

# SYNTACTIC FUNCTIONS IN GPSG

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## Abstract:

This paper motivates and proposes adding a new feature of syntactic function to the feature system of GPSG. Later, it shows its necessity in number of syntactic constructs, such as passivization, extraposition, coordination etc. But adding such feature is not understood as a mere technicality, and thus some implications for the explanatory power of the theory are also discussed.

## 1. Remarks on the Notation of PP

The notion of Prepositional Phrase has a firm and long standing tradition in the Anglo-Saxon linguistic framework, including GPSG. The classical Continental tradition, on the other hand, does not use this term for language description in majority of frameworks developed and treats prepositions predominantly as markers of nouns. In this paper, I will adhere to this approach.

The most important reason for doing this is the fact that, on the assumption of existence of PP, it is impossible to generate such sentences as (1) in the GPSG context-free framework.

- (1) I went there with John and with Paul,  
who met each other before.

The point is, that in (1), on the assumption of the existence of PP, we find a PP-coordination, resulting in a PP, rather than an NP one. Consequently, the relative clause must be sister of this PP rather than of an NP. But this is (at least in my opinion) hardly an acceptable solution, both intuitively and formally. Even an attempt to cope with this problem by means of rightward "Across-the-Board" extraposition would not make things better, since such a solution would presume phrases as "John who met each other" to be correct English NP's. I do not wish to pursue this further here, the problem is more thoroughly described in (Oliva,88) from both intuitive and formal viewpoints. What I really wanted to do was to motivate the decision of avoiding the term PP in this paper (and, possibly, the necessity of omitting it from the GPSG framework altogether), which will be reflected in the notation of rules. Thus, assuming otherwise the notation familiar from (Gazdar, Klein, Pullum and Sag,85), the category  $PP \{ \{ PFORM \mathcal{L} \} \}$  will be recasted as  $NP \{ \{ PREP \mathcal{L} \} \}$ , which should read as "NP marked with preposition  $\mathcal{L}$ ". As a special value of the feature PREP, the value "nil" ought to be introduced, with the meaning that there is no preposition marking the NP in question (i.e., the category  $NP \{ \{ PREP \text{ nil} \} \}$  in the new

notation is exactly equivalent to the simple NP in the notation of (Gazdar, Klein, Pullum and Sag,85)).

## 2. The Syntactic Function Feature

In this paper, I shall try to show some of the problems connected with omitting the traditional notion of (syntactic) function in GPSG, and their possible solutions.

The payoffs of the notion mentioned can be seen e.g. on the classification of adverbials: each adverbial modifier, whether expressed by an NP {PREP}, by an adverb, by a subordinated clause or otherwise, has its more specific meaning ("function") in the sentence. With specific lexical units, e.g. with the verb "put", this is so obvious that a "semantic" classification was proposed even in some of the syntactical approaches, cf. (Bresnan and Grimshaw,78), and later transferred into GPSG without change, as can be seen on the presence of the feature LOC and related lexical rule introducing "put" (2).

- (2)  $VP \rightarrow H[6] ,NP,PP\{+LOC\}$

Further, two more such features, viz. MANNER and TEMP, were, unfortunately again with no systematic motivation, proposed as "possible solution" for some problems of coordination in (Sag, Gazdar, Wasow and Weisler,85). These features LOC, MANNER, TEMP are, of course, nothing else than function markers on adverbial modifiers (of location, of manner, of time).

Now the time has come to introduce these modifiers more systematically; but I add two arguments in favour of such systemization before. First, the rule (2), explicitly stipulating the complement as PP (or, alternatively, as NP {PREP}), does not provide the theory with the power to generate any of (3).

- (3)a. I have put my spectacles somewhere,  
but now I cannot recall where it was.  
b. She put it where I wanted it.

The second argument comes again from coordination; neither under the traditional "categorical harmony" nor under the newly proposed theory of (Sag, Gazdar, Wasow and Weisler,85), the contrast in (4) could be explained.

- (4) a. She was killed by her husband  
and by his mistress.  
b. She was killed by a hammer  
and by an axe.  
c. \*She was killed by her husband  
and by a hammer.

