The Dynamic Lexicon from a functional perspective

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Abstract

The Lexicon plays an important role in Functional Grammar, but the current model makes unsufficiently clear what linguistic agents *do* with words. In this paper, we propose an alternative model in which linguistic actions and linguistic instruments are more clearly distinguished. As a result, the Lexicon and the formative expression rules are put together in one dynamic module. We describe both the actions that linguistic agents can perform on words and actions that agents perform with words. We argue that in this way it is possible to strenghten the functional perspective of FG and increase its descriptive adequacy without loss of formal specification power.

1   Introduction

The current FG model as depicted in (Dik, 1989) is a quasi-productive model and not intended to reflect the various steps that a speaker actually takes in producing linguistic expressions. In some sense, it is a generative grammar by means of which a language, viewed as the total (infinite) set of grammatical sentences, can be characterized. At the same time, it defines for each clause the underlying clause structure (UCS), specifying the functions of the components (for example, what is the subject or the agent) and the position of the component in the layer structure.

In this paper, we want to introduce a more functional model in which linguistic actions and linguistic instruments are more clearly distinguished. Our focus is on the Lexicon. In section 2, we will start with a critical discussion of the Lexicon in current FG. In section 3, we will sketch our alternative model. Some of the consequences of this new model for the Lexicon are worked out in section 4 and 5.

2   Lexis in FG

Lexis, taken here in the loose sense of "everything you want to know about words", comes in at the top as well as at the bottom of the model. The model starts with a Lexicon with basic predicates and basic terms. When we add the derived terms and predicates (derived by means of predicate formation rules), we get the lexical Fund. At this point, we do not have concrete words yet, only abstract lexical items. These items are the building blocks for the formation of the underlying clause. Then, at the bottom of the model, the underlying clause has to be expressed, and this includes expressing the lexical items. The rules that mediate between clause and expression are called the expression rules.

2.1   Some points of crititicism

We want to make a small number of critical remarks:

1. "All lexical items of a language are analyzed as predicates" (Dik, 1989, p54). For one thing, this means that grammatical items, such as articles and particles, which cannot be analyzed as predicates, are not considered to be lexical items; or at least, they are not contained in the Lexicon. One would search in vain in the FG lexicon for the conjunct "yet", or for the verb "to be", since they are supposed to be introduced by the expression rules (However, Dik is not

consistent on this matter and at some point "be" is called a predicate as well). In our view, descriptive adequacy demands that the Lexicon should first account for the complete supply of words in a language. Only after that, it makes sense to work out the function of words (or some words), such as predication. The lexicon not only contain predicates, but also words used to express those relational concepts marked by means of function words.

2. Dik's standpoint also means that purely refering lexemes, for example personal names, are analyzed as predicates. More generally, all nouns are analyzed as predicates, although their predicative function seems to be secundary (Mackenzie, 1986). In our opinion, FG is unnecessarily reductionist in this respect. It makes more sense to say that some lexical items do invoke concepts, and some lexical items refer to entities, and others do neither. In the group of lexical items that do invoke concepts (concept nouns, concept actions), some are used primarily to predicate and some are used primarily to refer (as head of a term).

3. Although the Lexicon in FG is considered to be part of the grammar (and not some uninteresting add-on, as in traditional generative grammars) at some points, the classic view on the Lexicon as a stock of irregular forms pops up again. Concequently, in the discussion about non-productive forms, Dik posits without further discussion that these, and only these, are stored in the Lexicon. However, if the expression component mediates between clause structure and expression, one would expect it to take care of both regular and irregular forms.

4. Although Lexicon and Expression rules are kept as far away from each other as possible, it cannot be ignored that they conspire at several points. We give three examples.

   - The expression rules draw on the Lexicon, since the scope of a certain rule is typically a certain lexical class: the class of verbs, or the class of nouns of a certain declination. It makes perfect sense to organize the expression rules along the structure of the Lexicon.

