they will not move any further. Their PFs can be concatenated (the moved item is displaced on the left), and the subtrees can be conflated into one in chain notation:

```
 -- lf:  THING P:GOOD F:ATT
#1  -- pf:  'good thing-$num.1$ '
    -- f:  [':', 'n:17', '-num:$num.1$']
```

The LF `THING GOOD F:ATT`, in reverse-Polish notation, corresponds to `F:ATT(GOOD,THING)`.
Table 5 shows some examples of parsing-generation of adjective+substantive.

4.3.3 Determiners and Quantifiers

Quantifiers and determiners enter the substantive bearing a "determiner relation" with the substantive (Goddard & Wierzbicka, 2002c, pag. 44).

NSM recognizes the determiners THIS, THE SAME and OTHER, and the quantifiers ONE, TWO, SOME, MANY, ALL and the "new entry" LITTLE/FEW.

As the authors observe, not all combinations of determiner + quantifier are allowed.

Leaving ALL aside for the moment, table 6 summarizes the combinatorial possibilities.

To account for the distributional facts, I distribute the elements between the lexical classes `q`, `det` and `a` as follows:

Table 6: Cooccurrence of Determiners and Quantifiers

	ONE	TWO	LITTLE/FEW	SOME	MANY
THIS	-	+	?-	-	?-
THE SAME	-	+	?-	-	?-
THE OTHER	-	+	?-	-	?-
(AN)OTHER	+	+	+	+	+

- The determiners THIS and THE SAME belong to the `det` class;
- ONE and SOME (and probably MANY) cannot co-occur with THIS and THE SAME, so I will put them in the same class as the determiners (namely `det`);
- TWO (and probably FEW) belong to `q`;
- As for the prome OTHER, we must distinguish the allolex THE OTHER, which behaves syntactically like THIS and THE SAME, and (AN)OTHER, which occupies a lower projection (cf. *the other thing* but *two other things*).[28]

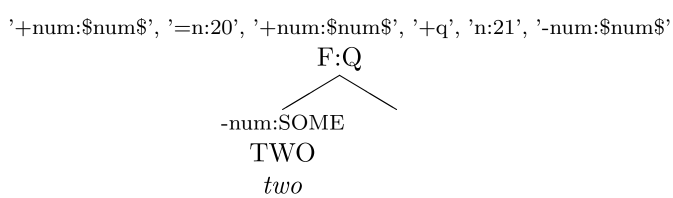
Table 7 shows how determiners and quantifiers are represented in the grammar file.

Determiners and quantifiers are merged with the noun head (plus its adjectives, if any) by two functional heads, F:DET and F:Q, which translate structurally the "determiner" and "quantifier relations."

```
'F:Q' : ['', '=q', '+num:$num$', '=n:20', '+num:$num$','+q',
        'n:21', '-num:$num$']
```

Let us see how the F:Q head works, by adding the quantifier TWO to the fragment GOOD THING that we had derived before.

1. First, F:Q selects its specifier TWO:



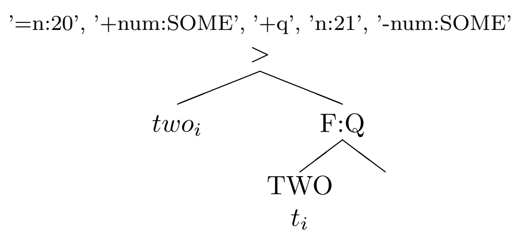
[28]The form "THE OTHER" can only be used in NSM when "we are referring to TWO things, and we have already referred to 'one of these two things' " (C. Goddard, p.c., October 2011). In different contexts, NSM uses the combination of primes THIS OTHER or THESE OTHER.

