Reducing grammatical functions in LFG

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Abstract

The aim of this paper is to reexamine the rich repertoire of grammatical functions assumed in LFG and provide novel arguments for the claim, voiced earlier for example in Alsina et al. 2005, that most of them are redundant. We also demonstrate that a textbook LFG test for the sameness of grammatical functions of different predicates fails on closer scrutiny. Constructively, we propose a more constrained approach to grammatical functions, which has the advantage of formalising the grammatical function hierarchy, assumed in LFG analyses of diverse phenomena but apparently not previously formalised.

1 Introduction

While LFG emphasises that grammatical functions (GFs) are first-class linguistic entities, not defined via tree-configurational or any other primitives, there is surprisingly little agreement on the definition of particular grammatical functions. The only function investigated in some depth is SUBJ, with a proposal of Falk 2006 to decompose it into two separate (but co-extensive in many of the familiar languages) functions: the most prominent argument of a verb and the argument that is accessible cross-clausally.[1] In practice, most subjects are easy to identify as those arguments which agree with the verb, although in many languages this test is limited to nominative arguments, and in some languages it is complicated by the existence of object agreement.

However, as the discussion in Dalrymple 2001, pp. 19–24, makes clear, there is no single cross-linguistically valid definition of object in LFG, not even one relating to passivisation; rather, as put in Dalrymple & Nikolaeva 2011, p. 24, "[d]iagnostics targeting nonsubject grammatical functions, specifically objects, also [i.e., as in the case of subjects] vary from language to language". Even less agreement is to be expected on GFs other than subject and (direct) object. However, if definitions of GFs are language-dependent, and there are no universal properties of, say, objects, it makes limited sense to assume a "universally available inventory of grammatical functions" (Dalrymple, 2001, p. 9); rather, LFG assumes an inventory of *names* of GFs, which have somewhat different meanings in the case of different languages.

The aim of this paper is to discuss further problems with the LFG approach to grammatical functions. In particular, we show that the way they are understood in actual LFG analyses is largely redundant (Section 2) and we substantiate proposals to reduce this redundancy (Section 3). We also show that a test aimed at identifying

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[1]See Sag 2007 and references therein for related work within HPSG.

the same grammatical functions of different predicates, based on dependent sharing, does not stand up to scrutiny (Section 4). On the basis of these considerations, we propose to minimise the role of (names of) GFs in LFG (Section 5).

2 GFs are redundant

The following (names of) grammatical functions are commonly assumed in LFG (Dalrymple 2001, p. 9, Bresnan et al. 2015, pp. 97–100): SUBJect, OBJect, OBJ$_\theta$, COMP, XCOMP, OBLique$_\theta$, ADJunct and XADJunct. In fact, the names with the θ subscript do not refer to specific grammatical functions such as SUBJ or OBJ, but they "represent families of relations indexed by semantic roles, with the θ subscript representing the semantic role associated with the argument" (Dalrymple, 2001, p. 9). In this paper, we concentrate on the governable grammatical functions SUBJ, OBJ, OBJ$_\theta$, OBL$_\theta$, COMP and XCOMP, i.e., grammatical functions of arguments of predicates (as opposed to the modifier functions ADJ and XADJ).

Subjects and (direct) objects are usually defined in a way independent of their morphosyntax. For example, while prototypical subjects in Indo-European languages are nominative NPs, not all such nominative NP dependents are subjects, and common tests such as ability to be controlled and being the sole binder of anaphors may identify as subjects NPs bearing cases other than nominative (as in the well-known case of quirky subjects in Icelandic). Moreover, coordination may provide evidence for non-NP subjects (see Section 3 below).

Similarly, if passivisation is used as the main test for objecthood, objects defined this way are not simply co-extensive with, say, accusative NPs: in many languages not all accusative dependents of active forms become subjects in the passive, and in various languages some of the arguments bearing other cases may passivise (see Section 4 for an example from Polish). Evidence from passivisation, psych-verbs, the contrast between unaccusative and unergative predicates, etc., also makes it clear that subjects and objects cannot be defined in terms of thematic roles they bear.[2] Hence, subject and object(s) may indeed be defined in a way that makes these grammatical functions primitive.

However, the same cannot be said about other argument GFs, which, in the usual LFG practice, are often conglomerates of independent syntactic (categorial) and semantic (thematic) properties. In the case of English, once we exclude subjects and (direct) objects, nominal arguments are often assumed to deterministically map into OBJ$_\theta$, prepositional arguments – into OBL$_\theta$, finite clauses (CPs) – into COMPs, and infinitival clauses – into XCOMPs:

(1)

XP:	NP	PP	CP	InfP
GF:	OBJ$_\theta$	OBL$_\theta$	COMP	XCOMP

The claim that XCOMP is often assumed to correspond directly to InfP may seem controversial since other categories – in particular, predicative NPs, APs and

[2] See, e.g., Dowty 1989, 1991 and references therein.