Under the "functional" approach, however, we find in (4)a the coordination of agents



(18) Passive Metarule for Direct Objects

$$\begin{array}{l}
 \text{VP}\{([\text{AGR X}])\} \longrightarrow \text{W,Y}\{[\text{FUNC dobj}]\} \\
 \quad \quad \quad \downarrow \\
 \text{VP}\{\text{pas},[\text{AGR Y}]\} \longrightarrow \text{W},(\text{X})\{[\text{FUNC ag}]\}
 \end{array}$$

Several remarks concerning (18): first, the "variable" X stands for the same category in the whole metarule, and this is also the case with Y. Second, the bracket pairs "(" and ")" mark off mutually bound optionality when used around the same category - in this rule the case is that of ([AGR X]) and (X), i.e. concerning [AGR X], either there is [AGR X] in the mother of the pattern rule and then, consequently, X {[FUNC ag]} occurs as the licensing category of optional agent complement in the target rule, or there is no [AGR X] in the pattern rule and then just {[FUNC ag]} is the licensing category of the optional agent, all other features left to later instantiation. This is important to allow for (19)a,b; note, however, that the verbs in this example are of different subcategorization classes V[2] and V[20], respectively<sup>2</sup>.

- (19)a. Lee was bothered by Kim.
- b. Lee was bothered  
        (that) Kim was elected.

To prevent strings like those in (20) to be generated, we have to introduce FSD (21) which marks all categories containing [FUNC ag] as NP {[PREP by]}, if this does not contradict some other principle of feature instantiation (which is not the case with "bother" in (19)b, because here the agent is already marked as S by the licensing rule)<sup>3</sup>.

- (20)a. \*Lee was bothered Kim.
- b. \*Lee was bothered after Kim.

(21) FSD:  
 $\{[\text{FUNC ag}]\} \implies \{[\text{N,+}], [\text{V,-}], [\text{PREP by}]\}$

Further, to prevent (22) to be generated, it is necessary to add FCR (23) to the metagrammar. This move, however, together with examples (24) and analogs ((24)b will be of particular interest), will lead us to a profound reconsideration of the roles and mutual relations of features COMP/PREP and FUNC. The matter is that, given the metagrammar in its current shape, (24)b cannot be generated, because FUNC is considered to be a Head feature and thus, in virtue of the Head Feature Convention, [FUNC subj] will be forced on the second subject sentence; but since this will be lacking the [COMP that] specification, it will be marked as unacceptable by (23).

- (22)a. \*For us to be elected bothers Sandy.
- b. \*Kim was elected bothers Sandy.

(23) FCR:  
 $\text{S}\{[\text{FUNC subj}]\} \implies \{[\text{COMP that}]\}$

- (24) a. That Kim was elected and  
          that Sandy was dismissed bothered Lee.
- b. That Kim was elected and  
          Sandy was dismissed bothered Lee.

How to solve this problem? For inspiration, let us turn to the classical and well-known analogy between verbs with complementizers and nouns with prepositions, shown in (25),(26).

- (25)a. That Sandy was dismissed bothered Lee.  
    b. \*Sandy was dismissed bothered Lee.
- (26)a. Kim waited for Leslie.  
    b. \*Kim waited Leslie.

At first glance, there is some discrepancy between (24)b and (25)b, in respect to the basic idea of coordination in (Gazdar,Klein, Pullum and Sag,85), namely that each member of a coordinated construction should be able to appear alone in place of the entire coordination structure. The same case will be, naturally, that of (26)b and (27).

(27) Kim waited for Lee and Leslie.

Of course, the matter is that in (24)b and (27) the COMP and PREP, respectively, belong to the whole coordination, not to its first member solely, and thus extracting the second member to stand alone as shown in (25)b,(26)b is wrong - it is, in fact, not the whole second member being extracted; one its indivisible part gets lost somehow, and thus it is only natural that the resulting string is ungrammatical. The second observation to be made is by far more important in its scope: from the comparison of examples (25)a vs. (25)b and (26)a vs. (26)b, it is clear that the role of constituent having some function in the sentence can be played only by a fully specified phrase of the appropriate type (i.e., in (25), the role of (sentential) subject by a sentence containing "that"-complement, in (26), the role of (prepositional) object by a noun phrase containing the concerned preposition). And the same holds also vice versa, i.e. no underspecified phrase can play the role of the constituent having the function in question. In other words, whenever the complement or preposition is expanded in the generation process, the "rest" of the phrase must not be any more marked as having the function the "whole" phrase has. This is just what is expressed in the COMP and PREP expansion rules (28)a,b.

