Grammemes

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Abstract

Importing key concepts from explanatory combinatorial lexicology, we revisit the notion of grammeme and show that it is an entity of the same level of abstraction as a vocable. Grammemes are polysemic and one of their acceptations is the basic one from which the others are derived. We propose criteria to identify it, and show how it can be used to guide the grouping of grammemes into inflectional categories.

Keywords

Grammemes, Grammatical Signs, Inflection, Morphology, Syntax.

1   Introduction

The inflectional system of a language is a hairy problem to tackle. To avoid getting lost, it is necessary to have solid theoretical ground to stand on. In this paper, we propose to further refine the definition of grammemes and inflectional categories within the Meaning-Text Theory (MTT) framework.[1] We will distinguish two things: grammemes proper, and grammatical units, i.e., their acceptations, and we will show how to identify the basic grammatical unit of a grammeme. We will also make a distinction between deep and superficial grammemes. Finally, we will propose a methodology for the study of inflectional systems that is based on explanatory and combinatorial lexicography. The analogy between the lexical and grammatical fields of study is twofold. First, the division of grammemes into grammatical units is similar to the division of vocables into lexical units. Second, the grouping of grammemes into inflectional categories, on the basis of their syntactics and semantics, is somehow reminiscent of the grouping of vocables into parts of speech or lexical fields. But most importantly, it is the acknowledgment of the fact that polysemy plays just as central and confusing a role in the grammar as it does in the lexicon that underpins our approach.

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[1]It is not the goal of this paper to look at new linguistic phenomena. For an illustration of how the concepts introduced here can be used in practice, see (Lareau, 2008, 2009).

2 The notions of grammeme and grammatical unit

2.1 Grammemes in the Meaning-Text Theory

(Mel'čuk, 1993) defines the grammeme as a *signification* that is part of an inflectional category, the latter being defined in the same book as the maximal set of significations that are mutually exclusive in a given (logical or semantic) position. The problem with this definition is that the concept of *signification*, although central in his theory of morphology, is defined nowhere in this book.[2] Is it a morphlogical or a semantic entity? Or is it a correspondence between such entities?

This purposefully vague definition aimed to resolve what we call the *grammeme polysemy paradox*. Indeed, grammemes tend to express several meanings. For instance, the future tense of Spanish verbs can either express a temporal meaning (*Vendré sobre las 6* 'I'll come around 6'), or a modal one (answering the question *¿Qué hora es?* 'what time is it?': *Serán las 2* 'it must be 2'—literally 'it will be 2'). In the former case, the future tense simply situates an event in time. In the latter however, the meaning is not at all temporal; the speaker is making a hypothesis about the *current* situation. There are clearly two distinct signs that we call *future tense* here. They have little in common semantically speaking, and as such, one would like to put them into different categories: the former with tenses, the latter with moods (or perhaps evidentiality). One would like to say that there are two grammemes **future** in Spanish. Yet, at the syntactic, morphological and phonological levels, these two signs are absolutely indistinguishable. So at the same time, one would want to say that there is only one grammeme **future** in Spanish.

This is probably what Mel'čuk had in mind when he wrote that a grammeme is a "beam of correspondences between a set of forms and a set of meanings" (Mel'čuk, 1993, p. 278). In other words, a grammeme is an interface between meanings and forms. He gives as example the plural of nouns in English, which, save for exceptions, is expressed by /s/, /z/ or /əz/. It can bear a number of meanings, for instance 'more than one X' (*The cats were sleeping there*), or 'all Xs' (*Piranhas are dangerous*).[3] One could of course describe this situation with a correspondence between every meaning and every form. But, if there are n meanings for a grammeme and it can be expressed by m forms, then one needs $n \times m$ correspondences. A more elegant and more cognitively plausible model is where the n meanings and m forms correspond to one entity of an intermediate level of representation, thus necessitating only $n + m$ correspondences.