PPs – may in theory also map to this open complement function. However, this theoretical possibility is rarely taken advantage of in practice; two other analyses of such predicative complements are discussed in Dalrymple et al. 2004, including one involving a closed grammatical function, PREDLINK. Moreover, in implemented LFG/XLE grammars, a distinct grammatical function, XCOMP-PRED, is often used for open predicative complements. Hence, the correlation between XCOMP and InfP is rather strong in the actual LFG practice.

A mapping similar to (1) is also often assumed for languages other than English,[3] although in the case of languages with nominal morphology richer than in English, values of grammatical cases may also play a role, as in an analysis of Russian, where OBL_{GOAL} arguments may be bare (adpositionless) nominals marked for the dative case (King, 1995, p. 180). A clear illustration of this kind of morphosyntactic redundancy may be found in Nordlinger 1998, an LFG analysis of Australian languages based on the idea of constructive case, where grammatical functions are explicitly defined on the basis of morphological cases; since, as discussed in Nordlinger 1998, pp. 69–84, case features are required in such languages independently of grammatical functions, the question arises whether in such languages different GF features are really required independently of morphological case.

Grammatical functions, as understood in LFG, are redundant not only with respect to morphosyntax. While morphosyntax often determines the choice between OBJ_θ and OBL_θ, the particular value of θ, say, BENEFICIARY or INSTRUMENT), is redundant with respect to another level of representation, namely, s-structure, which is currently assumed to contain semantic attributes such as BENEFICIARY, PATH or INSTRUMENT (Asudeh & Giorgolo, 2012; Asudeh et al., 2013, 2014).

Let us also note in passing that, in some LFG analyses, the indices in OBL_θ do not always refer to thematic roles, but may also refer to specific (non-semantic) prepositions heading the PPs. This practice not only introduces further redundancy (as information about the form of these prepositions is already present both at c-structure and elsewhere at f-structure), but also clashes with the view that LFG provides a "universally available inventory of grammatical functions". For example, OBL_{OF} (for an argument of the adjective AWARE, the noun RELATIVE, and – more generally – nominal gerunds; Dalrymple 2001, pp. 82, 249, Bresnan et al. 2015, p. 316), with the English preposition OF as the index, cannot be assumed to be a part of the universal linguistic endowment.

3 Reducing the redundancy

It is clear that not all finite clauses bear the COMP grammatical function. One of the arguments for treating at least some CPs as subjects or objects concerns the

[3]For example: "Since the recipient/goal of the Urdu ditransitive verb *de* 'give' is marked with dative case, and never with a postposition, I assume that it is not an oblique, but an indirect object (OBJ_θ)" (Butt, 1995, pp. 163–164).

possibility to coordinate them with uncontroversial SUBJs and OBJs (Sag et al., 1985, p. 165):[4]

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

(3) a. Pat remembered the appointment.
    b. Pat remembered the appointment and that it was important to be on time.
    c. Pat remembered that it was important to be on time.

Thus, given that the phrase *the implications* is an uncontroversial subject in (2a) and that such an NP may be coordinated in this position with a CP, as shown in (2b), the finite clause should also be assumed to be the subject in (2c). Analogously, given that the phrase *the appointment* is an uncontroversial object in (3a) and that it may be coordinated in this position with a CP, as shown in (3b), the finite clause should also be assumed to be the object in (3c). Since CPs may be subjects and objects, should COMP be retained as a separate GF at all?

Dalrymple & Lødrup (2000) show that two different kinds of (non-subject) clausal complements exist in languages such as English, German and Swedish, and propose retaining COMP as the grammatical function of those CP arguments which are not OBJs (or SUBJs). However, Alsina et al. (2005) convincingly argue that the grammatical differences between different CP arguments may be accounted for without recourse to COMP; instead, English CPs treated in Dalrymple & Lødrup 2000 as COMPs should be analysed as OBLiques, which is sufficient to distinguish them from SUBJects or OBJects.

In passing, Alsina et al. (2005, p. 41) also postulate that "XCOMP should probably go the same way as COMP", but provide no arguments for this position (apart from mentioning that "XCOMP may be considered a special case of COMP"). While this move would be more far-reaching than getting rid of COMP, as it would obliterate the distinction between closed and open GFs, we believe it is sanctioned by the same kind of evidence that led to the acceptance of CP subjects and objects, namely, evidence from the coordination of unlikes.