Table 7: Quantifiers and Determiners (I)

```
'ONE' :    ['one', 'det','-num:ONE', '-det:UNSP'],

'TWO' :    ['two', 'q', '-num:SOME', '-q'],
'FEW' :    ['few', 'q', '-num:SOME', '-q'],

'SOME' : ['some', 'det',  '-num:SOME', '-det:UNSP'],
'MANY' :   ['many', 'det', '-num:SOME', '-det:UNSP'],


'THIS' : ['this-$num$', 'det','-num:$num$', '-det:THIS'],
'THE_SAME' : ['the_same', 'det', '-num:$num$', '-det:THE_SAME'],
'THE_OTHER' : ['the_other', 'det','-num:$num$', '-det:THE_OTHER'],

'ONE+UNSP' : ['a', 'det', '-num:ONE', '-det:UNSP'],

'f:ALL' : ['all',
           '=d:3', '+det:$det$','+p:$p$', '+num:$num$', '+k:$k$','>',
           'd:4', '-det:$det$', '-p:$p$', '-num:$num$', '-k:$k$'],

'OTHER_1' : ['other', 'a:18', '-pred:NOT+pred'],
'OTHER_2' : ['else', 'a:18', '-pred:pred'],
```

```
#1  -- pf:  ''
    -- f:  [':', '+num:$num.3$', '=n:20', '+num:$num.3$', '+q',
             'n:21', '-num:$num.3$']
----------
#2  -- pf:  'two'
    -- f:  [':', '-num:SOME', '-q']

---------------------------
```

2. Now the active feature is +num, which triggers movement and, more importantly, agreement, instantiating the other instances of the variable \$num\$ to the value SOME:

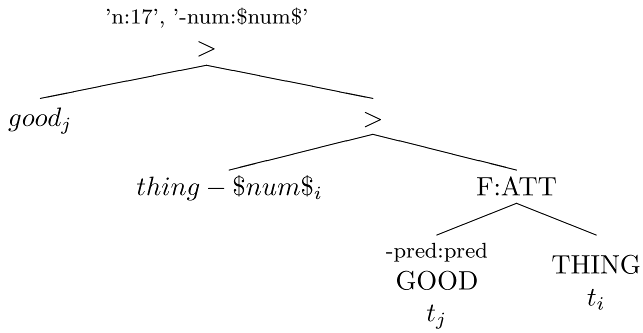



```
 -- lf:  TWO F:Q
#1  -- pf:  ''
    -- f:  [':', '=n:20', '+num:SOME', '+q', 'n:21', '-num:SOME']
----------
```

```
#2  -- pf:  'two'
    -- f:  [':', '-q']
```

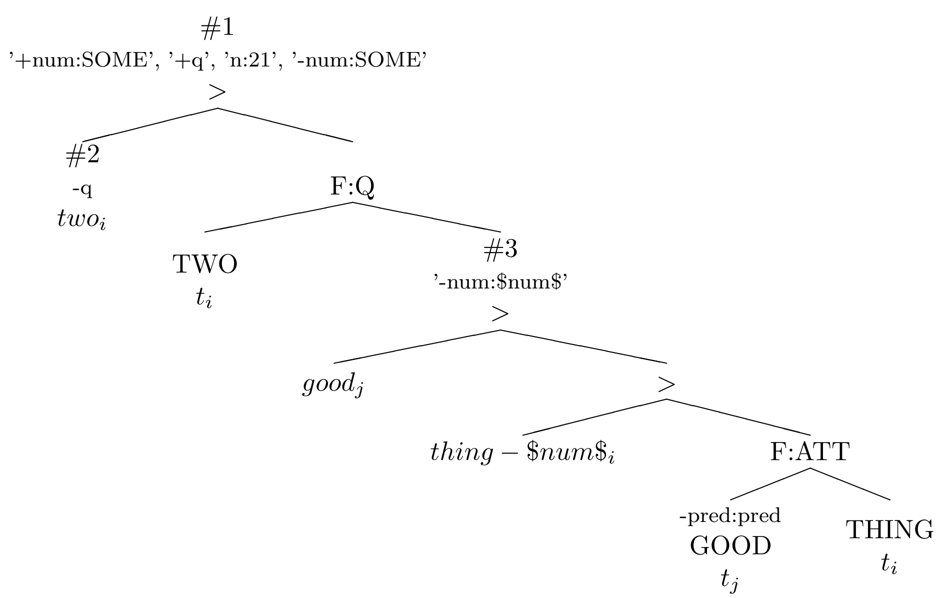
Note how, in chain notation, the vacuous move is not represented by a separate branch. Only its agreement effects are shown.