   - The Lexicon draws on the expression rules during predicate formation. For example, to derive a deverbal adjective such as "inhabited" or "uninhabited", the predicate formation rule in question must apply the Past Participle operator to the verbal predicate "inhabit".

   - Sometimes the same lexical item occurs both in the Expression rules and in the Lexicon. An example is "to have", which as an auxiliary does not reside in the Lexicon but is generated in the expression component; as a verb of possession, it is in the Lexicon. These two lemmata are now totally separated, in spite of the formal commonalities and the historical continuity.

2.2 Content versus Expression

One might regard the above remarks as minor quibbles, but for us these shortcomings are symptomatic of a more fundamental problem in the FG model. This problem has to do with what Peter Harder calls the "confusion between content and expression" (Harder, 1996). As far as the lexicon is concerned, the problem manifests itself as follows.

On the one hand, it means that FG has no general way of representing the actual words of a language. "Words" do not even have a theoretical basis, as they are only the output of the expression component. Hence, functional linguists have to resort to informal "glosses" when they want to describe the actual expressions in a certain language. FG can only describe the underlying clause structure (UCS), but, as we noted above, many words do not even appear in this structure. We do not want to suggest that FG linguists do not consider the form, but they lack a good instrument to represent it.

On the other hand, FG is also not wholly semantic. Although the Lexicon is firmly rooted in the (abstract) UCS, the predicates are not considered to be language-independent concepts, as one would expect, but are explicitly linked to a particular language. In other words, not only do "words" not have a theoretical status in FG, but also "concepts" are not available, only their representation in a specific language. Although it has methodological advantages to see concepts and their representations in close relation (it makes no sense to talk about concepts without representation), this does not mean that we should blur the theoretical distinction.

3 An Alternative FG Model

In the previous section, we indicated a number of smaller and bigger problems concerning the way in which the lexicon is treated in FG. In this section, we want to sketch an alternative FG model that is still in the spirit of Functional Grammar, but solves the problems that we have mentioned.

3.1 A Central Lexicon

In the first place, we want to allocate in the model one central location for knowledge about words. Here, the grammar describes what all the available words are in a given language. Since this set is typically infinite, and there are rules according to which the language user can make new words, the specification is principally generative. So somehow this module covers both the basic Lexicon, the predicate formation rules, and the formative expression rules (e.g. inflection). We call this module the Lexicon.

Note that we start "bottom-up"; every word available to the language user is included as part of the Lexicon. That these words can be further classified in predicates, function words, or whatever, is secundary. In the linguistic tradition, a word is viewed as a unit of form (signe) and meaning (signifiant). In our view, the word is also a binary unit, but since words may have different functions,

it is not always a unit form/meaning. For the content words of the language (the vast majority), there is of course a "meaning" relationship, which we would like to phrase as "sign X invokes concept Y", or, "sign X can be used (by a Speaker of language L) to invoke concept Y". For words that do not invoke concepts, such as personal names, there is another functional unit. In this case, one can say that "sign X (the personal name) can be used (by a Speaker of language L) to refer to a person (or man or woman)". There are also words that neither invoke concepts nor refer, but, for example, serve to express a feeling ("Au!"); it is clear that the list of possible functions is open-ended.

3.2   Actions and Instruments

In the functionalist view on grammar, language is viewed as an instrument of social interaction (Dik, 1989). Unfortunately, this view is currently insufficiently reflected in the FG model. In our view, a functional grammar must center around the actions that the language user can perform and the basic instruments offered for this by the language, which boils down to the supply of words. The distinction between action and instrument is essential for the "instrument metaphor"; just as there is a difference between hammering and a hammer, and between writing and a pencil. In a similar vein, a linguistic distinction must be made between some linguistic action, e.g. "referring ", and the related executive instrument(s) offered by a particular language. Functional semantics should then be described in terms of the actions performed, and this should be linked up with what instruments are available to fulfill the job.

