Preserving grammatical functions in LFG

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Abstract. Patejuk and Przepiórkowski (2016) have provided arguments and evidence to call into question the traditional role that named grammatical functions have played in the descriptions and representations of Lexical Functional Grammar. They propose reducing the number of distinguished function names to a much more limited set. In this brief paper I examine a few of their observations and find them not yet convincing enough to justify such a fundamental revision of LFG theory. I am also concerned that a less refined structure at the interface between syntax and semantics will only shift to the semantic interpretation component the descriptive and explanatory burden of interpreting idiosyncratic morphosyntactic properties. I conclude that most if not all grammatical function distinctions should be preserved in LFG functional structures.

1 Introduction

Lexical Functional Grammar posits a level of functional structure to decompose the complex mapping between surface word and phrase configurations and the semantic predicate-argument relationships that they express (Kaplan 1989; Kaplan and Bresnan 1982). The f-structure is intended as an intermediate, formal characterization of the syntactic information needed to guide the construction of meaning representations while abstracting away from grammatical details that are semantically irrelevant. The premise of this modular architecture is that the overall form-to-meaning mapping is a nearly decomposable system (Simon 1996) whose apparent complexity can be diminished by a division of labor that separates the correspondence of surface configurations to f-structure from the correspondence of f-structures to semantic representations.

One of the hallmarks of Lexical Functional Grammar from its inception has been the fundamental role that the *names* of grammatical functions play in syntactic descriptions and syntactic representations. The f-structure is defined as a hierarchical attribute-value matrix where symbols like SUBJ, OBJ, and ADJ serve as the attributes that formally identify and distinguish the individual functions. For more than 30 years this fundamental architectural assumption and its associated mathematics have supported precise characterizations of complex grammatical phenomena in a wide variety of languages (see Dalrymple 2001; Bresnan, Asudeh, et al. 2016), the construction of

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detailed, broad coverage grammars for a more limited set of languages (e.g. Butt et al. 2002), and efficient computational systems for parsing and generation (e.g. Kaplan and Maxwell 1996; Crouch et al. 2008; Wedekind and Kaplan 2012).

However, in a recent provocative paper Patejuk and Przepiórkowski (2016) have called into question that underlying assumption of the LFG architecture. Patejuk and Przepiórkowski (henceforth P&P) argue that most function-name distinctions can and should be eliminated. This is because they are either redundant with other morphosyntactic and semantic properties or because they undercut the analysis of certain well-attested constructions. P&P arrive at a proposal for a bleached-out functional representation with a reduced set of function names consisting only of SUBJ and OBJ and a catch-all DEPS that groups all other clausal entities in an undifferentiated list of HPSG-style 'dependents'.

This is an interesting proposal that certainly deserves more exploration and discussion. In this brief paper I examine some of the syntactic arguments and evidence that Patejuk and Przepiórkowski put forward but find them not yet convincing enough to justify such a fundamental revision of LFG theory. I am also concerned that a less refined structure at the interface between syntax and semantics will only shift to the semantic component the descriptive and explanatory burden of interpreting idiosyncratic morphosyntactic properties. I conclude that most if not all grammatical function distinctions should be preserved in f-structure.

2 The oblique functions

P&P acknowledge that the governable functions SUBJ and OBJ are not directly aligned with particular morphosyntactic properties and therefore have independent theoretical motivation. Setting aside SUBJ and OBJ (and also the ungoverned functions ADJ and XADJ), they point to a deterministic correspondence that is often assumed between syntactic categories and governable grammatical functions for English, as illustrated in (1).

(1)

XP:	NP	PP	CP	InfP (=VP)
GF:	OBJ_θ	OBL_θ	COMP	XCOMP

This picture is more complicated because the OBJ_θ and OBL_θ labels stand for families of functions that are further distinguished in some approaches by values of θ that identify specific thematic roles (e.g. BENEFICIARY or GOAL). These may be flagged in phrase structure by particular prepositions (e.g. *for* or *to*), as in English, or by case markings in languages with richer morphology. P&P argue that the mapping of particular nominals to the proper thematic roles can be achieved without making the θ distinctions in function names.

On any account there must be a specification that correlates particular cases/prepositions with their associated thematic roles (*to* $\longleftrightarrow$ GOAL), and the representation (f-

structure) that serves as the interface between syntax and semantics must encode enough information from the surface configuration so that that specification can be properly interpreted. On the traditional account, that information is extracted from local c-structure properties and converted to explicit, distinctive handles that subsequently give easy access to relevant functional units. This can be accomplished by means of standard functional-description designators in conventional LFG rules and lexical entries as are partially shown in (2).[1]

(2)
$$\begin{array}{lllll} \text{VP} \longrightarrow & \text{V} & \text{NP} & & \text{PP*} \\ & & (\uparrow \textsc{obj})=\downarrow & (\uparrow (\downarrow \textsc{gf})) = (\downarrow \textsc{obj}) & \\ \text{PP} \longrightarrow & \text{P} & \text{NP} & & \\ & & (\uparrow \textsc{obj})=\downarrow & & \\ \textit{to:} & \text{P} & (\uparrow \textsc{gf}) = \textsc{obl}_{\textsc{goal}} & & \end{array}$$