Hence, Mel'čuk conceives the grammeme as an object of the syntactic representations that serves as an interface between semantics and surface syntax or morphology. As such, it is what we would like to call a "sub-semiotic" entity, i.e., the grammeme is not a linguistic sign, but rather something that sits on the correspondence path between meanings and forms. This resolves the apparent problem of the polysemy of grammemes, as it avoids saying that to each grammatical meaning corresponds one distinct grammeme on the one hand, and that grammemes are polysemic signs on the other hand, which would contradict the accepted definition of a linguistic sign in the MTT framework, where a sign can only have one meaning (again, this is discussed in (Mel'čuk, 1993)).

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[2]The concept has later been discussed by (Polguère, 2008) and Mel'čuk (to appear).

[3]These semantic descriptions are of course very approximate; the definite/indefinite interfere here. It is not our topic to study the semantics of these grammemes; see for instance (Beyssade & Dobrovie-Sorin, 2005).

2.2 Grammatical units

Because of their polysemy, grammemes cannot be signs. This is similar to vocables in the lexical domain. Vocables are polysemic too, and they are not signs for the same reason: they are sets of lexical signs that share certain characteristics. The various acceptations of a polysemic vocable can have quite different meanings; for instance, the vocable **FACE** can denote a part of someone's head, or one of the surfaces of an object. These two meanings belong to two different lexical units (let us call them $FACE_1$ and $FACE_2$) and are different enough to be in different semantic fields: body parts for the former, and geometry for the latter. Yet, both $FACE_1$ and $FACE_2$ belong to the same vocable **FACE**, because they share non-trivial characteristics at every level of representation (even at the semantic level, their meanings are not entirely unrelated).

What we observe is that grammatical signs show the same kind of organization. Signs that share non-trivial characteristics are grouped under a unit of a higher level of abstraction, equivalent to the level of the vocable, and this is what we call *grammeme*. This abstract entity is a set of similar grammatical signs. To refer to the various acceptations of a given grammeme, we use the term *grammatical unit*, to echo the term *lexical unit*. This idea comes from (Kahane, 2002),[4] who viewed the grammatical units as "deep signs" just like lexical units, i.e., signs whose signified is a piece of the semantic representation, and whose signifier is a piece of the syntactic structure.[5] What distinguishes grammatical units from lexical units in (Kahane, 2002) is the nature of their signifier: grammatical units have as their signifier a grammeme, while lexical units have a vocable as their signifier.[6]

Hence, if we go back to the examples given above, there are in Spanish the grammatical units $future_1$ and $future_2$, which are two acceptations of the same grammeme **future**, in the same way as the lexical units $FACE_1$ and $FACE_2$ are acceptations of the vocable **FACE**.

2.3 Deep *vs* superficial grammemes

In MTT models, grammemes appear at the deep and surface syntactic levels. However, not all of them can appear at both levels. For example, definiteness in French is expressed by determiners. The signifier being a lexeme, it must have its own node at the surface syntactic level. Hence, in French, there are **definite** and **indefinite** grammemes only at the deep syntactic level; they are not needed anymore in surface syntax because their signifier has already been chosen. Therefore, we find it useful to distinguish between two types of grammemes:

Deep grammemes appear at the deep syntactic level and work as an interface between elements of the semantic representation (semantemes or communicative configurations) and elements of the surface syntactic level (function words or surface grammemes).

Superficial grammemes appear at the surface syntactic level and work as an interface between elements of the deep syntactic representation (deep grammemes or syntactic configurations) and elements of the deep morphological level (morphemes, prosodemes or word order).

It is around the deep grammemes that the grammatical system of a language is built, and for the rest of this paper, we refer to them simply as *grammemes*.

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[4]He uses the word *grammie* in French, by analogy with *lexie*.

[5](Kahane, 2002) makes a point of not having a deep syntactic level of representation.

[6]More precisely, for (Kahane, 2002), the signifier of a lexical unit is what he calls a *lexeme*, which corresponds more or less to what is usually referred to as *vocable* in the MTT litterature.