We distinguish two categories of action: actions *on* words and actions *with* words. The latter category is the most obvious: language is an instrument, so words, as part of a language, are instruments as well. Actions with words have to do with what speakers "do with words", in terms of Austin. However, sometimes the instruments are not ready-made, and the words have to be composed first. These actions we call actions *on* words. It follows that the Lexicon module that we defined above should describe both the set of basic words of the language and the actions that the language user can perform to create new words. The lexical rules are the rules according to which the language user should operate.

3.3   Rules or Conventions; Social Aspects

All actions performed by language users are bound by certain rules. The task of the linguist is to describe these rules for specific languages, and find universals if possible. Since linguistic action takes place in a social world, the rules should primarily be interpreted as conventions, and not as generative devices. For example, to express the third person singular of "to drink" in English, you are supposed to suffix an "s", so the result is "drinks"; however, a speaker may not follow this rule and still be intelligible.

This is not to say that no universal restrictions on conventions exist. We do not claim conventions

to be autonomous; surely they are restricted by our psycho-neurological make-up, the 'way the world is", universal pragmatics, etc. The point is that until it is clear what the universals are, we prefer the conventional status of rules (see also (Dik, 1989, p6-7)).

Linguistic conventions clearly have a social reality; certain deviations of some standard held among a group provides socially important information about an individual's identity, even to the point where it can stigmatize people (Chambers and Trudgill, 1980, p84), but people can also voluntarily express their identity by means of such deviation. This may even lead to 'linguistic rebellion' (e.g. (Aitchison, 1981, p69-)).

In generative grammars, including FG in this case, it looks as if rules generate a language. However, language is generated by language acts. The rules are sometimes explicit and taught in school or prescribed by governments; in other cases, speakers follow them unconsciously, and there are also situations in which there are no rules at all, e.g. in the case of some instances of the coining of new words (Quirk et al., 1985, p1524).

The rules that apply to language use go far beyond correct syntax. They also include, for example, how you put a polite request, which differs from one language to another (Wierzbicka, 1991). Language actions do not always take the form of complete sentences, but can also be exclamations, ways of addressing, starting a story.

3.4 Four types of Actions With Words

Following Searle (Searle, 1969), we distinguish three types of actions with words: *illocutionary acts, linguistic acts and utterance acts.* Illocutionary acts are for example asking, requesting, cursing, apologizing, etc. Linguistic acts are referring and predicating (these are the ones mentioned by Searle; we believe many more can be identified). Utterance acts are the material actions of uttering a word or sentence, including actions like stressing and pausing.

To these three types we want to add also the action of interpretation. In normal dialog situations, language users cooperate in the communication process. This means that the Speaker need not be comprehensive in his utterances: he can leave some of the work to the Addressee. This is not only a theoretical possibility, witness the frequent use of "indirectness" and derived illocutions in speech (Moutouakil, 1991). The interpretation is an action performed by the Addressee, and languages differ in the rules that license certain interpretations. For a given sentence, we cannot of course with certainty predict the way in which it will be interpreted by the Addressee, but we can specify what interpretations are licensed in the context.

3.5 Example

To illustrate the functional redressing of FG that we have in mind, consider the following example:
Example:

(1) *John, where is the cat?*

We "represent" this sentence as a set of actions that are performed by the Speaker. (UA means utterance act, LA means linguistic act and IA means illocutionary act):

```
UA: S  utters "John", S utters "where" etc
UA: S gives rising intonation to the sentence
IA: S addresses the Addressee
IA: S calls Addressee John
LA: S invokes the concept of cat
LA: S refers to (specific) cat x
LA: S predicates a location y over x
IA: S asks for y
```

Note that there is a hierarchy between the different acts. The Speaker can only refer to the cat x by uttering the word "cat" (and the word "the"). And the Speaker can only ask for the location of the cat by acts of referring and predicating.