These might characterize f-structure (3) for *John gave a book to Susan.*

(3)
$$\begin{bmatrix} \textsc{pred} & \text{`}\textsc{give}\langle \textsc{subj}, \textsc{obj}, \textsc{obl}_{\textsc{goal}} \rangle\text{'} \\ \textsc{subj} & \begin{bmatrix} \textsc{pred} & \text{`}\textsc{John}\text{'} \end{bmatrix} \\ \textsc{obj} & \begin{bmatrix} \textsc{pred} & \text{`}\textsc{book}\text{'} \end{bmatrix} \\ \textsc{obl}_{\textsc{goal}} & \begin{bmatrix} \textsc{pred} & \text{`}\textsc{Susan}\text{'} \end{bmatrix} \end{bmatrix}$$

Note that under this analysis the f-structure is not cluttered with a separate GOAL/TO feature. The VP rule uses that value to make a local decision about the specific OBL variant, and the result is then recorded as the distinguished grammatical function.

On the account that P&P suggest, the relevant properties of the local configuration presumably would be imported as features into f-structure, perhaps with no motivation other than to enable subsequent discrimination of the units that are collected into an otherwise undifferentiated DEPS list, roughly as in (4).

(4)
$$\begin{bmatrix} \textsc{pred} & \text{`}\textsc{give}\text{'} \\ \textsc{subj} & \boxed{1}\ [\textsc{pred}\ \text{`}\textsc{John}\text{'}] \\ \textsc{obj} & \boxed{2}\ [\textsc{pred}\ \text{`}\textsc{book}\text{'}] \\ \textsc{deps} & \left\langle \boxed{1}, \boxed{2}, \begin{bmatrix} \textsc{pred} & \text{`}\textsc{Susan}\text{'} \\ \textsc{case} & \textsc{goal} \end{bmatrix} \right\rangle \end{bmatrix}$$

1 The Kleene-star asterisk on the PP allows for predicates that subcategorize for multiple co-occurring obliques: *John talked to Susan about the plan.* I also follow the LFG convention that head-marking equations ↑ =↓ are implicit for otherwise unannotated categories.

Here we see that the reduction in the set of function names is accompanied by a compensating increase in f-structure complexity. The CASE feature is explicit in the f-structure and, as P&P propose, the DEPS list redundantly includes the SUBJ and OBJ structures. Apart from the apparent structural complexity, an otherwise unnecessary collection of identification and feature-filtering constraints, essentially another analysis of the space of structures, would also be required to provide a semantic interpretation. Thus, P&P are technically correct in that the correspondence of surface markers and oblique thematic roles can be defined without recourse to these distinguished function names. But the grammatical system may be simpler overall if these distinctions are preserved.

We also see that the semantic form has been reduced to just the predicate name, without the traditional mapping of grammatical functions to semantic arguments. Semantic forms were introduced by Kaplan and Bresnan (1982) as a formal device to encapsulate the syntactic properties of relevance to semantic interpretation while allowing syntactic description to remain agnostic to the details of semantic representation. As P&P and others have noted and as Kaplan and Bresnan anticipated, the syntactic/semantic dependencies that semantic forms encode have been spelled out more explicitly in particular semantic formalisms, e.g. the early Halvorsen and Kaplan (1988) projection architecture and more recently in Glue semantics (Dalrymple 2001). Semantic forms are thus sometimes regarded as redundant with respect to a full-fledged semantic theory. But they are intended to be viewed as succinct characterizations of more elaborate specifications and are designed to support the modularity of the overall grammatical system. Along the same lines, the correspondence between grammatical functions and thematic relations is the province of another relatively independent module within the LFG framework, Lexical Mapping Theory (Levin 1986; Dalrymple 2001; Bresnan, Asudeh, et al. 2016).

3 The function XCOMP

P&P question the independent status of the open complement function XCOMP given its one-to-one correspondence to the category InfP (henceforth VP) that they display in the table in (1). In constructing this table, they have discounted the possibility of assigning XCOMP to adjectival, prepositional, and nominal complements. This is because alternatives to that analysis have appeared in theoretical discussions (Dalrymple, Dyvik, et al. 2004) and in some of the large-scale grammars developed by the Pargram consortium (Butt et al. 2002). Those alternatives (including the PREDLINK proposal) focus mostly on the AP, PP, and NP′ complements of copular constructions, but even then it is recognized that XCOMP is appropriate for at least some non-infinitive examples in some languages (see Dalrymple, Dyvik, et al. 2004 for discussion). Perhaps with less controversy, post-verbal complements as in (5b-c) also show that open complements can be realized by categories other than the VP in (5a).

(5) a. We consider John to be intelligent.
b. We consider John intelligent.
c. We consider John an intelligent manager.