Consider the following attested examples involving the control verb TEACH:[5]

(4) I taught him manners and to respect his elders.[6]

(5) . . . they taught me patience and to not take everything for granted.[7]

(6) Cooking has taught me patience, perseverance and to be creative.[8]

(7) It was my mother who taught me right from wrong, and to be careful who I

[4] Sag et al. (1985, pp. 164–165) mention that not all speakers accept (2c) and (3c).

[5] Another English example of this kind is given in Patejuk & Przepiórkowski 2014a, p. 456.

[6] https://bellamiataurus.com/tag/strengthineverknewihad/

[7] http://blog.girlscouts.org/2016/06/the-golden-girls-of-troop-520.html

[8] http://www.thekitchn.com/what-cooking-taught-me-about-being-happy-204508

surrounded myself with.[9]

(8) You taught me about disappointment and to recognize when something wasn't right...[10]

In all these examples, a closed constituent (e.g., *manners* in (4)) is coordinated with an open constituent with a controlled subject (e.g., *to respect his elders* in the same example).[11] Should this coordinated argument be assigned a closed grammatical function (probably an OBJ_θ, with some appropriate index), or the open grammatical function XCOMP?

Similar examples may be found for other uncontroversial control verbs, e.g. WANT:

(9) The majority want peace and to live a comfortable life...[12]

(10) I just want friends and to be happy.[13]

(11) Adult learners want respect and to be seen as capable learners.[14]

(12) Really I just want a mask and to wear this to an elegant ball.[15]

(13) The survey suggests that unlike Boomers who want their objectives and to be left alone to execute, Gen Y wants an almost constant stream of feedback.[16]

Obviously, such constructions are not limited to English; for example, Patejuk & Przepiórkowski 2014a discuss – and provide an analysis for – similar examples in Polish, including the following (originally from Kallas 1993, p. 92):

(14) Nie chciał pić ani kanapki. (Polish)
NEG wanted drink.INF nor sandwich.GEN
'He didn't want to drink nor (did he want) a sandwich.'

While all the above examples involve coordination of a broadly nominal element (a PP in the case of (8)) and an apparent XCOMP, in this order, (15) below il-

[9] http://www.inc.com/joe-desena/6-lessons-my-mother-taught-me-about-business.html

[10] https://whisperedthingsiwillscream.wordpress.com/2016/03/22/you-taught-me-more-than-happily-ever-after-could-have/

[11] The external anonymous reviewer suggests that such examples could perhaps be analysed as cases of non-constituent coordination, i.e., as cases of sentential coordination. For example, (4) "would then get an f-structure generally shaped as the f-structure for *I taught him manners and I taught him to respect his elders* (but with appropriate reentrancies)" (citing the review). However, this alternative analysis seems to suffer from the kind of data originally discussed in Partee 1970 and more recently in Kubota & Levine 2015 (see also references therein), involving the distribution of quantification over coordination. For example, in case of *Two different people taught him manners and to respect his elders*, the f-structure representation analogous to *Two different people taught him manners and two different people taught him to respect his elders* would probably require a much more complicated syntax–semantics mapping in order to get the intended reading where one person taught him manners and another one taught him to respect his elders.

[12] http://www.newyorker.com/magazine/2014/12/01/quiet-german

[13] http://www.healthguidance.org/entry/15944/1/Can-Maladaptive-Daydreaming-Be-Treated.html

[14] https://ala.asn.au/adult-learning/the-principles-of-adult-learning/

[15] https://pl.pinterest.com/pin/127226758198429442/

[16] http://www.forbes.com/sites/tykiisel/2012/05/16/gimme-gimme-gimme-millennials-in-the-workplace/

lustrates coordination of an apparent XCOMP and an apparent COMP; and (16)–(17) are similar examples from Polish, involving the verb CHCIEĆ 'want', which in Polish may combine with various categories, including CPs:

(15) I hope to be successful and that you all will always be with us.[17]

(16) Publiczność chce skakać i żeby było głośniej. (Polish)
audience.NOM wants jump.INF and that is louder
'The audience wants to jump and that it be louder.'[18]

(17) Musimy to zmienić, jeśli chcemy być konkurencyjni na tamtejszych
must this change if want be competitive on those
rynkach i aby rósł nasz eksport. (Polish)
markets and that grow our export
'We must change this if we to want be competitive in those markets and that our export grows.'[19]

Examples such as (4)–(17) undermine the distinction between closed and open grammatical functions.[20] In their analysis of cases like (14), Patejuk & Przepiórkowski (2014a) treat the coordinated argument as OBJ, explicitly allowing control into OBJ, if this syntactic position is occupied by an open constituent. Similarly, Arka & Simpson (1998) convincingly argue for the possibility of control into SUBJ in Balinese. Hence, there is ample justification for Alsina et al.'s (2005) postulate to remove XCOMP from LFG's repertoire of grammatical functions.[21]

Getting rid of COMP and XCOMP would also be beneficial for the LFG linking theory, i.e., Lexical Mapping Theory (Bresnan & Kanerva, 1989), as traditionally LMT has nothing to say about these grammatical functions. Furthermore, attempts to include COMP and XCOMP in the purview of LMT have either assumed that these functions are actually OBLs (Zaenen & Engdahl, 1994, p. 198), or mapped arguments to (X)COMP on the basis of both thematic and categorial information (Butt, 1995, pp. 168–169), rather than on the basis of the $\pm$r and $\pm$o annotations, as in the standard LMT.