Another example:

(2) *The cat is on the mat*

```
S invokes the concept of cat
S refers to (specific) cat x
S invokes the concept of mat
S refers to (specific) mat y
S predicates a location "on the mat" over x (result: predication p)
S asserts a fact z
S talks about (topic) the cat x
S affirms by means of z that p is valid
etc
```

This example illustrates that what is considered a structural element in FG, for example, the pragmatic function Topic, can be remodelled in a dynamic way. In some sense, this dynamicity is already hidden in the proposed subdistinctions of Topic, such as NewTopic, ResumedTopic. Our notation makes the actions transparant, but the information that the set of actions conveys about the utterance can encompass what is represented in the UCS (and much more). Of course, this claim

can only be proved by showing for each element of the UCS how it is expressed as an action. This is something we neither can nor want to do in this paper.

The z that is asserted by the Speaker corresponds to the propositional content of the UCS. Facts can be asserted, but also questioned, etc. The fact itself affirms or denies that a certain predication (in this case, the predication p) is valid. To be more precise, it is the Speaker who affirms this by means of z. Note that we use "predicating" in the more traditional way in which an elementary proposition is split up in a subject and a predicate, and not for every invocation of a concept, as it is in current FG. As a consequence, we get a dynamic interpretation of the notion of "Subject" (as the "primary perspective", not as a grammatical category) for free.

(3) *There!*

```
UA: S points to/refers to a table
UA: [S utters "there"; S looks under table x]
NA: A concludes that the cat is under the table
```

This example shows first the elegance of our approach with respect to non-sentential utterances. Where traditional FG would have to import a complete four-layered UCS (mostly empty), our approach allows us to just represent what is going on and nothing more.

The example also shows some peculiar cases of non-verbal communication, such as pointing. We classify them as utterance acts as well, although one may reserve a special category for them. The example also gives an example of an interpretation act (NA): the Addressee is licensed to conclude that the location referred to by the Speaker is the location he asked for in the previous question, that is, the location of the cat.

3.6   Refering to Actions in the World

Apart from actions with words and actions on words, we also need to include actions described by words, that is, the States of Affairs that are presented. This is where the semantic funtions of FG come in. These functions can be expressed as actions as well. We will call these the modelled actions (MA). For example:

(4) *The cat did bite Molly*

```
LA: S invokes an event of "biting" (e)
MA: in the invoked event, the biting is done by x
MA: in the invoked event, the biting is done on y
LA: S refers to (specific) cat x
```

```
LA: S refers to (specific) entity y
LA: S calls y "Molly"
LA: S predicates "bite Molly" over x (result: predication p)
UA: S utters "cat"; "did"; etc.
```

In the description of the States of Affairs we can use a small set of actions, such as "act on", "transfer", "move". These actions determine the kind of semantic functions of the participants. For example, an Agent is someone who *acts on* something, and a Recipient is someone to whom something is *transferred*.

3.7 Recapitulation: the Action Approach to FG

In the following, we will concentrate on the Lexicon as the set of words/instruments, i.e. words and actions *on* words. Concept words have a form and a meaning. We will distinguish these two as follows: there is a domain of concepts and a domain of words (lexemes). By means of words, linguistic agents can *invoke* concepts (which is a linguistic action). The Lexicon describes both the lexemes and the concepts invoked by them. And, as we stipulated above, it represents the actions that can be performed on words, such as nominalize, express, etc.

In this paper, we do not work out the actions *with* words in detail. Rather, we attempt to work out actions with words in such a way as to provide a framework at least as detailed as the UCS in FG. The basic structures of FG - terms and predications - are already captured by the actions of referring and predicating, but there is of course much more ground to cover. The UCS is clearly incomplete with respect to, for example, non-sentential constructions.

The advantage of the action approach is that we do not need to put a uniform structural straight jacket on every linguistic utterance. Only the actions actually performed (and this attestably so) need to be represented.

The kinds of actions with words that we will distinguish will aim to hold universally in principle, but it is possible that a certain language allows more, and different, actions than others. However, as mentioned before, we acknowledge that decisive identification of true universals is currently beyond our grasp.