Examples like these are admitted by the rule (6a) and the lexical entry (6b).[2] [3]

(6) a. VP ⟶ V NP VP|AP|PP|NP′
(↑ OBJ)=↓ (↑ XCOMP)=↓

b. *consider:* (↑ PRED) = ‘CONSIDER⟨SUBJ, OBJ, XCOMP⟩’
(↑ XCOMP SUBJ) = (↑ OBJ)

Thus the open XCOMP function cannot be identified only with infinitival phrases in constituent structure, contrary to this particular claim for redundancy that P&P put forward.

4 The function COMP

Turning to the closed complement function, P&P note that COMP is always related to clausal constituents of category CP but the converse is not true: there are CP’s that do not map to COMP. P&P use the paradigm of unlike-category coordination in (7a-c), based on Sag et al. (1985), to make the point. They argue that SUBJ and not COMP should be assigned to CP’s when they stand alone in English pre-verbal positions, given that they can coordinate with uncontroversial nominal subjects.[4] This argument is strengthened by the fact that CP’s can also participate in raising constructions (7d), since then there is no appeal to an indirect inference from coordination.

(7) a. The implications frightened many observers.
b. That Himmler appointed Heydrich frightened many observers.
c. That Himmler appointed Heydrich and the implications thereof frightened many observers.

2 The category NP′ can be derived by a simple type-shifting rule that coerces an ordinary NP into a monadic predicate:

NP′ ⟶ NP
(↑ PRED) = ‘↓⟨SUBJ⟩’

The relation position of the constructed semantic form is filled by ↓, indicating that the semantic interpretation of the entire complement NP is to be taken as a predicate that applies to the controlled subject, just as for complement constructions with other categories.

3 This rule overgenerates in that the verb *consider* does not admit of a prepositional complement:

*We consider John in the park.

See Kaplan and Maxwell (1996), Crouch et al. (2008), and particularly Dalrymple (2017) for discussions of devices that allow individual predicates to restrict the categories that a general phrase structure rule would otherwise allow for their governed functions.

4 Berman (2007) makes a similar argument for German.

d. That Himmler appointed Heydrich seemed to frighten many observers.

P&P appeal to a similar coordination argument to show that CP's can also be mapped to OBJ. That argument is reinforced by several other observations that other researchers have discussed (e.g. Dalrymple and Lødrup 2000; Alsina et al. 2005; Forst 2006). Some post-verbal CP's can undergo passivization, for example, as we see in (8).

(8) a. I believe that the earth is round.
b. That the earth is round was not believed.

But P&P and others also examine evidence for CP's that cannot be assimilated to the SUBJ or OBJ functions. The post-verbal CP in (9a) does not satisfy the conventional passivization test of typical OBJ's.

(9) a. John hoped that it would rain.
b. *That it would rain was hoped.

Dalrymple and Lødrup (2000) suggest preserving the function COMP to label these instances of CP, while P&P follow Alsina et al. (2005) and propose marking these clauses as OBLiques. Forst (2006) also argues for an OBLique account on the basis of considerations from computation and parallel grammar development. Support for this analysis comes from the fact that (non SUBJ or OBJ) finite clauses stand in complementary distribution to traditionally oblique nominals that are marked with particular prepositions/cases.

(10) a. The secretary has already insisted on it. (Forst 2006)
The secretary has already insisted that I have to fill out the form.
b. We weren't aware of the problem. (Alsina et al. 2005)
We weren't aware that Chris yawned.

Forst cites as an advantage of this account that disjunctive subcategorization frames (11a) would no longer be needed for lexical predicates. Only the simpler OBL_{ON} specification for *insist* in (11b) would be required.[5]

(11) a. *insist:* $(\uparrow \text{PRED}) = \text{`INSIST}\langle \text{SUBJ,OBL}_{\text{ON}} \rangle\text{'} \vee (\uparrow \text{PRED}) = \text{`INSIST}\langle \text{SUBJ,COMP} \rangle\text{'}$
b. *insist:* $(\uparrow \text{PRED}) = \text{`INSIST}\langle \text{SUBJ, OBL}_{\text{ON}} \rangle\text{'}$

5 A more compact and possibly more efficient subcategorization frame than (11a) might be expressed with functional uncertainty:

insist: $(\uparrow \text{PRED}) = \text{`INSIST}\langle \text{SUBJ, } \{\text{OBL}_{\text{ON}} \mid \text{COMP}\} \rangle\text{'}$

This pattern can be propagated systematically across the lexicon, perhaps with a general template, as another way of highlighting the complementarity of COMP and obliques.

However, eliminating COMP in favor of predicate-selected obliques (cf. Section 2) may be accompanied by added complexity of the c-structure grammar. The phrase structure rules must be adjusted to anticipate the particular oblique function that a given predicate selects for the CP. This might be done, for example, by a functional uncertainty in the VP rule (12a). Or the annotation on the PP in (2) can be left alone if an unusual exocentric expansion of PP to CP is introduced to guess the particular oblique function in a different way (12b).