2.4   Inflection *vs* derivation: distinctive properties

Now, let us go back to Mel'čuk's definition of the grammeme. In (Mel'čuk, 1993), he defines it as an element of an inflectional category. Indeed, it is an important characteristic of grammemes that they are organized in inflectional categories: a grammeme is a grammeme only if it is opposed to other grammemes with which it forms a set of mutually exclusive elements. What makes these sets inflectional categories is, obviously, their inflectional nature. So let us review briefly the properties that distinguish inflection from derivation.[7]

Of all the properties mentionned by linguists to characterize inflection, as opposed to derivation, its obligatory nature is the one on which there is the largest consensus. (Jakobson, 1959), commenting on (Boas, 1938), said that the true difference between languages lies not in what they can express, but in what they force the speaker to express. This captures the essence of inflection. From this property follows the fact that inflectional meanings tend to be less numerous and more abstract. (Mel'čuk, 1993) notes six other characteristics that distinguish inflectional morphemes from the derivational ones: 1) they resist better to phraseologization, 2) they tend to have less restrictive combinatorics, 3) they tend to be expressed in a more regular way, 4) only grammemes can appear in agreement or concordance rules, 5) they tend to appear farther away from their lexical root, and 6) they do not modify the part of speech of the stem they attach to.

2.5   A methodology in two steps for the study of grammatical signs

The above characteristics help in identifying the grammemes of a language. But at the same time, these grammemes must be grouped into inflectional categories. As we have seen earlier, a grammeme may very well correspond to several meanings. In fact, one of the main problems in the study of grammemes is precisely their polysemy, often rich and subtle. It is hard to build a coherent model of a language's grammatical system if one tries to describe at once all the acceptations of a given grammeme. To make an analogy with lexicography again, this would amount to describing the meaning of a vocable without distinguishing its various acceptations.

Another pitfall in the study of grammatical signs is the unsuspected phenomenon of phraseology. Just like phrases can be lexicalized, combinations of grammemes can take on non-compositional meanings. To our knowledge, within the MTT framework, (Beck, 2007) was the first to mention this phenomenon, with examples of morphological phrasemes from Totonac. A more detailed account was later published as (Beck & Mel'čuk, 2011). We also gave examples of such phrasemes as well as grammatical collocations in French in (Lareau, 2008, 2009). Phraseologized expressions must be left aside when identifying the grammemes and the categories they belong to, in the same way that, for instance, the phraseme ⌜BY AND LARGE⌝ is irrelevant to the description of the lexeme LARGE.

In the following sections, we propose a resolutely discrete approach, in the sense that we believe it possible to isolate the acceptations of a grammeme, for the description of grammatical signs. In section 3, we discuss the notion of *basic grammatical unit* and propose a methodology to identify it. Then, in section 4, we propose principles for the grouping of grammemes into inflectional categories, based only on their basic grammatical unit.

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[7]We use the term *inflection* in a broad sense that includes not only morphological inflection but also analytical forms such as auxiliaries and other function words.

3   The basic grammatical unit of a grammeme

Looking at the meanings a grammeme can express, we perceive intuitively that one is more sallient than the others. Grammemes have, like vocables, a basic sense from which its other meanings are derived somehow. This idea is not new, it was already expressed, for instance, in (Bello, 1847). We will call *basic grammatical unit* the acceptation of a grammeme that corresponds to its "proper meaning", by analogy with the *basic lexical unit* of vocables (Mel'čuk et al., 1995). It is often intuitively obvious what is the basic acceptation of a grammeme. Yet, it is difficult to formulate perfectly clear and rigorous criteria that systematically identify the basic grammatical unit of all grammemes. Below is our best attempt at it.

There are logically two types of criteria one can imagine: those based on the meaning of grammatical units, and those based on their combinatorics. It is not possible to have criteria based on the third component of linguistic signs, form, because, by definition, all acceptations of a grammeme are associated with the same forms.