(28)  $\mathcal{L}, \beta \neq \text{nil}$

- a.  $\text{S}\left\{\left\{\begin{array}{l} [\text{FUNC } \mathcal{L}] \\ [\text{COMP } \beta] \end{array}\right\}\right\} \longrightarrow \{[\text{SUBCAT } \beta]\}, \text{S}\left\{\left\{\begin{array}{l} [\text{FUNC nil}] \\ [\text{COMP nil}] \end{array}\right\}\right\}$
- b.  $\text{NP}\left\{\left\{\begin{array}{l} [\text{FUNC } \mathcal{L}] \\ [\text{PREP } \beta] \end{array}\right\}\right\} \longrightarrow \{[\text{SUBCAT } \beta]\}, \text{NP}\left\{\left\{\begin{array}{l} [\text{FUNC nil}] \\ [\text{PREP nil}] \end{array}\right\}\right\}$

Not only that these rules cope correctly with all problems which we mentioned in this respect, but (more importantly) they shed light on the mutual relations between complementizers or prepositions and syntactic functions: that they are just mirror images of each other, which cannot exist separately.

### 3. Conclusions

It was shown that a new feature denoting syntactic function of a phrase should probably be added to the feature system of GPSG, which will help make the theory more adequate. This feature proved to be useful not only in some technicalities, but even in the intuitive and explanatory background of the theory. The bulk of support material for this new feature was taken from passivization of constructions with direct object in this paper, but similar evidence for the new feature can be drawn also from other types of passivization (of constructions with indirect objects, prepositional complements ("A doctor was sent for.") or adjuncts ("This bed has been slept in.")), as well as from other types of extraposition (cf. the impossibility of generating sentences like "It was hoped by everybody that he would sing." in the standard GPSG) and yet other sources.

Adding the syntactic function feature to the GPSG (meta)grammar goes in certain aspects in parallel with the independently motivated efforts to eliminate metarules from GPSG altogether and/or to shift their work to lexical redundancy rules, e.g. (Pollard,85), (Kilbury,86). This fact only confirms the old wisdom that, given some linguistic information, the question of dividing it between grammar and lexicon may be decided rather arbitrarily. The important point is that the proposals made here do not require such radical changes in the GPSG framework as the "lexical" approaches do, i.e., they keep better the basic spirit of the current GPSG (while solving the problems shown at least equally well). The only points in which a really substantial change occurred in this paper was, first, the structure of PP, and, second, the stipulation that purely morphological characteristics of constituents is insufficient for the description of English syntax. But I hope that in the light of the data presented these moves appear to be fully justified.

#### Notes:

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1) The status and validity of this FSD is, however, somewhat unclear: it forces [AGR NP {[NFORM norm]}] to all verbal predicates which are not marked otherwise in the respective ID-rule. Consequently, such verbs as "bother" must be listed in the lexicon twice, each time with different subcategorization class, but in both cases subcategorizing for identical complements (and, hence, there have to be two almost identical lexical rules in the grammar, one for each of the classes). This, in turn, makes the (otherwise simple and clear) sentence (i) ambiguous, while on the other hand, due to this FSD none of the sentences in (ii),(iii) can be generated.

- (i) Kim was bothered.
- (ii) That John would not come was obvious.  
That Kim was elected  
gave Sandy the satisfaction.
- (iii) It was obvious  
that John would not come.  
It gave Sandy the satisfaction  
that Kim was elected.

On closer observation, a lot of verbs can (appropriate pragmatic conditions provided) take a sentential subject: the "brute force" method for coping with this fact would be to increase the size of rules and lexical entries, as performed with "bother" and analogs in (Gazdar, Klein, Pullum and Sag,85). More appropriate solution (at least in my opinion) would be to soften the FSD11 to the form (iv), and simultaneously to stipulate that only verbs taking exclusively sentential subject (if they exist) or exclusively nominal subject (e.g. "believe", "hope") would be marked as such.

- (iv) FSD11:  

$$\{[V,+], [BAR,0]\}$$

$$(\{[AGR NP \{[NFORM norm]\}]\} \text{ or } \{[AGR S]\})$$

Generating (iii), however, requires further replacing the [AGR S] specification in the mother of the pattern rule in the Extraposition Metarule with  $\sim$ [AGR NP] specification.

- (v) Extraposition Metarule

$$\begin{array}{ccc}
 X^2 \{ \sim [AGR NP] \} & \xrightarrow{\quad} & W \\
 & \downarrow & \\
 X^2 \{ [AGR NP \{ it \}] \} & \xrightarrow{\quad} & W, S
 \end{array}$$

2) But see the previous comment for some discussion of this point.

3) However, to keep consistency with the proposals from 1), we had better to introduce a FCR (i) instead of FSD (21)

- (i) FCR  

$$\{[FUNC ag]\}$$

$$\Rightarrow (NP \{[PREP by]\} \text{ or } S \{[COMP that]\})$$

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