[17] http://www.visedal.org/sonia.html

[18] http://poznan.wyborcza.pl/poznan/1,36037,19099237,kosmiczna-odyseja-czyli-wodecki-plus-mitch-mitch-pszczolki.html

[19] National Corpus of Polish (http://nkjp.pl/; Przepiórkowski et al. 2011, 2012)

[20] Note that the problem would persist even if these apparent XCOMP constituents were analysed as COMPs with obligatory anaphoric control – a mechanism would still be needed to ensure such obligatory control into just one of the conjuncts.

[21] Once the XCOMP grammatical function is removed under the proposed analysis, the question arises (also in comments from the internal anonymous reviewer) about the treatment of predicative items, sometimes analysed via XCOMP. As already mentioned in Section 2 above, an alternative LFG analysis is also available, involving the closed grammatical function PREDLINK. The closed analysis of predicative complements has the advantage of accounting for cases where the predicative item has a subject of its own (as in the case of gerunds or clauses), while appropriate control can be ensured using, e.g., a dedicated CONTROLLER attribute inside the predicative item, as proposed in Patejuk & Przepiórkowski 2014a. This PREDLINK analysis carries over to the current account, with the only difference that such predicative complements do not have a dedicated grammatical function but are treated as obliques (rather than objects, as predicative complements do not passivise).

In summary, given that:

- COMP and XCOMP are superfluous,
- the θ indices in OBJ$_\theta$ and OBL$_\theta$ are redundant,
- SUBJect and OBJect(s) are perhaps the only truly primitive grammatical functions,

a three-way distinction presents itself between subjects, objects and other dependents. This is essentially the system proposed (but not amply justified) in Alsina 1996, where the "other dependents", i.e. obliques, also include adjuncts (in line with the proposal of Przepiórkowski 2016). Section 5 suggests ways of formalising this idea that eschews certain technical problems with the formalisation of Alsina 1996.

Let us end the current section by emphasising that the division of dependents into the three classes should be understood as fully independent of their categorial status. In particular, it cannot be maintained, even in the case of English, that NPs are only subjects and objects, and PPs are only obliques. In the case of languages with sufficiently rich case systems, evidence that obliques may also be realised as NPs is provided by coordination of NPs and PPs, as in the following Polish examples:

(18) Owinął dziecko w koc i ręcznikiem. (Polish)
wrapped baby in blanket.ACC and towel.INST
'He wrapped the baby in a blanket and with a towel.'[22]

(19) Gola dedykuję dla rodziców i sympatii Iwonie.
goal.ACC dedicate.1.SG to parents.GEN and girlfriend.DAT Iwona.DAT (Polish)
'I dedicate this goal to my parents and my girlfriend Iwona.'[23]

However, NPs are not limited to subjects and objects even in languages like English and may even play the role of typical adjuncts – i.e. obliques, given the approach of Alsina 1996 – as in the following examples from Larson 1985, p. 595, with oblique NPs emphasised:

(20) I saw John *that day*.

(21) I saw John *someplace you'd never guess*.

(22) John was headed *that way*.

(23) Max pronounced my name *every way imaginable*.

Conversely, it is also easy to find PP subjects and objects. Multiple examples in English and Polish are provided in Jaworska 1986a,b, including examples of (raised) subjects in (24) and examples of objects in (25), which become subjects in the passive voice, cf. (26) (Jaworska, 1986b, pp. 355–356):

(24) a. *Between six and seven* seems to suit her fine.
b. *Across the road* appeared to be swarming with bees.

[22] Kosek 1999, p. 43

[23] National Corpus of Polish

(25) a. The campaigners planned *until Christmas* in detail.
b. The new tenants are reclaiming *behind the garage*.

(26) a. *Until Christmas* was planned in detail.
b. *Behind the garage* is being reclaimed by the new tenants.

We conclude that only two grammatical functions need to be distinguished: SUBJect and OBJect(s). (All other dependents, including adjuncts, may be called OBLiques, as in Alsina 1996.) In addition, even in the case of English, no assumptions should be made about the morphosyntactic makeup of grammatical functions.