3.1   Semantic criteria

If asked out of the blue what *he will eat* means, one would expect a native speaker to mention that the activity happens in the future. Then, if he thinks about it for a while, if the verb is put in various contexts, he might find other meanings to the future tense, but these meanings do not come to mind easily. So, trivially, the first criterion we could imagine, and in fact the one that best captures the essence of what we want to call *basic grammatical unit*, is the following:

Spontaneous interpretation criterion

   The most common interpretation of a grammeme, the one that spontaneously comes to mind out of context, is the one that identifies the basic grammatical unit of a grammeme.

Obviously, this criteria opens the door to a certain subjectivity and must be used carefully. Besides, it does not always apply. It cannot easily be used for grammemes that do not correspond to semantemes (for example, grammemes of agreement). Even when a grammeme has acceptations that can be modeled with semantemes, the situation can be blurred by the fact that some grammatical meanings are "marked" while others are not. For example, in the tense system of English, the future and the past are marked, but not the present. A marked meaning being more sallient, it is more accessible to the speaker, while unmarked ones can easily go unnoticed. Hence, if a speaker is asked out of context what *he eats* means, she would probably define 'eat' rather than explain what the present tense means.

Empirically, we observe that, as is the case for the basic lexical unit of a vocable, the basic sense of a grammeme is often included in the other meanings of the same grammeme. In particular, there can be metaphorical relations between the basic meaning and the derived meanings of a grammeme. For example, the semantic relation between the present progressive that denotes a process taking place now (*I'm eating*—progressive$_1$) and the one that denotes a programmed action (*I'm leaving tomorrow*—progressive$_2$) could be described as a metaphor: '$X \oplus$progressive$_2$' $\approx$ 'X is so inexorably programmed that it is as if $X \oplus$progressive$_1$'. Based on this observation, we can formulate a second criterion:

Semantic inclusion criterion

If grammatical units A and B correspond to the same grammeme G and the meaning of A is included in that of B (by simple inclusion—direct or indirect—or via a metaphorical relation), then A is the basic grammatical unit of G.

(Mel'čuk et al., 1995) use the same criterion in the lexical domain. It often suffices, but there are cases where it does not identify what we would intuitively like to call the basic meaning of a grammeme. There are logically two cases where it would not work: 1) the criterion is not applicable because the meanings of the grammatical units under consideration are not included in one another, or 2) it is the basic sense of the grammeme that includes another. We have not found any example of the latter case, which would be a counter-example to our criterion, but it is easy to find examples of the former. For example, the *irrealis* sense of the English past tense:

- '$X \oplus \text{past}_1$' $\approx$ 'X happens before now' (*I had money last year*).
- '$X \oplus \text{past}_2$' $\approx$ 'condition X does not hold true [and I know it]' (*If I had money, I'd travel*).

Intuitively, we perceive the first one as the basic acceptation of **past**, but our criterion cannot be used here because there is no obvious inclusion relation between the two senses.

Generally speaking, criteria based on meaning pose two problems. First, not all grammemes are associated with meanings; notably all the "syntactic grammemes" of (Mel'čuk, 1994). Obviously, semantics-based criteria are useless for these. Second, while some grammatical meanings can relatively easily be defined by a semantic decomposition, as we normally do for lexemes, it is far from obvious that all meaning-bearing grammemes can. For example, the Japanese suffix –WA, which marks the theme of a sentence, has a signified that can only be described in the communicative structure, not by semantemes. For such grammemes, the semantic criteria fail.

Let us now turn to the criteria based on combinatorial properties.

3.2   Morphosyntactic criteria

In general, one would expect the basic acceptation of a grammeme to have less restrictive combinatorics than that of other acceptations. Given our conception of the deep grammeme as an interface device between semantics and surface syntax, the combinatorics of grammatical units cannot differ beyond the deep syntactic level. The combinatorial properties to consider are thus limited to two types: the syntactic configurations in which a grammeme can appear when it expresses a given meaning, and the lexical units with which it can combine.