4 Dynamic versus Static

It is customary in FG (and many other frameworks) not to spell out each and every form for every inflectional option, but use general morphological rules in regular cases. However, in some case (e.g. irregular verbs), it is hard or even impossible to identify general rules, even though there may be some regularity in the irregularities observed. It is tempting to treat such regularities as rules as well,

but according to Dik we should not. They are generally not considered part of the *grammar* of the language as such, but rather a 'regularity in the lexicon' (Dik, 1989). Following Dik, we think it best to at least explicitly store all items which cannot be straightforwardly generated. This does raise the question of when a certain 'rule' is or is not a 'real' one.

A very workable distinction between 'rules' and mere 'regular irregularities' lies in *productivity*. Since we want the lexicon to be able to deal as well as possible with new words (in both the productive and interpretive sense) we need to include the productive rules of the language in question. We propose to make productiveness the decisive factor for rule adoption. But are productive rules only used to coin new word forms, or are they actually used every time a (known) word is used?

The question whether or not formative rules are very regularly used *in real time* to produce new lexical elements is hard to answer and is a matter of psycholinguistics (which we will not get into here). But suppose that, at the very least, in a fair number of cases words are recovered from memory rather than being re-formed time and again. Without making hard claims about the cognitive reality of word production or word recovery, we believe that both mechanisms should be included in the lexicon as options. Our arguments for this go beyond mere practicality. They involve the basic duality in language between productivity and memory. We (tentatively) suggest the following balance between the two:

Grammatical rules are the principal means we have of putting together sentences (Quirk et al., 1985, p1523), with the exception of the occasional use of fixed expressions (and even their structure is often adjusted slightly in use). Sentences are, by nature, typically generated rather than stored as wholes.

Words, on the other hand, are typically stored, and generated only in exceptional cases. Productive lexical rules exist and are used when unknown, or very rare, words are encountered; less frequently, they are even used to coin new words.

Terms are somewhere in between. This is probably the reason that Dik considers them as part of the Lexical Fund. It is clear that many complex terms (i.c., terminology) are treated by the linguistic agents *in toto*, as with words. But terms can also contain relative clauses with a complete sentence grammar.

People generally tend to *remember* words and *construct* sentences, but since exceptions to either of these processes do in fact occur, we have to cater for both in our theory. Whether or not a word or phrase (or even a text, as in a completely memorized prayer) is put into memory most likely depends on when it becomes 'cheaper' to store than to produce, i.e. if a word or phrase is used frequently enough, it can and will be remembered[1]. Clearly, it is possible for an item to disappear from memory as well.

But apart from cognitive reality, if we could reproduce every word or even phrase in principle,

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[1]If this is the case, memory capacity is expected to increase the number of items which are remembered instead of generated.

why bother about storing words in the first place? Discarding arguments related to efficiency and processing (either cognitive or computational), the main answer lies in the diachronic aspect of the lexicon. It is quite possible for a once productive rule to have disappeared and for words to change over time, thus leaving lexical heritage (with all its shifts in meaning and form) as the only means of carrying on use and understanding of a word. Besides, words are not always coined in a way which allows for general and easy deciphering through lexical rules. Many words are learnable only through context, which also makes direct and rule-independent storage a necessity.

Within the context of our current discussion, we focus on productive lexical rules, bearing in mind that once the rule is used to coin or make sense of a word, this word is likely to be stored in the lexicon. On the one hand, then, it has to be possible to put down somewhere, in a static fashion, what exactly a certain form of a certain word is; on the other hand we want to define the dynamic rules that govern the production of word forms. A lexicon in the broad, dynamic sense should cover both static and dynamic aspects of lexis.

5 The structure of the Lexicon: Actions On Words

(Weigand, 1994) describes a formal and explicit way in which expression rules can be formulated by means of f-structures (Aït-Kaci, 1986; Pollard and Sag, 1987) and linear precedence rules. By this, he aims to represent the generally rather abstract descriptions of (universal) expression rules in a form explicit enough to be used for implementation within some computational framework.