3. At this point, the active feature is '=n:20'. The previously built tree, which is repeated below, has base n:17:



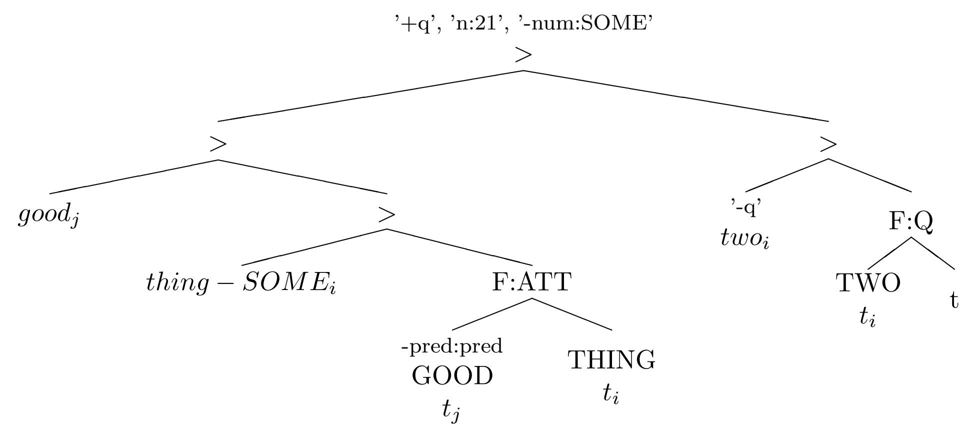

```
 -- lf:  THING P:GOOD F:ATT
#1  -- pf:  'good thing-$num.1$ '
    -- f:  [':', 'n:17', '-num:$num.1$']
```

Thus, *merge* can apply, yielding:



```
 -- lf:  THING P:GOOD F:ATT TWO F:Q
#1  -- pf:  ''
    -- f:  [':', '+num:SOME', '+q', 'n:21', '-num:SOME']
----------
#2  -- pf:  'good thing-$num.1$ '
    -- f:  [':', '-num:$num.1$']
----------
#3  -- pf:  'two'
    -- f:  [':', '-q']
```

4. The active feature is now the "num" selector. The value SOME gets assigned to the variable num, and so the PF *thing-num* becomes *thing-SOME*:

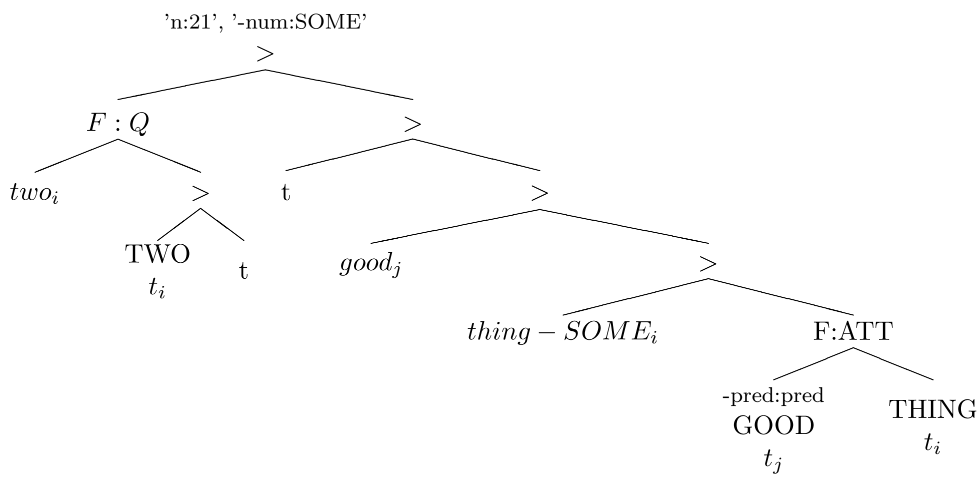



```
 -- lf:  THING P:GOOD F:ATT TWO F:Q
#1  -- pf:  'good thing-SOME  '
    -- f:  [':', '+q', 'n:21', '-num:SOME']
----------
#2  -- pf:  'two'
    -- f:  [':', '-q']
```