First, it seems sensible to exploit the priviledged position of the root of a tree:

Syntactic root criterion (provisional)

If the grammeme under consideration combines with a class of lexemes that can be the syntactic root of a sentence, then its basic acceptation can be used in that position.

However, there are two problems with this criterion. First, there are grammemes that do combine with lexemes which can be syntactic roots, but that cannot appear at all in that position. For example, the past participle in English, although it combines with verbs (which are normally the root of a sentence), cannot appear in such a position, in any of its acceptations. Second, there are cases where this criterion identifies the wrong basic acceptation. In French, the grammeme

subjunctive usually appears on a subordinated verb (*Je veux qu'il aille demande à son chef* 'I want that he go ask his chief'). It can only be used on the root of the sentence if it bears an imperative meaning: *Qu'il aille demander à son chef!*, literally 'That he go ask his chief!'. Yet, one would not want to say that this imperative acceptation is the basic one for **subjunctive**. To avoid these problems, we need a more general criterion:

Syntactic polyvalence criterion
    The basic sense of a grammeme is the one that is used in the most varied syntactic contexts.

For example, the imperative acceptation of the French **subjunctive**, though it can be used on the root of the sentence, can only be used in that position. In contrast, when this grammeme expresses subordination, it can occupy various positions: subject of a verb, complement of a verb, complement of a conjunction, etc.

Finally, the same criteria applies to the ability of grammemes to combine with different lexemes:

Lexical polyvalence criterion
    The basic sense of a grammeme is the one that can be used in the most varied lexical contexts.

This criteria works only if there is a semantic incompatibility between a sense of a grammeme and certain lexemes. If the incompatibility is syntactic or morphological, then all acceptations of the grammeme are affected, since they all behave in the same way beyond deep syntax.

Generally speaking, the criteria based on combinatorics have a limited use since all acceptations of a grammeme correspond to the same object of the deep syntactic representation. Thus, it is only in the interface between semantics and syntax that one can observe differences in the combinatorics of various acceptations of a grammeme.

Finally, we want to insist on the fact that these criteria cannot, in isolation, systematically identify the basic acceptation of a grammeme. Together, however, they can lead the linguist when confronted with a non-obvious case.

Identifying the basic grammatical unit of a grammeme is a very important step in our methodology because it is this acceptation only that will be considered when grouping the grammemes into inflectional categories. Let us now turn to this problem.

4 Grouping grammemes into inflectional categories

As we have mentionned earlier, grammemes are only grammemes if they are part of an inflectional category. Then, what are the criteria that should guide the grouping of grammemes into categories? There are logically three major types of criteria that could be considered, based on the three components of signs: meaning, form and combinatorics. We do not know of any linguist who proposed building inflectional categories based on the forms of its members. Given the arbitrary nature of the signifiers of linguistic signs and the fact that grammemes are often expressed cumulatively, this avenue looks like a dead end. However, the other two components of signs seem viable options, so let us explore them.

But first, let us emphasize that it is the *deep* grammemes, and not the grammatical units nor the superficial grammemes, that we want to group into inflectional categories. It is indeed at this level that grammatical systems are organized.[8]

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[8]This echoes the idea of (Kahane, 2009) that the deep syntactic level is where signs are organized in a sentence.

4.1   Morphosyntactic criteria

The combinatorics of grammatical signs offers an interesting basis for rigorous and verifiable criteria because it is relatively easy to observe. (Martinet, 1979) proposed a methodology essentially based on it, which (Touratier, 1996) pushed a little further. Both get similar results when applying their method to French, which shows its reproducibility. It relies mainly on two criteria, given in (Martinet, 1979), that we reformulate below with our terminology. These two principles correspond to the two facets of *contrastive distribution*, a key concept in linguistics.

Mutual exclusion criterion

   Grammemes of a same inflectional category are mutually exclusive.

Combinatorial similarity criterion

   Grammemes of a same inflectional category have similar combinatorics.