(12) a. VP $\longrightarrow$ V { PP* $(\uparrow(\downarrow \text{GF}))=(\downarrow \text{OBJ})$ | CP $(\uparrow\{\text{OBL}_{\text{ON}}|\text{OBL}_{\text{OF}}|\ldots\})=\downarrow$ }

b. PP $\longrightarrow$ {P NP $(\uparrow \text{OBJ})=\downarrow$ | CP $(\uparrow \text{OBJ})=\downarrow$ $(\uparrow \text{GF})\in\{\text{OBL}_{\text{ON}}, \text{OBL}_{\text{OF}}, \ldots\}$ }

There may be other accounts of distributions as in (10a), but their value also must be measured against the impact on other parts of the grammar. As has been suggested, reducing the set of distinguished function-names is not an end in and of itself.

5 The open/closed distinction

P&P argue, as I have indicated, that some grammatical function distinctions are technically unnecessary for syntactic description. They also make a stronger argument, that the distinction between the open complement XCOMP and other closed functions is actually harmful. Their argument is for the most part based on examples of unlike category coordination that also involve open/closed differences in function assignment.

Recall the major premises of the traditional LFG treatment of constituent coordination (Bresnan, Kaplan, et al. 1985; Kaplan and Maxwell 1988; Dalrymple and Kaplan 2000; Dalrymple 2001, and many others): c-structures are derived by substituting a particular category for X in the general metarule (13), the membership annotations map the coordination to a set in f-structure whose elements are the f-structures corresponding to the conjoined constituents, and a so-called 'distributive property' is satisfied by a set if and only if it is satisfied by each of its elements (14).[6]

6 Distribution has typically been defined, in theory and in practice, by simply declaring that some attributes (grammatical functions and morphosyntactic features like CASE) are distributive and others (e.g. PERSON, GENDER, and NUMBER) are not (Kaplan and Maxwell 1996; Crouch et al. 2008; Dalrymple and Kaplan 2000; Dalrymple, King, et al. 2009). Distributive properties are then just those with designators that include distributive attributes.

The Dalrymple and Kaplan (2000) notion of property foreshadows a more general formulation, and Przepiórkowski and Patejuk (2012) propose allowing a larger combination of constraints to be specfied as a unitary distributive property. This would permit in particular arbitrary disjunctive constraints to have narrow scope with respect to coordination, something that has otherwise been encoded indirectly, for example, by using feature decomposition (Dalrymple, King, et al. 2009) or off-path constraints (Przepiórkowski and Patejuk 2012). This idea can be formalized as an explicit operator declaring that an

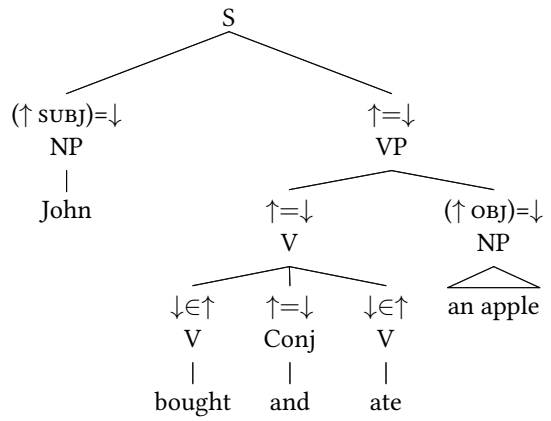
(13) $\begin{array}{lcccc} X & \longrightarrow & X & Conj & X \\ & & \downarrow \in \uparrow & \uparrow = \downarrow & \downarrow \in \uparrow \end{array}$

(14) A structure f satisfies a distributive property P if and only if
f is an f-structure and f satisfies P, or
f is a set and g satisfies P for all g in f.

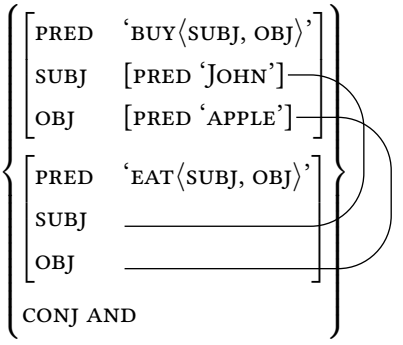
Substituting V for X in (13) will derive the c-structure in (16) for the verb coordination in (15), and it will receive the f-structure (17). Because the set corresponding to the coordinated verb is the head of the VP and S and the grammatical function assignments (SUBJ and OBJ) are distributive, they apply to the f-structures corresponding to each of the verbs. The resulting structure satisfies the subcategorization requirements of each predicate.

(15) John bought and ate an apple.

(16)



(17)



arbitrary description P is a distributive property when it is applied to an f-structure f that happens to be a set:

DISTRIB(f, v, P)

In any invocation (perhaps notated as a built-in template call) f will be a designator (e.g. ↑) and P will be a formula with a variable v that is bound in the scope of P to either the non-set designated by f or to each of its elements in turn.