5. The last movement is triggered by the feature `+q`, which attracts the numeral, and yields the final tree:

Table 8: Quantifier relations – Examples

one thing	F:DET(ONE, THING)
two things	f:SOME+UNSP(F:Q(TWO, THING))
some people	F:DET(SOME, PEOPLE)
some things	F:DET(SOME, THING)
many people	F:DET(MANY, PEOPLE)
many things	F:DET(MANY, THING)
all people	f:ALL(f:SOME+UNSP(PEOPLE))
all things	f:ALL(f:SOME+UNSP(THING))
these two people	F:DET(THIS, F:Q(TWO, PEOPLE))
these two things	F:DET(THIS, F:Q(TWO, THING))
these two places	F:DET(THIS, F:Q(TWO, PLACE))




```
 -- lf:  THING P:GOOD F:ATT TWO F:Q
#1  -- pf:  'two good thing-SOME  '
    -- f:  [':', 'n:21', '-num:SOME']
```

The final LF is F:Q(TWO,F:ATT(GOOD,THING)), and the PF is *two good thing-SOME*.

Some examples of quantifier + attribute + substantive are in table 8.

4.3.4 "Determiner-like" substantive primes

Following generative tradition, I have asigned "pronouns" like *I, you, it, something* to the determiner class.

"Substantive THIS" is represented as a separate item, THIS_THING.[29] I have also distinguished between the anaphoric and the cataphoric use of THIS

[29]For languages that cannot use THIS without a head noun, like for example Lao (Enfield, 2002) and Mangaaba-Mbula Bugenhagen (2002), an LF rule rewrites `THIS_THING` into

Table 9: Substantive primes (II)

```
'ME'    :    ['me-$k$', 'd:2', '-det:ME', '-p:1', '-num:ONE', '-k:$k$'],
'YOU'   :    ['you', 'd:2', '-det:ME', '-p:2', '-num:SOME', '-k:$k$'],

'SOMEONE' : ['someone', 'd:2', '-det:UNSP', '-p:3', '-num:ONE', '-k:$k$'],
'SOMETHING' : ['something', 'd:2', '-det:THIS', '-p:3', '-num:ONE', '-k:$k$'],

'IT' : ['it', 'd:2','-det:THIS',  '-p:3', '-num:$num$', '-k:$k$'],
'THIS_THING' : ['this-$num$', 'd:2', '-det:THIS', '-p:3', '-num:ONE', '-k:$k$'],
'CATAPHORA' : ['this:', 'd:2', '-det:THIS', '-p:3', '-det:THIS', '-num:$num$', '-k:$k$'],
```

(the latter as in, for example, SOMETIMES PEOPLE THINK LIKE THIS:, followed by the formula expressing the thought.

"Pronoun-like" substantive primes are shown in table 9.

These items have base `d` and four licensees, which embody, respectively, definiteness (`-det`), person (`-p`), number (`-num`) and case (`-k`).

The prime ME has the case variable in its PF, in order to derive the two allolexes, `ME-acc` (that is, *me*), and `ME-nom` (that is, *I*).

The same feature structure `d -det -p -num -k` is acquired by noun-like substantive primes after they combine with a determiner with a "determiner relation" (figure 2).

Figure 2: Determiner relation

```
'F:DET' : ['', '=det', '+num:$num$',
           '=n:22', '+num:$num$', '+det:$det$',
           'd:1', '-det:$det$', '-p:3', '-num:$num$', '-k:$k$'],
```

Note how the F:DET functional head has three instance of the \$num\$ variable:

- `'=det', '+num:$num$'` selects the determiner and matches its number;
- `'=n:22', '+num:$num$'` selects the noun and matches its number. The variable \$num\$ is the same, so agreement occurs;
- `+det` moves the determiner toward the left of the noun phrase;
- The third intance of \$num\$ ensures the persistence of the number feature, which will be needed, for example, if the noun phrase is subject, for agreement with the predicate

Some examples of substantive phrases with determiner are shown in table 10.

something like `F:DET(THIS,THING)`.

As Cliff Goddard points out (p.c., October 2011), "standalone" THIS can be an allolex of IT, which does not refer to (concrete) things, but rather to situations.