4 GFs and dependent sharing

The conclusion of the previous section seems to be directly contradicted by the contrast in (27)–(28), originally from Barbara Partee's dissertation (Hall, 1965, p. 66); in LFG, this contrast is claimed to show that dependents shared between two coordinated verbs "must bear the same grammatical function in both conjuncts" (Dalrymple, 2001, p. 366):

(27) John washes and polishes his car in the garage.

(28) *John washes and keeps his car in the garage.

While in (27) the locative phrase is an adjunct to both WASH and POLISH, in (28) it is an adjunct to WASH, but an (oblique) argument to KEEP; hence the ungrammaticality, on the assumption – rejected in Alsina 1996, in the current paper and in Przepiórkowski 2016 – that argument obliques and adjuncts are different grammatical functions.

However, closer inspection shows that this apparent test for the sameness of grammatical functions of different predicates regularly contradicts dominant LFG analyses. For example, a locative phrase is syntactically required in the case of verbs such as RESIDE (McConnell-Ginet, 1982, p. 166), so it must be treated as its argument, if one adopts the prevailing view that required dependents are arguments. On the other hand, in the case of DIE, such a locative phrase is a prototypical optional adjunct. Hence, the following attested sentences should be ungrammatical, and for the same reason as (28):

(29) If a person resided and died in a foreign country and had assets in US, can the estate be probated in US?[24]

(30) Prime Minister Sir Winston Churchill resided and died in Number 28 on the street called Hyde Park Gate...[25]

(31) We assessed data on Medical Examiner-certified suicide victims aged 65 years or older from 2001 through 2004 who had resided and died in New York City...[26]

[24] http://www.avvo.com/legal-answers/if-a-person-resided-and-died-in-a-foreign-country--206311.html

[25] http://www.apeksdevelopments.co.uk/famous-hyde-park-residents-throughout-history/

[26] http://europepmc.org/abstract/MED/19210947

Another problematic case is illustrated with the following examples:

(32) I will devour this cake.

(33) I will give Mary this cake.

(34) I will either devour or give Mary the carrot cake my mother baked yesterday.

In (32), *this cake* is the passivisable OBJ, while in (33) it is an OBJ_θ, as the OBJ position is taken by the passivisable *Mary* (Dalrymple, 2001, p. 22). However, these two supposedly different grammatical functions may be shared, as (34) illustrates.

The problem also occurs in languages other than English. For example, Patejuk 2015, p. 51, discusses the following examples from Polish:

(35) Marek manipuluje i wysługuje się Marysią. (Polish)
Marek.NOM manipulates and uses REFL Marysia.INST
'Marek manipulates and uses Marysia.'

(36) Marysia lubi ale też boi się Marka. (Polish)
Marysia.NOM likes but also fears REFL Marek.ACC/GEN
'Marysia likes but at the same time is afraid of Marek.'

The natural definition of object in Polish is as the passivisable argument; if so, in both examples the non-subject argument (*Marysią* in (35) and *Marka* in (36)) bears the OBJ function only in relation to one of the conjoined verbs (to *manipuluje* 'manipulates' and to *lubi* 'likes', respectively). This again violates the claim that shared dependents must bear the same grammatical function in relation to conjoined verbs. One way to attempt to defend this claim would be to revert to the more traditional understanding of the direct object, as the argument in the accusative case. If so, neither of the verbs in (35) takes an OBJ (the shared argument is in the instrumental). However, in (36), one verb, *lubi* 'likes', takes such an accusative object and the other verb, *boi się* 'fears', takes a genitive argument; so the shared argument *Marka* still simultaneously fills two different grammatical function slots.[27] As there is no other reasonable way of defining OBJ in Polish, we must conclude that either it makes no sense (or at least there is no need) to posit OBJ in Polish, or the coordination test based on the contrast from Hall 1965 does not work.

In fact, the latter seems to be the case. Without attempting to provide an exhaustive analysis, let us note that in all the grammatical examples where a dependent bearing different grammatical roles is shared, it has the same (or sufficiently similar) semantic role in relation to the conjoined verbs. In particular, in the *resided and died* examples, the locative phrase, while obligatory in the case of RESIDE and optional in the case of DIE, has the semantic role of event location, the same as the locative *in the garage* in Partee's grammatical (27). On the other hand, while the phrase *in the garage* also expresses location in the case of (28), it arguably bears two rather different semantic roles with respect to WASH and KEEP, namely, event

[27] See Dalrymple & Kaplan 2000 and, especially, Dalrymple et al. 2009 on how *Marka* may be analysed as accusative and genitive at the same time.

location in the case of the former, but participant location in the case of the latter.[28]

Let us finally note that the fact that two predicates may assign different grammatical functions to their shared dependent is not a technical problem for LFG; as verified in the XLE implementation of Polish (Patejuk & Przepiórkowski, 2012, 2014b; Patejuk, 2016), all that is required is the assignment of grammatical functions in c-structure rules via functional uncertainty, as in (37), rather than via separate equations, as in (38):

(37) $(\uparrow \{\text{GF}1|\text{GF}2\})=\downarrow$

(38) $(\uparrow \text{GF}1)=\downarrow \vee (\uparrow \text{GF}2)=\downarrow$

So the (only) conclusion of this section is that shared dependents do not provide a test for the sameness of grammatical functions, contra common LFG assumptions (expressed, e.g., in Dalrymple 2001, p. 366, and in Peterson 2004).