In the context of lexical representation and the manipulation of concepts and their morphosyntactic representation (currently focusing on lexical matters), we continue to develop the above mentioned representation formalism. A crucial aspect is that we wish to keep strictly separate matters of conceptual representation/manipulation from those related to actual expression, i.e. the form lexical items take. However, the relation between concept and form will have to be fully specified.

5.1 F-structures

First we will briefly recapitulate and present the f-structure format as used in (Weigand, 1994, p406).

'An f-structure (feature structure [...]) is a mathematical structure in which a functionally built-up complex object can be represented and on which a powerful notion of unification can be defined. Formal definitions can be found in [...] (Weigand, 1990, p207-213).'

'The f-structure format can be used to write down FG predications in the following way. All functions correspond to slot names. The predicate of the frame becomes a substructure. Markings, such as the category marking, are mapped to slots as well.'

For example, the English verb 'hand' with predicate frame

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```
(1)  hand-v(ag x [human])(go y [object])(dst z [human])
```

is written as:

```
(2) (pred => (stem => 'hand-'; cat => v;)
              type => [action];
              cat  => p;
              (sem => (ag => (cat => t; type => [human]));
                      (go => (cat => t; type => [object]));
                      (dst => (cat => t; type => [human]))
              );
              (forms => (inf => "hand");
                        (imp => "hand");
                        (2 pres sing => "hand");
                        (3 pres sing => "hands");
                        (1 pres plur => "hand");
                        (2 pres plur => "hand");
                        (3 pres plur => "hand");
                        (1 past sing => "handed");
                        (2 past sing => "handed");
                        (3 past sing => "handed");
                        (1 past plur => "handed");
                        (2 past plur => "handed");
                        (3 past plur => "handed");
                        (pres part => "handing");
                        (past part => "handed")
              )
      )
```

An advantage of f-structures over less flexible forms of predicate notation is that additional information can be easily incorporated. For example, if we want to expand the frame for "hand" to that of "hand over", we only have to add the 'particle' notion in the basic predicate definition:

```
(3)  (pred => (stem => 'hand-'; particle => 'over'; cat => v);
      etc.
```

5.2   Predicate Formation

(Weigand, 1994, p408): 'In FG, the fund is built up as a lexicon of basic predicate frames, such as the one listed above, plus a number of predicate formation rules. A predicate formation rule is a synchronically productive lexical rule by which new predicate frames can be derived. In our notation, these rules are functions from f-structures to f-structures.' As an example, we take nominalization:

```
(4) NOM-1 ((pred => (stem => X; particle => Y; cat => v);
                     cat => p;
                     type => T
                     sem => (F => A)
            ) ==
            (pred => (stem => X + '-ing' + Y; cat => n);
                     cat => t;
                     type => T;
                     num => sing;
                     sem => (F => A)
            )
          )
```

5.3   Inflection and Derivation

There clearly is a difference between inflection and derivation, though what exactly the difference is is a much debated question (Watters, 1995, p86-). Without going into all aspects of the distinction, we focus on the difference in impact either has on the semantics and form of the predicate.

Inflection provides the information which is needed to (re)form the word in such a way that it can be grammatically used as a certain part of a certain syntactic structure. It does not so much change the core predicate as adapt its form to language-dependent demands raised by syntax. As such, it belongs to the realm of formative expression rules (Watters, 1995; Dik, 1989). Inflections then are extentions of a lemma, the set of which contains a fixed number of elements.

Derivation, on the other hand, directly involves predicate formation rules (same references). Yet more often than not, derivation also has morphological effects which mark the semantic shift that takes place. It has a lexico-semantic impact on the core predicate that inflection lacks, but in addition it shares with inflection a formative component which intuitively belongs to the formative expression rules. We will have to incorporate this distinction in our formal notation, keeping (principally universal) semantic shift at the level of core predicate formation apart from (language dependent) formation rules that mark either derivation or inflection. Contrary to inflection, derivation does not easily lend itself for definition strictly through a set of extentions. Whether derivation leads to a new concept,

or to an extension of the mother concept/lemma, is a hard question to answer. Though we cannot go into this matter in too much detail, we will see below that our approach at least offers the means of capturing both extension and the generation of new concepts.

Finally, we are left with the question whether or not inflectional and derivational formative expression rules should somehow be distinguished in principle. We do know that even when it comes to expression rules, derivation seems to occur at a somewhat 'deeper' level than inflection. (Watters, 1995, p89):

> 'It should [...] be noted that these two types of morphology are distinct in terms of their ordering within complex words. This ordering can be specified by the following schema (Dik, p.c.) which by and large holds across languages:
>
> (5) [inflection [derivation [stem/root] derivation] inflection]'

Considering the fact that some formative phenomena occur with both inflection and derivation (as in *the driving* versus *John was driving*), we want to make it possible for one formative rule to be combined with various conceptual rules, which is one of the reasons we separate form from content. For the moment, we roughly stipulate that derivation occurs 'before' inflection.

5.4 Separating Form and Content

Slightly reformatting the f-structure notation presented in (3) does not lead to significant changes in approach since they merely influence the notational structure. A more substantial change reflecting the abovementioned difference between inflection and derivation lies in the formulation of the rules underlying these manipulations. Take, again, nominalization. In (4), both formative and conceptual aspects of nominalization are expressed. Below, they are separated:

```
(6) Formative: F((pred => (stem => X; particle => Y; cat => v) ==
                 (pred => (stem => X + 'ing' + Y; cat => n))


(7) Conceptual: C((pred => cat => p;
                        type => T;
                        sem => (F => A) ==
                 (pred => cat => t;
                        type => T;
                        num => sing;
                        sem => (F => A))
```

Of course, it would sometimes be possible to stick to a notation not separating Formative and Conceptual aspects, but for our current purposes it seems better to keep them separate in principle

and 'tie them together' when required. The universal nature of conceptual manipulation with regard to the core predicate, as opposed to the language-dependent nature of the formative expression rules, is the main argument here. Additionally, as mentioned above, by keeping them separate we can explicitly deal with similarities between the formative aspects of derivation and inflection.

Finally, it becomes possible to define a number of conceptual manipulations which are all expressed by the same formative manipulation. This accounts for the fact that if someone hears a new word, she can only guess what it means by inference, i.e. association with what she knows the stem and/or affixes may stand for. A thoroughly defined dynamic lexicon will ultimately give access to all possible conceptual interpretations of a word, leaving the very difficult task of finding the right one to contextual circumstances. This is particularly relevant for those manipulations that have an indeterminate conceptual part, such as the verbalization of nouns ("to mouse", "to paper", ...). In current FG, this process is problematic, because one cannot specify a predicate formation rule for it. In our approach, we can describe the formative rule without problems, and leave the interpretation (that is, the linking to one of all the possible conceptual manipulations), open.

In (7), the 'type' and 'sem' properties are mentioned in the rule, even though they are left unchanged by it. This is done for illustrative purposes, but actually, rules are defined purely on the basis of crucial input properties (specifying to which items the rule may apply) and of those properties changed by the rule. Below, we will keep to such a minimal specification. Note that specification is needed for the cancellation, change or addition of a property.

5.5 Example: Two Manipulations on 'Drive'

As an example we first take the difference between the derivation of a deverbal noun 'driving' (as in *the driving home*) and the 'stronger' nominal form which can be derived from the same verb, namely 'drive' (as in *the drive home*). The first is presented under (8), the second under (9). In (9a), the semantic difference introduced is not only the transformation from predication frame to term frame (cat), but also the assignment of imperfective aspect (for the perfective/imperfective distinction, see (Dik, 1989, p186).