Of crucial significance, the curved lines in this structure indicate that the two predicates share exactly the same SUBJ and OBJ structures, including the same semantic-form instantiations. Instantiated semantic forms were introduced by Kaplan and Bresnan (1982) to mark for semantic interpretation the difference between two f-structure entities that happen to be described in the same way, and a single entity that serves more than one syntactic function. Thus (15) and (17) contrast with the sentence-level coordination in (18):

(18) a. John bought an apple and John ate an apple.

b.
$$\left\{ \begin{bmatrix} \text{PRED} & \text{`BUY}\langle \text{SUBJ, OBJ}\rangle\text{'} \\ \text{SUBJ} & [\text{PRED `JOHN'}] \\ \text{OBJ} & [\text{PRED `APPLE'}] \end{bmatrix} \begin{bmatrix} \text{PRED} & \text{`EAT}\langle \text{SUBJ, OBJ}\rangle\text{'} \\ \text{SUBJ} & [\text{PRED `JOHN'}] \\ \text{OBJ} & [\text{PRED `APPLE'}] \end{bmatrix} \text{CONJ AND} \right\}$$

Unlike the verb-level coordination in (15), (18) admits the possibility that one apple was bought and another was eaten. Instantiation is the formal device that controls what might otherwise be many other semantic anomalies.[7]

I now return to the question of whether the distinction between open and closed grammatical functions is harmful to syntactic analysis and should therefore be eliminated. P&P base their argument on well-formed examples of unlike-category coordination where distribution would assign an open grammatical function to one of the coordinated phrases and a closed OBJ to the other.

(19) The majority want peace and to live a comfortable life.

The coordination of unlike categories is not in itself a particular problem. The typical approach is to relax the substitution possibilities in the meta-rule (13) so that one of the conjuncts can be realized as a category different from the mother's.

(20) $$\begin{array}{lcccccc} \text{X} & \longrightarrow & \text{X} & & \text{Conj} & & \text{Y} \\ & & \downarrow\in\uparrow & & \uparrow=\downarrow & & \downarrow\in\uparrow \end{array}$$

The match between the mother category and one of its daughters (typically the first as shown here (Peterson 2004), but that issue has not been studied in detail and there

7 In terms of the notions of Glue semantics (see Dalrymple (2001)), the structure (17) provides a single OBJ resource for semantic interpretation with respect to both predicates. Structure (18b) provides two separate resources with accidentally similar properties.

may be wide variation) ensures that at least that daughter satisfies the external categorial requirements of the mother.[8] This relaxation allows for the coordination of unlike closed functions as we saw above (7c) and unlike open functions (21).

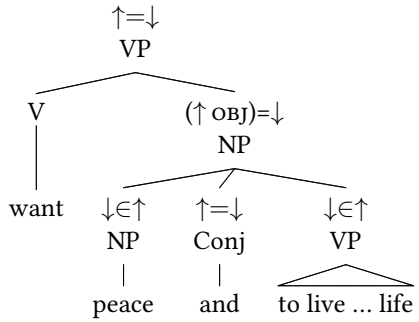
(21) We consider John intelligent and a good manager.

Here the functional control in the lexical entry for *consider* (6b) is distributed to provide a SUBJ for both open elements of the coordination. Combined with the type-shifting rule of footnote 2, this results in an f-structure (22) with appropriate syntactic and semantic properties.

(22)
$$\begin{bmatrix} \text{PRED} & \text{`CONSIDER}\langle \text{SUBJ, OBJ, XCOMP}\rangle\text{'} \\ \text{SUBJ} & [\text{PRED `PRO'}] \\ \text{OBJ} & [\text{PRED `JOHN'}] \\ \text{XCOMP} & \left\{ \begin{bmatrix} \text{PRED} & \text{`INTELLIGENT}\langle \text{SUBJ}\rangle\text{'} \\ \text{SUBJ} & \square \end{bmatrix}, \begin{bmatrix} \text{PRED} & \text{`}\begin{bmatrix} \text{PRED} & \text{`MANAGER'} \\ \text{MOD} & \left\{ [\text{PRED `GOOD'}] \right\} \end{bmatrix}\langle \text{SUBJ}\rangle\text{'} \\ \text{SUBJ} & \square \end{bmatrix}, \text{CONJ AND} \right\} \end{bmatrix}$$

Another instance of rule (20) will expand an NP in object position to derive the NP-VP coordination of sentence (19) and assign OBJ to the resulting set.

(23)



This will be compatible with the first of the alternative subcategorization frames for *want* in (24). The problem is that that frame does not provide a SUBJ for *live* in the open VP complement, and the overall f-structure will be incomplete. The other frame

8 Any further predicate-specific restrictions can be imposed by other formal devices, as per the references in footnote 3.

does provide the SUBJ for an XCOMP but does not allow for the OBJ that comes from the c-structure annotation.

(24) *want:* (↑ PRED)='WANT⟨SUBJ, OBJ⟩' ∨ (↑ PRED)='WANT⟨SUBJ, XCOMP⟩'
(↑ XCOMP SUBJ)=(↑ SUBJ)

P&P mention in a footnote that an anonymous reviewer proposed an analysis for sentences like (19) that treats them as instances of non-constituent coordination. I explore that possibility here. Non-constituent coordination has received far less attention in LFG theory than constituent coordination, but a basic framework was laid out by Maxwell and Manning (1996). They introduce systematically a family of new categories and rules just for coordination that subdivide a regular right-side expansion of an ordinary c-structure rule. Those new categories expand so that their concatenation covers the same immediate daughter sequences as the original rule. Consider the VP rule (25) that optionally allows for an OBJ NP and an XCOMP VP.