5 Minimising the role of GFs in LFG

Alsina 1996, ch. 2, proposes to represent all dependents of a predicate via just three (types of) attributes: SUBJ, OBJ and OBL. In fact, these attributes are understood there as shorthands for, respectively, the following feature bundles: $\begin{bmatrix}\text{subj} & +\\ \text{obl} & -\end{bmatrix}$, $\begin{bmatrix}\text{subj} & -\\ \text{obl} & -\end{bmatrix}$, and $\begin{bmatrix}\text{subj} & -\\ \text{obl} & +\end{bmatrix}$. It is not clear to us how to extend the formal apparatus of LFG so that not only atomic symbols, but also such feature bundles may act as attributes, so we continue using the atomic values SUBJ, etc., here. In typical f-structures with a propositional content there must be exactly one subject in languages such as English and Catalan (as decreed by the Subject Condition, Alsina 1996, p. 20), but there may be multiple objects and obliques. This creates the obvious formal problem of possible multiple occurrences of the same OBJ or OBL attribute. Alsina (1996, pp. 47–48) solves this problem by indexing such attributes with the identifiers of f-structures which are the values of these attributes. Again, this mechanism does not seem to be a generally assumed part of the LFG apparatus. Below we will provide a formalisation which only assumes the standard LFG machinery.

An obvious solution is to make OBJ and OBL set-valued, on par with ADJ in the usual LFG analyses. As far as we can see, various constraints and analyses of Alsina 1996 may be easily reformulated to accommodate this solution. However, we would like to propose a more radical solution, more scrupulously justified in Przepiórkowski 2016, which also deals with the long-standing problem of the lack of formalisation of the syntactic hierarchy of grammatical functions, assumed to play a role in standard LFG analyses of control (Bresnan 1982, p. 294, Dalrymple 2001, p. 345), binding (Bresnan et al. 2015, chs. 9–10, and references therein)

[28] See, e.g., Koenig et al. 2003 on this distinction, as well as Maienborn & Schäfer 2011 and references to Claudia Maienborn's work therein on the more general distinction between event-external and event-internal modification.

and unbounded dependencies (Dalrymple 2001, p. 412 and references therein). According to the functional hierarchy of LFG, and similar hierarchies assumed by other grammatical theories (cf. the accessibility hierarchy of Keenan & Comrie 1977, the relational hierarchy of Perlmutter 1983, the obliqueness hierarchy of Pollard & Sag 1987, 1994, etc.), the subject syntactically outranks the direct object, which outranks the indirect object, which in turn outranks any oblique dependent. This hierarchy is also assumed in Alsina 1996, p. 253, even though, as in LFG at large, it is not formally represented anywhere in the analysis.

The basic idea of the solution is to represent all dependents of a predicate within a single ordered DEPS list, in a way reminiscent of the use of this attribute in some HPSG analyses (Bouma et al., 2001; Przepiórkowski, 1999). Just as in HPSG, the order of the elements reflects the grammatical function hierarchy. To the extent that some core grammatical functions, i.e., functions which take part in processes such as verbal agreement and passivisation, need to be distinguished and cannot be predicted from the position in the argument list, they could be singled out as values of separate attributes (apart from being present on the argument list),[29] in a language-dependent fashion.

For example, in the case of Polish, it makes sense to distinguish two grammatical functions: SUBJect and OBJect. Polish subjects are typically nominative and, when they are nominative, they agree with the verb, but not all nominative dependents are subjects, and not all subjects are nominative: as is well known, they may in particular be finite and infinitival clauses (Świdziński, 1992, 1993), prepositional phrases (Jaworska, 1986a,b), or accusative numeral phrases (Franks, 1995; Przepiórkowski, 1999). Similarly, given that passivisable arguments cannot be recognised morphosyntactically in Polish (not all accusative arguments passivise; and some genitive, instrumental and maybe even dative arguments do; Zabrocki 1981, pp. 124–125), objects should also be distinguished, when present. Thus, f-structures for the sentences (39) (featuring an instrumental passivisable object) and (40) (featuring an instrumental dependent which does not passivise), which involve the two verbs discussed in the context of (35) above (MANIPULOWAĆ 'manipulate' and WYSŁUGIWAĆ SIĘ 'use (somebody)'), would be as in (41) and (42), respectively.