```
(8a) Conceptual:  M((pred => cat => p) ==
                      (pred => cat => t))
(8b) Formative: F((pred => (stem => X;
                            cat  => v) ==
                  (pred => (stem => X + 'ing';
                            cat  => n))


(9a) Conceptual: M((pred => cat  => p;
                           type => [T,pf] ==
```

```
                    (pred => cat  => t;
                          type => [T,impf])
(9b) Formative:  F(pred => (cat => v)) ==
                    (pred => (cat => n))
```

(8) and (9) invoke combinations of elementary conceptual and formative rules which together form fully specified manipulative constructs. So for (8) and (9) we need the following elementary rules:

```
(10a)        C1(cat  => p)       == (cat  => t)
             C2(type => [T,pf]) == (type => [T,impf])


(10b)        F1(stem => X) == (stem => X + 'ing')  * the "prp" function
             F2(cat  => v) == (cat  => n)
```

Frome these we form the following manipulations:

```
(11a)        D1: <C1 o C2, F1 o F2> (verbal drive -> nominal driving)



(11b)        D2: <C1,F2> (verbal drive -> nominal drive)
```

Note that the specifications above allow a level of detail that goes beyond the mere notion of 'derivation'. What is also interesting is that our approach allows different conceptual manipulations to be associated with the PrP form. For example, there are words that do not easily allow an imperfective interpretation, such as "jump", and in that case, the PrP can be used to express a repetitive action. So "the jumping" would not be the result of D1, that includes the imperfective manipulation, but a variant in which C2 is replaced by another (repetitive) manipulation; at the formative side, nothing changes.

5.6   Inflection

The difference between derivation and inflection is that derivation involves a conceptual change, whereas inflection only involves a further specification of the conceptual content. On the formative side, there is no principal difference. Consider the representation of the verbal form "hands":

```
(12)  (pred => (sign => "hands"; stem => 'hand-'; cat => v;)
             type => [action];
```

```
            cat  => p;
            (sem => (ag => (cat => t; type => [human]));
                    (go => (cat => t; type => [object]));
                    (dst => (cat => t; type => [human]))
            agreement (num => sing; person => 3);
            tense => present)
```

The representation specifies both the form (sign "hands") and the meaning (including tense and agreement). The agreement and tense features simply add to the existing ones; hence, it is not a derivation. Of course, words like "hands" are made by the Speaker according to a simple inference rule, that could be represented as follows:

(13)   (pred => (stem => X);   < (pred => (sign => X + -s))
             agreement => (num => sing;
                           person => 3);
            tense => present)

The rule says that if the agreement features are sing/p3, and the tense is present, then the sign becomes "stem + -s". In line with our dynamic approach, we consider this rule as a convention for the linguistic agent regarding inflecting (as one of the actions on words that he can perform on words). From a computational point of view, the rule can be interpreted as an inference rule: IF the agreement features are so and so, THEN the sign gets this form.

Note that inflection is not regarded as a transformation from a frame to a word (string), but rather as the transformation of one word representation (where sign is not filled in yet) to another. The actual utterance of the word is another action: it is simply taking the "sign" feature and uttering it in phonetic or alphabetic form.

6 Conclusion

In this paper, we have introduced the Dynamic Lexicon. The Dynamic Lexicon makes a clear distinction between forms (and the formative actions one can perform on them) and their meanings (for content words: the concept they invoke), that can be manipulated as well. Words are seen as instrument of linguistic agents. We have sketched an alternative model of FG in which the linguistic acts are central, rather than an abstract UCS. In this model, we want to leave the Cartesian view of language in which an utterance is seen as the physical expression of a non-physical mental object (and which in some form or another lurks behind much work in FG, but also in for example Cognitive Science), and replace it with a truly functional view of language in which an utterance is an action that gets its significance in the social domain of human interaction. At this moment, we are not able

to work out this model in any level of detail, but we hope to be able to show more about it in the future.

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