Table 10: Noun Phrases – examples

this person	F:DET(THIS, PERSON)
this thing	F:DET(THIS, THING)
these people	F:DET(THIS, PEOPLE)
the same person	F:DET(THE_SAME, PERSON)
the same thing	F:DET(THE_SAME, THING)
the same people	F:DET(THE_SAME, PEOPLE)
someone else	F:SPEC1(OTHER, SOMEONE)
something else	F:SPEC1(OTHER, SOMETHING)
other people	f:SOME+UNSP(F:ATT(OTHER, PEOPLE))
this time	F:DET(THIS, TIME)
the same time	F:DET(THE_SAME, TIME)
another time	F:DET(ONE+UNSP, F:ATT(OTHER, TIME))
this place	F:DET(THIS, PLACE)
the same place	F:DET(THE_SAME, PLACE)
another place	F:DET(ONE+UNSP, F:ATT(OTHER, PLACE))
a big place	F:DET(ONE+UNSP, F:ATT(P:BIG, PLACE))
a small place	F:DET(ONE+UNSP, F:ATT(P:SMALL, PLACE))

4.3.5 Selective relation, Classification and Partonomy

Quantifiers can be used in the "selective construction" (Goddard & Wierzbicka, 2002c, pag.48). In English this construction uses the preposition *of* (*many of these people*, *two of these places*).

A similar construction is used in the "KIND OF" and "PART OF" relation. In the latter, I simply give two entries for the primes PART and KIND: one of them selects a complement (the *of*-phrase), the other is used absolutely. Figure 3 shows the SEL, KIND-OF and PART-OF functional heads; examples of selection and partonomy are in table 11.

For the "kind of" relation, NSM prefers the construction Noun + OF THIS/THE SAME/ONE KIND, OF MANY KINDS, with "kind" as modifier. The latter uses the CLASS functional head.

Examples are in table 11.

5 Conclusion and Prospects

The minimalist analysis of English NSM set forth in this paper can lead to an "integrated" view of Universal Grammar. If both approaches (NSM and minimalism) are on the right track, then UG could consist of:

- A set of lexical items, the *semantic primes*, of which sixty-four have been isolated so far;
- A set of *functional categories*, which belong to the extended projections of lexical heads, and express the fundamental semantico-syntactical relations

Figure 3: Selective relation

```
'F:SEL_1' : ['',
           '=q','+num:$num$', '+q',
           '=gen',
           'd:3', '-det:SEL', '-p:$p$', '-num:$num$', '-k:$k$'],
'F:SEL_2' : ['',
           '=det','+num:$num$', '+det:UNSP',
           '=gen',
           'd:3', '-det:SEL', '-p:$p$', '-num:$num$', '-k:$k$'],
'f:PART-OF' :  ['part-$num$', '=gen', '>', 'n:1', '-num:$num$'],
'f:KIND-OF' :  ['kind-$num$', '=gen', '>', 'n:1', '-num:$num$'],
'F:CLASS' : ['',
            '=d:3', '+det:$det$', '+p:$p$', '+num:$num$', '+k:$k$',
            '=gen',
            'd:4','-det:$det$', '-p:$p$', '-num:$num$', '-k:$k$'
            ],
```

(attributive, predicative, and so on) into which the lexical items (both primes and non) can enter;

- The structure-building operations *merge* and move (or, better, *agree*), which recursively build the syntactic and semantic structures from the basic "bricks". In the grammar here described, only functional heads trigger structure-building operations;
- A set of syntactic *features*, which drive selection (*merge*) and agreement (*move*) and, in NSM term, determine the various allolexical forms of the primes.

In this work, I have begun to analyze features into semantic primes. For example, for number features, I have used the values ONE and SOME, instead of the more abstract values SING and PLUR. It would be very interesting to analyze the structural features proposed in the minimalist literature in terms of semantic primes (and, perhaps, also in terms of semantic molecules).

Number	Primes
singular	ONE
dual	TWO
trial	ONE + TWO
paucal	LITTLE/FEW
plural	SOME, MANY

Another recurrent feature in minimalist analysis is "person"; the following table shows a tentative analysis of some possible values of this feature in terms of semantic primes[30]

[30] Cf. also Wierzbicka (1996). "12" represents the "fourth" person of Aymara, dual inclusive form, that is, basically, I and YOU (Hardman, 2001).