(39) Marek manipuluje Marysią. (Polish)
Marek.NOM manipulates Marysia.INST
'Marek manipulates Marysia.'

(40) Marek wysługuje się Marysią. (Polish)
Marek.NOM uses REFL Marysia.INST
'Marek uses Marysia.'

[29] This would again follow the HPSG practice; e.g., Heinz & Matiasek 1994 single out the deep subject as the value of the DA (designated argument) attribute, Sag 2007 proposes to encode the argument visible outside of the maximal projection (i.e., roughly, Falk's 2006 PIVOT) as XARG, etc.

(41)
$$\begin{bmatrix} \text{PRED} & \text{`MANIPULATE'} \\ \text{TENSE} & \text{PRES} \\ \text{SUBJ} & \boxed{1} \\ \text{OBJ} & \boxed{2} \\ \text{DEPS} & \left\langle \boxed{1}\begin{bmatrix} \text{PRED} & \text{`MAREK'} \\ \text{CASE} & \text{NOM} \end{bmatrix}, \boxed{2}\begin{bmatrix} \text{PRED} & \text{`MARYSIA'} \\ \text{CASE} & \text{INST} \end{bmatrix} \right\rangle \end{bmatrix}$$

(42)
$$\begin{bmatrix} \text{PRED} & \text{`USE'} \\ \text{TENSE} & \text{PRES} \\ \text{SUBJ} & \boxed{1} \\ \text{DEPS} & \left\langle \boxed{1}\begin{bmatrix} \text{PRED} & \text{`MAREK'} \\ \text{CASE} & \text{NOM} \end{bmatrix}, \begin{bmatrix} \text{PRED} & \text{`MARYSIA'} \\ \text{CASE} & \text{INST} \end{bmatrix} \right\rangle \end{bmatrix}$$

Moreover, unlike in English, where each verb has a syntactic subject, some Polish verbs arguably do not have any subjects, not even expletive or PRO subjects. One such a verb is MDLIĆ 'nauseate', in its use illustrated in (44), to be contrasted with (43), which does involve an agreeing subject:[30]

(43) Zapach kwiatów mdlił mnie. (Polish)
smell.NOM.M.SG flowers.GEN nauseated.M.SG me.ACC
'The smell of the flowers made me nauseous.'

(44) Mdliło mnie od zapachu kwiatów. (Polish)
nauseated.N.SG me.ACC from smell.GEN.M.SG flowers.GEN
'I felt nauseous from the smell of the flowers.'

Hence, in the case of the two Polish examples above, the following f-structures result:[31,32]

(45)
$$\begin{bmatrix} \text{PRED} & \text{`NAUSEATE'} \\ \text{TENSE} & \text{PAST} \\ \text{SUBJ} & \boxed{1} \\ \text{DEPS} & \left\langle \boxed{1}\begin{bmatrix} \text{PRED} & \text{`SMELL'} \\ \text{DEPS} & \langle \begin{bmatrix} \text{PRED} & \text{`FLOWER'} \\ \text{CASE} & \text{GEN} \end{bmatrix} \rangle \\ \text{CASE} & \text{NOM} \end{bmatrix}, \begin{bmatrix} \text{PRED} & \text{`I'} \\ \text{CASE} & \text{ACC} \end{bmatrix} \right\rangle \end{bmatrix}$$

[30]The arguments in Babby 2009, ch. 1, for the lack of any grammatical subject of the Russian cognate of this verb carry over to Polish. Other examples of genuinely subjectless verbs and verbal constructions in Polish may be found in Kibort 2006.

[31]We follow here the observation that Glue Semantics makes PRED – and also the principles of Completeness and Coherence – largely redundant (Dalrymple et al. 1993, pp. 13–14; Kuhn 2001, § 1.3.3). In particular, we adopt the practice of Asudeh & Giorgolo 2012 and later work of retaining PRED, albeit with values representing the bare predicate, without its arguments.

[32]The attribute PFORM in (46) is commonly used in implemented LFG/XLE grammars to indicate the form of a non-semantic ('case-marking') preposition.