Thus, for instance, the French adjectival grammemes **masculine** and **feminine** belong to the same category because they are mutually exclusive and they have identical combinatorial properties: both combine with adjectives and with grammemes of number.

However, we think that combinatorics-based criteria alone do not suffice. (Touratier, 1996) made a model of French verb conjugation based strictly on the combinatorics of grammatical signs, and his results illustrate very well the limitations of this method. His reasoning goes roughly as follows. First, the imperfect can combine with the subjunctive (which gives the subjunctive imperfect), while the past tense cannot. Like the subjunctive, the future tense can also combine with the imperfect (which gives the conditional)[9] but not with the past tense. Therefore, the future is part of the same category as the subjunctive since they have the same combinatorics, and the past, because they are mutually exclusive. Since the subjunctive cannot be anything else than a mood, the past and future must also be moods. We do not find this reasoning convincing. The fact that the future cannot combine with the past is indeed a hint that they belong to the same category, but their incompatibility with the subjunctive does not necessarily imply that they form a paradigm with it. It could simply be due to the fact that the two are tenses and that the subjunctive does not combine with tenses.[10]

We believe that criteria based on combinatorics alone do not suffice to group grammemes into categories, and that it is necessary to take into account the basic meaning of these grammemes (but only the basic one!).

4.2   Semantic criteria

(Mel'čuk, 1993) defines a category (a notion that englobes inflectional categories) as a set of elements that are mutually exclusive in a given "semantic or logical position". Thus, it is mainly (but not exclusively) on semantic criteria that he builds his inflectional categories. Following his definition of a category, one can formulate the following criterion:

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[9]Indeed, the conditional in French (*mange<u>rait</u>*) is formed by the combination of two suffixes, –R (future tense) and –AIT (imperfect), in a way similar to the English conditional (*would eat*), which is expressed by the auxiliary WILL (future tense) in its past form.

[10]This would also mean that the imperfect is not a tense, an analysis argued for by (Vet, 2007) and (Lareau, 2008).

Semantic mutual exclusion criterion

    The basic meanings of the grammemes of an inflectional category are mutually exclusive.

Here, it is important that we consider only the basic sense of grammemes, a point that (Mel'čuk, 1993) missed. Otherwise, we are forced to stipulate unnecessary elements of the syntactic and morphological representations that are simply traces of the polysemy of grammemes. For example, if we took into account all the senses of the conditional in English, we would have to distinguish at the syntactic and morphological levels at least two grammemes for the conditional: one that belongs to moods (for the conditional that expresses politeness, as in *Would you pass me the salt?*), and another that belongs to tenses (for the conditional that expresses temporal relations, as in *He told me he would come*). Yet, from the deep syntactic level, and up to the surface realization, both have exactly the same behaviour. The result is an unnecessary duplication of rules in every module of the grammar, a problem that we avoid if we take into account only the basic meaning of grammemes. Finally, we complement this criterion with one inspired from the definition of a vocable in (Mel'čuk et al., 1995):

Semantic similarity criterion

    The basic acceptation of the grammemes of an inflectional category have an obvious semantic similarity.

This avoids putting in the same category the French past and subjunctive, like (Touratier, 1996).

5   Conclusion

We have distinguished between *deep grammemes*, which belong to the deep syntactic structure and are at the core of the grammatical system of a language, and *surface grammemes*, which are found in surface syntax. Grammemes, because they are polysemic, are not signs, but entities of the same level of abstraction as the vocables in the lexical domain. We call each acceptation of a grammeme a *grammatical unit*, and one of them constitutes the *basic grammatical unit* of that grammeme, a concept borrowed from lexicography. We have proposed some criteria based on the meaning and the combinatorics of grammatical units to identify the basic one for a grammeme. It is only the basic grammatical units that must be considered when grouping the grammemes into inflectional categories, and phraseologized grammatical signs must be ignored. Finally, we proposed criteria to decide whether two grammemes belong to the same category: their basic acceptations must be mutually exclusive and show certain similarities at every level of representation.

Acknowledgments

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