Table 11: Selection, Classification and Partonomy – examples

one of these people	PEOPLE THIS F:DET f:GEN ONE F:SEL
two of these people	PEOPLE THIS F:DET f:GEN TWO F:SEL
one of these things	THING THIS F:DET f:GEN ONE F:SEL
two of these things	THING THIS F:DET f:GEN TWO F:SEL
many of these things	THING THIS F:DET f:GEN MANY F:SEL
this part	PART THIS F:DET
the same part	PART THE_SAME F:DET
another part	PART OTHER F:ATT ONE+UNSP F:DET
a part of something	SOMETHING f:GEN PART ONE+UNSP F:DET F:CLASS
many parts of this thing	THING THIS F:DET f:GEN PART-OF MANY F:DET
this kind	KIND THIS F:DET
the same kind	KIND THE_SAME F:DET
another kind	KIND OTHER F:ATT ONE+UNSP F:DET
something of one kind	KIND ONE F:DET f:GEN SOMETHING F:CLASS
people of two kinds	KIND TWO F:Q f:SOME+UNSP f:GEN PEOPLE f:SOME+UNSP F:CLASS
places of many kinds	KIND MANY F:DET f:GEN PLACE f:SOME+UNSP F:CLASS
something of this kind	KIND THIS F:DET f:GEN SOMETHING F:CLASS

Person	Primes
1	I
2	YOU
12	I + YOU
3	SOMEONE
1 (incl)	I + YOU + OTHER PEOPLE
1 (excl)	I + OTHER PEOPLE
2	YOU + OTHER PEOPLE
3	PEOPLE

These are only examples of how the "structural" and the "semantic" approach to UG could not only co-exist, but also complement each other.

References

Baker, Mark. 2001. *The atoms of language*. Oxford: Oxford university press.

Belletti, Adriana (ed). 2004. *Structures and Beyond*. The Cartography of Syntactic Structures, vol. 3. Oxford University Press.

Brody, Michael. 2000. Mirror Theory: Syntactic Representation in Perfect Syntax. *Linguistic Inquiry*, **31**, 29–56.

Bugenhagen, Robert. 2002. *The Syntax of Semantic Primes in Mangaaba-Mbula*. *In:*Goddard & Wierzbicka (2002b). Pages 1–64.

Chesi, Cristiano. 2004. *Phases and Cartography in Linguistic Computation. Toward a cognitively motivated computational model of linguistic competence*. Ph.D. thesis, University of Siena.

Chesi, Cristiano. 2007. An Introduction to Phase-based Minimalist Grammars: why *move* is Top-Down from Left-to-Right. *STiL Studies in Linguistics*, **1**.

Chomsky, Noam. 1957. *Syntactic Structures*. The Hague: Mouton.

Chomsky, Noam. 2001. *Derivation by Phase*. Cambridge MA: MIT Press. Pages 1–52.

Chomsky, Noam. 2005a. *On Phases*.

Chomsky, Noam. 2005b. Three Factors on Language Design. *Linguistic Inquiry*, **36**(1), 1–22.

Cinque, Guglielmo. 1999. *Adverbs and functional heads: a cross-linguistic perspective*. Oxford University Press.

Cinque, Guglielmo (ed). 2002. *Functional structure in DP and IP*. The Cartography of Syntactic Structures, vol. 1. Oxford University Press.

Cinque, Guglielmo (ed). 2006. *Restructuring and functional heads*. The Cartography of Syntactic Structures, vol. 4. Oxford University Press.

Cinque, Guglielmo. 2009. *The Syntax of Adjectives. A Comparative study*. The MIT Press.

Cinque, Guglielmo. forthcoming. *Typological Studies: Word Order and Relative Clauses*. Routledge.

Cinque, Guglielmo, & Rizzi, Luigi (eds). 2009. *Mapping Spatial PPs*. The Cartography of Syntactic Structures, vol. 6. Oxford University Press.

Cinque, Guglielmo, & Rizzi, Luigi. 2010. *The Cartography of Syntactic Structures*. Pages 51–65.

Damonte, Federico. 2004. *The Thematic Field. The syntax of argument structure enhancing morphology*. Ph.D. thesis, Universitá degli Studi di Padova.

Enfield, Nick J. 2002. *Combinatoric Properties of Natural Semantic Metalanguage Expressions in Lao*. *In:*Goddard & Wierzbicka (2002b). Pages 145–256.