(46)
$$\begin{bmatrix} \text{PRED} & \text{`NAUSEATE'} \\ \text{TENSE} & \text{PAST} \\ \text{DEPS} & \left\langle \begin{bmatrix} \text{PRED} & \text{`I'} \\ \text{CASE} & \text{ACC} \end{bmatrix}, \begin{bmatrix} \text{PRED} & \text{`SMELL'} \\ \text{DEPS} & \langle \begin{bmatrix} \text{PRED} & \text{`FLOWER'} \\ \text{CASE} & \text{GEN} \end{bmatrix} \rangle \\ \text{PFORM} & \text{OD} \\ \text{CASE} & \text{GEN} \end{bmatrix} \right\rangle \end{bmatrix}$$

In the case of Romance, since subjects are readily identifiable as the first elements of DEPS in f-structures expressing propositional content, only a set-valued attribute OBJect is needed to carry over the analyses of Alsina 1996.[33] Further, since the value of OBJ will identify any objects in DEPS, all other DEPS elements, following the subject and the object(s), if any, must be obliques.

Let us illustrate the analysis with the following two Catalan examples, from Alsina 1996 (with the original glosses left intact):

(47) El mestre fa llegir un poema al nen. (Catalan)
the teacher makes read a poem to-the boy
'The teacher is making the boy read a poem.'[34]

(48) Cauen rocs de la muntanya. (Catalan)
fall.3.PL stones from the mountain
'Stones fall from the mountain.'[35]

Example (47) involves a complex predicate, *fa llegir* 'makes read', with both verbs contributing to the grammatical functions of the clause: the causer, *el mestre* 'the teacher', is the subject, the agent of reading, *al nen* 'the boy', affected by causation, is realised as a dative (hence, indirect) object, and the patient of reading, *un poema* 'the poem', is realised as a non-dative (hence, direct) object (Alsina, 1996, p. 191):[36]

[33] Obviously, it is possible to have a separate SUBJ attribute, also in the case of Romance, whose value would always be structure-shared with the first element of DEPS. This would perhaps be redundant in the case of Catalan, but it would better reflect the idea that all languages have subjects (to the extent that this generalisation is true; see Falk 2006 and references therein) and it could also be beneficial from the point of view of parallel grammar development. Also, Alsina's (1996) supposedly universal distinction between direct and oblique dependents could simply be represented as that between the values of SUBJ and OBJ on the one hand, and all other DEPS elements on the other.

[34] Alsina 1996, p. 190, ex. (6b)

[35] Alsina 1996, p. 130, ex. (19)

[36] In the following f-structures we ignore argument structures, which Alsina (1996) encodes within the values of PRED.

(49)
$$\begin{bmatrix} \text{PRED} & \text{`CAUSE READ'} \\ \text{TENSE} & \text{PRES} \\ \text{OBJ} & \left\{ \boxed{1}, \boxed{2} \right\} \\ \text{DEPS} & \left\langle \begin{bmatrix} \text{PRED} & \text{`TEACHER'} \\ \text{DAT} & - \end{bmatrix}, \boxed{1}\begin{bmatrix} \text{PRED} & \text{`POEM'} \\ \text{DAT} & - \end{bmatrix}, \boxed{2}\begin{bmatrix} \text{PRED} & \text{`BOY'} \\ \text{DAT} & + \end{bmatrix} \right\rangle \end{bmatrix}$$

If the sentence also contained obliques, they would follow the two objects on DEPS, and they would not have to be explicitly mentioned outside of this list. This is illustrated by the following f-structure for (48), which involves the oblique phrase *de la muntanya* 'from the mountain':

(50)
$$\begin{bmatrix} \text{PRED} & \text{`FALL'} \\ \text{TENSE} & \text{PRES} \\ \text{OBJ} & \left\{ \boxed{1} \right\} \\ \text{DEPS} & \left\langle \boxed{1}\begin{bmatrix} \text{PRED} & \text{`STONE'} \\ \text{DAT} & - \end{bmatrix}, \begin{bmatrix} \text{PRED} & \text{`FROM'} \\ \text{DEPS} & \left\langle \left[ \text{PRED} \quad \text{`MOUNTAIN'} \right] \right\rangle \end{bmatrix} \right\rangle \end{bmatrix}$$

An interesting feature of this f-structure is that it economically reflects the analysis of Alsina 1996, p. 132, in which *rocs* 'stones', the first argument of the unaccusative verb *cauen* 'fall', simultaneously fills two grammatical functions: subject and object. This is represented in (50): the first element of DEPS, as always in the case of propositional f-structures in Catalan, is the subject, but it is also present in the value of OBJ, so it is at the same time an object.

6 Conclusion

It is surprising how ill-defined, redundant and inconsistent the notion of grammatical functions – claimed to be fundamental in LFG – is on closer inspection. In this paper we returned to the basic LFG assumptions and re-examined the need for a repertoire of grammatical functions as first-class theoretical citizens. We reappraised and further substantiated the approach of Alsina 1996, where the only grammatical functions assumed are SUBJect and OBJect (and OBLique, for anything else), but we suggested a different implementation of this general idea, further formalised and illustrated in Przepiórkowski 2016, one that substantially extends an HPSG approach.

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