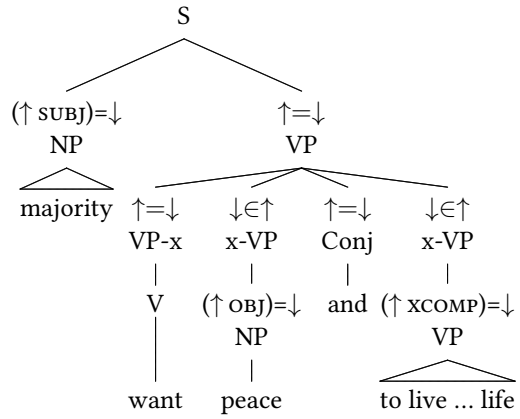
(25) VP ⟶ V (NP) (VP)
(↑ OBJ)=↓ (↑ XCOMP)=↓

According to their proposal, for this case we let x denote the juncture between the initial V and the subsequent optional categories and introduce new categories VP-x and x-VP with expansions as in (26a-b). The alternative VP rule (26c) uses the new categories to cover coordinated VP daughter sequences.

(26) a. VP-x ⟶ V
b. x-VP ⟶ (NP) (VP)
(↑ OBJ)=↓ (↑ XCOMP)=↓
c. VP ⟶ VP-x x-VP Conj x-VP
↑=↓ ↓∈↑ ↑=↓ ↓∈↑

With these rules we can now derive the annotated c-structure (27) for the problematic sentence (19).

(27)



The f-description produced from this c-structure defines a set at the top level (because of the ↑=↓ annotation) that contains two elements. One element has an OBJ corresponding to *peace* and the other has an XCOMP that represents the *live* complement. The disjunctive specification of *want*'s subcategorization requirements (24) still poses a problem. Disjunction in LFG normally has wide scope. Thus either the OBJ frame or the XCOMP frame would be distributed to both elements of the coordination set, and in each case one of the elements will fail the completeness/coherence tests. We must further arrange for the disjunction itself to be distributed and resolved separately on each element. It is well established that functional uncertainties with distributive attributes are independently evaluated on individual set elements, and I make use of that fact to rewrite the *want* lexical entry.[9]

(28) *want:* (↑ PRED) = 'WANT⟨SUBJ, {OBJ | XCOMP (→ SUBJ)=(← SUBJ)}⟩'

This allows *want*'s second argument to be filled by an OBJ in one conjunct and an XCOMP in the other. The subject-control relation is paired as an off-path constraint just with the XCOMP selection: it identifies the XCOMP's SUBJ (designated by (→ SUBJ)) with the matrix SUBJ (designated by (← SUBJ)). With this adjustment we obtain the f-structure (29) for sentence (19).

(29)
$$\left\{\begin{bmatrix} \text{PRED} & \text{'WANT⟨SUBJ, OBJ⟩'} \\ \text{SUBJ} & [\text{PRED 'MAJORITY'}] \\ \text{OBJ} & [\text{PRED 'PEACE'}] \end{bmatrix}, \begin{bmatrix} \text{PRED} & \text{'WANT⟨SUBJ, XCOMP⟩'} \\ \text{SUBJ} & \square \\ \text{XCOMP} & \begin{bmatrix} \text{PRED} & \text{'LIVE⟨SUBJ, OBJ⟩'} \\ \text{SUBJ} & \square \\ \text{OBJ} & [\text{PRED 'LIFE'}] \end{bmatrix} \end{bmatrix}, \text{CONJ AND} \right\}$$

This non-constituent solution thus assigns appropriate c- and f-structures to (19) while preserving the open/closed complement distinction. As John Maxwell (p.c.)

9 Alternatively, we can declare the disjunctive entry for *want* (24) as a narrow-scope distributive property using the DISTRIB notation proposed in footnote 5:

want: @DISTRIB(↑, V, (V PRED) = 'WANT⟨SUBJ, OBJ⟩'
∨
(V PRED) = 'WANT⟨SUBJ, XCOMP⟩'
(V XCOMP SUBJ) = (V SUBJ))

Indeed, it may be worth exploring whether subcategorization frames and other core lexical constraints should be interpreted distributively as a general convention.

notes, the clearer case of non-constituent coordination in (30) offers further support for this analysis.

(30) The majority want peace on some days and to live a comfortable life on others.

P&P dismiss this approach, however, on semantic grounds. They point to well known observations about the distribution of quantification over coordination (e.g. Partee (1970)), noting the difference in possible interpretations for the single indefinite NP external to a phrasal coordination (31a) compared to a repetition of quantified NPs in a sentence-level coordination (31b).

(31) a. A majority want peace and to live a comfortable life.

b. A majority want peace and a majority want to live a comfortable life.