Goddard, Cliff (ed). 2006. *Ethnopragmatics: Understanding Discourse in Cultural Context*. Berlin: Mouton de Gruyter.

Goddard, Cliff (ed). 2008a. *Cross-Linguistic Semantics*. Studies in Language Companion Series. John Benjamins.

Goddard, Cliff. 2008b. *Natural Semantic Metalanguage: The state of the art*. *In:*Goddard (2008a). Pages 1–24.

Goddard, Cliff. 2010. Semantic molecules and semantic complexity (with special reference to "environmental" molecules). *Review of Cognitive Linguistics*, **8**(1), 123–155.

Goddard, Cliff. 2011. *Semantic Analysis. A Practical Introduction.* Oxford Textbooks in Linguistics. Oxford University Press. Second Edition.

Goddard, Cliff, & Wierzbicka, Anna. 1994. *Semantic and Lexical Universals. Theory and Empirical Findings*. John Benjamins.

Goddard, Cliff, & Wierzbicka, Anna. 2002a. *Meaning and Universal Grammar. Theory and Empirical Findings. Vol. 1*. Amsterdam: John Benjamins.

Goddard, Cliff, & Wierzbicka, Anna. 2002b. *Meaning and Universal Grammar. Theory and Empirical Findings. Vol. 2*. Amsterdam: John Benjamins.

Goddard, Cliff, & Wierzbicka, Anna. 2002c. *Semantic Primes and Universal Grammar*. Vol. 1 of Goddard & Wierzbicka (2002a). Pages 41–85.

Hale, Ken. 1994. *Preliminary Observations on Lexical and Semantic Primitives in the Misumalpan Languages of Nicaragua*. *In:*Goddard & Wierzbicka (1994). Pages 263–284.

Hale, Kenneth, & Keyser, Samuel Jay (eds). 1993. *The view from building 20. Essays in honor of Sylvain Bromberger*. Cambridge, Mass.: the MIT Press.

Halle, Morris, & Marantz, Alec. 1993. *Distributed Morphology and the Pieces of Inflection*. *In:*Hale & Keyser (1993). Pages 111–176.

Hardman, M. J. 2001. *Aymara*. LINCOM Studies in Native American Linguistics, 35. LINCOM EUROPA.

Harkema, Hendrik. 2001. *Parsing Minimalist Languages*. Ph.D. thesis, University of Califrnia, Los Angeles.

Hornstein, Norbert, Nunes, Jairo, & Grohmann, Kleanthes K. 2005. *Understanding Minimalism*. Cambridge Textbooks in Linguistics. Cambridge University Press.

Hudson, Richard A. 2007. *Language networks : the new word grammar*. Oxford: Oxford University Press.

Retoré, C. (ed). 1997. *Logical Aspects of Computational Linguistics*. Springer.

Rizzi, Luigi. 1997. *The Fine Structure of the Left Periphery*.

Sapir, Edward. 1921. *Language. An Introduction to the study of speech*. New York: Harcourt, Brace and company.

Scott, Gary-John. 2002. *Stacked Adjectival Modification and the Structure of Nominal Phrases*. Vol. 1 of Cinque (2002). Pages 91–120.

Sigursson, Halldr. 2004. *Meaningful Silence, Meaningless Sounds*.

Stabler, Edward. 1997. *Derivational Minimalism*. *In:*Retoré (1997). Pages 68–95.

Stabler, Edward. 2011a. *Computational Minimalism. Acquiring & Parsing Languages With Movement*. John Wiley & Sons Inc.

Stabler, Edward. 2011b. *Computational perspectives on minimalism*. Pages 616–641.

Wierzbicka, Anna. 1972. *Semantic Primitives*. Frankfurt: Athenaeum.

Wierzbicka, Anna. 1988. *The Semantics of Grammar*. Amsterdam: John Benjamins.

Wierzbicka, Anna. 1996. *Semantics: Primes and universals*. Oxford: Oxford University Press.

Wojdak, Rachel. 2005. *The Linearization of Affixes: Evidence from Nuu-chah-nulth*. Ph.D. thesis, The University of British Columbia.

Zamblera, Francesco. Forthcoming. Generating with Minimalist Languages.