The same majority is involved in both (31a) events while (31b) admits of two distinct majorities. P&P suggest that a complicated syntax-semantics mapping would be required to distinguish the intended readings of these sentences, given the similarity of their f-structures. But the f-structure for (31a) has the upper SUBJ-to-SUBJ linking line that (29) has for (19). This encodes the fact that a single semantic resource is a participant in both clauses. Crucially, that link is missing in (32), the f-structure for (31b).

(32)
$$\left\{\begin{bmatrix} \text{PRED} & \text{`WANT}\langle\text{SUBJ, OBJ}\rangle\text{'} \\ \text{SUBJ} & [\text{PRED `MAJORITY'}] \\ \text{OBJ} & [\text{PRED `PEACE'}] \end{bmatrix} \right.$$
$$\left.\begin{bmatrix} \text{PRED} & \text{`WANT}\langle\text{SUBJ, XCOMP}\rangle\text{'} \\ \text{SUBJ} & [\text{PRED `MAJORITY'}] \\ \text{XCOMP} & \begin{bmatrix} \text{PRED} & \text{`LIVE}\langle\text{SUBJ, OBJ}\rangle\text{'} \\ \text{SUBJ} & \\ \text{OBJ} & [\text{PRED `LIFE'}] \end{bmatrix} \end{bmatrix} \right\}$$
$$\text{CONJ AND}$$

The syntactic representation of shared/unshared resources thus marks a difference that can support the alternative readings. Note also that these semantic differences are orthogonal to the distinctions between open and closed functions, like and unlike category coordination, and constituent and nonconstituent coordination: the sentences (33) exhibit the same semantic contrasts.

(33) A majority want to make money and to live a comfortable life.

A majority want to make money and a majority want to live a comfortable life.

P&P argue from examples like (19) that it is not helpful, and even harmful, to discriminate between open and closed complements. At least for these examples we have seen that this is not the case. Treating this as an instance of nonconstituent coordination, our analysis maintains that functional distinction but still assigns representations that are plausible with respect to both syntax and semantics.

6 Conclusion

I have surveyed some of the arguments and some of the evidence that Patejuk and Przepiórkowski (2016) have presented as motivation for reducing the inventory of grammatical functions that may populate an LFG f-structure. It would be surprising if there were no connection between specific grammatical functions and other morphosyntactic properties, since those properties of words and phrases are what signal those functions in particular configurations. But contrary to P&P and even though it may be technically possible, I have suggested that the overall grammatical system will not be improved if obliques are no longer differentiated or if the open and closed complement functions are collapsed together or with other functions. The denatured representation that P&P propose as a replacement for an articulated f-structure may simplify the syntactic component of the grammatical system at the expense of redundancy and complexity in semantic interpretation. Distinguished grammatical functions abstract away from variation in morphosyntactic detail, preserving (or creating) formal distinctions at the intermediate f-structure level intended to support an overall simpler, modular mapping from surface form to meaning.

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References

Alsina, Alex, Tara Mohanan, and K. P. Mohanan (2005). "How to Get Rid of the COMP". In: *On-Line Proceedings of the LFG2005 Conference*. Ed. by Miriam Butt and Tracy Holloway King. Stanford: CSLI Publications.

Berman, Judith (2007). "Functional Identification of Complement Clauses in German and the Specification of COMP". In: *Architectures, Rules, and Preferences: Variations*

on Themes by Joan W. Bresnan. Ed. by Annie Zaenen, Jane Simpson, Tracy Holloway King, Jane Grimshaw, Joan Maling, and Chris Manning. Stanford: CSLI Publications, pp. 69–83.

Bresnan, Joan, Ronald M. Kaplan, and Peter G. Peterson (1985). "Coordination and the Flow of Information Through Phrase Structure". Unpublished manuscript, Xerox PARC.

Bresnan, Joan, Ash Asudeh, Ida Toivonen, and Stephen Wechsler (2016). *Lexical-Functional Syntax*. 2nd ed. Oxford: Wiley Blackwell.

Butt, Miriam, Helge Dyvik, Tracy Holloway King, Hiroshi Masuichi, and Christian Rohrer (2002). "The Parallel Grammar Project". In: *Proceedings of the International Conference on Computational Linguistics (COLING2002) Workshop on Grammar Engineering and Evaluation*. International Committee on Computational Linguistics. Taipei, pp. 1–7.

Crouch, Dick, Mary Dalrymple, Ronald M. Kaplan, Tracy Holloway King, John T. Maxwell III, and Paula S. Newman (2008). *XLE Documentation*. Palo Alto Research Center. Palo Alto, CA.

Dalrymple, Mary and Ronald M. Kaplan (2000). "Feature Indeterminacy and Feature Resolution". In: *Language* 76.4, pp. 759–798.

Dalrymple, Mary and Helge Lødrup (2000). "The Grammatical Functions of Complement Clauses". In: *On-Line Proceedings of the LFG2000 Conference*. Ed. by Miriam Butt and Tracy Holloway King. Stanford: CSLI Publications.

Dalrymple, Mary (2001). *Lexical Functional Grammar*. Syntax and Semantics 34. New York: Academic Press.

Dalrymple, Mary, Helge Dyvik, and Tracy Holloway King (2004). "Copular Complements: Closed or Open?" In: *On-Line Proceedings of the LFG2004 Conference*. Ed. by Miriam Butt and Tracy Holloway King. Stanford: CSLI Publications.

Dalrymple, Mary, Tracy Holloway King, and Louisa Sadler (2009). "Indeterminacy by Underspecification". In: *Journal of Linguistics* 45, pp. 31–68.

Dalrymple, Mary (2017). "Unlike phrase structure category coordination". In: *The very model of a modern linguist: in honor of Helge Dyvik*. Ed. by Victoria Rosén and Koenraad De Smedt. Bergen Language and Linguistics Studies (BeLLS) 8, pp. 33–55.

Dalrymple, Mary, Ronald M. Kaplan, John T. Maxwell III, and Annie Zaenen, eds. (1995). *Formal Issues in Lexical-Functional Grammar*. Stanford: CSLI Publications.

Forst, Martin (2006). "COMP in (Parallel) Grammar Writing". In: *On-Line Proceedings of the LFG2006 Conference*. Ed. by Miriam Butt and Tracy Holloway King. Stanford: CSLI Publications.

Kaplan, Ronald M. and John T. Maxwell III (1996). *LFG Grammar Writer's Workbench*. Palo Alto Research Center. Palo Alto, CA.

Halvorsen, Per-Kristian and Ronald M. Kaplan (1988). "Projections and Semantic Description in Lexical-Functional Grammar". In: *Proceedings of the International Con-*

ference on Fifth Generation Computer Systems (FGCS-88). ICOT. Tokyo, pp. 1116–1122. Reprinted in Dalrymple, Kaplan, Maxwell, and Zaenen (1995, pp. 279–292).

Kaplan, Ronald M. and John T. Maxwell III (1988). "Constituent Coordination in Lexical-Functional Grammar". In: *Proceedings of the International Conference on Computational Linguistics (COLING88)*. International Committee on Computational Linguistics, pp. 303–305. Reprinted in Dalrymple, Kaplan, Maxwell, and Zaenen (1995, pp. 199–210).

Kaplan, Ronald M. (1989). "The Formal Architecture of Lexical-Functional Grammar". In: *Journal of Information Science and Engineering* 5, pp. 305–322. Reprinted in Dalrymple, Kaplan, Maxwell, and Zaenen (1995, pp. 7–22).

Kaplan, Ronald M. and Joan Bresnan (1982). "Lexical-Functional Grammar: A Formal System for Grammatical Representation". In: *The Mental Representation of Grammatical Relations*. Ed. by J. Bresnan. Cambridge, Mass.: MIT Press, pp. 173–281. Reprinted in Dalrymple, Kaplan, Maxwell, and Zaenen (1995, pp. 29–130).

Levin, Lori S. (1986). "Operations on Lexical Forms: Unaccusative Rules in Germanic Languages". PhD thesis. Massachusetts Institute of Technology. Reprinted by Garland Press, New York, 1988.

Maxwell III, John T. and Christopher D. Manning (1996). "A Theory of Non-Constituent Coordination Based on Finite-State Rules". In: *On-Line Proceedings of the LFG96 Conference*. Ed. by Miriam Butt and Tracy Holloway King. Stanford: CSLI Publications.

Partee, Barbara Hall (1970). "Negation, conjunction, and quantifiers: Syntax and semantics". In: *Foundations of Language* 6, pp. 153–165.

Patejuk, Agnieszka and Adam Przepiórkowski (2016). "Reducing Grammatical Functions in LFG". In: *Proceedings of the Joint 2016 Conference on Head-driven Phrase Structure Grammar and Lexical Functional Grammar*. Ed. by Doug Arnold, Miriam Butt, Berthold Crysmann, Tracy Holloway King, and Stefan Müller. Stanford: CSLI Publications.

Peterson, Peter G. (2004). "Coordination: Consequences of a Lexical-Functional Account". In: *Natural Language and Linguistic Theory* 22.3, pp. 643–679.

Przepiórkowski, Adam and Agnieszka Patejuk (2012). "On case assignment and the coordination of unlikes: The limits of distributive features". In: *On-Line Proceedings of the LFG2012 Conference*. Ed. by Miriam Butt and Tracy Holloway King. Stanford: CSLI Publications, pp. 479–489.

Sag, Ivan A., Gerald Gazdar, Thomas Wasow, and Steven Weisler (1985). "Coordination and How to Distinguish Categories". In: *Natural Language and Linguistic Theory* 3.2, pp. 117–171.

Simon, Herbert A. (1996). "The Architecture of Complexity: Hierarchic Systems". In: *The Sciences of the Artificial*. 3rd ed. Cambridge, Mass.: M.I.T. Press, pp. 183–216.

Wedekind, Jürgen and Ronald M. Kaplan (2012). "LFG Generation by Grammar Specialization". In: *Computational Linguistics* 38.4, pp. 867–915.