How *not* to distinguish arguments from adjuncts in LFG

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I Introduction One of the conspicuous differences between LFG and HPSG concerns grammatical functions: while LFG assumes the repertoire of at least six grammatical functions (SUBJ, OBJ, COMP, XCOMP, ADJ and XADJ) and two families of grammatical functions indexed by thematic roles they bear (OBJ_θ and OBL_θ), HPSG makes only a three-way distinction between the SUBJECT, the COMPLEMENTS and the MODIFIERS (see e.g. Dalrymple 2001, pp. 8–11, Bresnan *et al.* 2015, pp. 94–100; Pollard and Sag 1994, ch. 9, Van Eynde 2015, ch. 3). Moreover, while LFG clearly distinguishes adjuncts (members of the set-valued attributes ADJ and XADJ) from arguments (all other grammatical functions), within HPSG there is a thread of work which denies any syntactic difference between arguments and at least a class of adjuncts (see, esp., Bouma *et al.* 2001 and Przepiórkowski 1999a,b,c; recent work assuming this approach includes AlQurashi 2015 and Oshima 2015).

The fact that various types of dependents cannot be comfortably classified either as arguments or as adjuncts has also been recently discussed within LFG, where – in a series of important papers by Ida Toivonen, Ash Asudeh and colleagues (Needham and Toivonen 2011, Asudeh and Giorgolo 2012, Toivonen 2013, Asudeh *et al.* 2014) – the class of *derived arguments* is proposed and formalised. According to some tests on the argument–adjunct distinction, such *derived arguments* are arguments, and according to other – they are adjuncts. However, on the analysis just alluded to, they bear the grammatical functions of arguments (e.g. OBJ and OBL_θ for two different kinds of benefactives), so the dichotomy between arguments and adjuncts still remains intact, and the effect of this analysis is that the class of arguments is now further split into basic and derived.

The first aim of this paper is to reexamine arguments for the assumed di- or trichotomy and argue that there are no compelling reasons to divide the spectrum of dependents ranging from prototypical arguments to prototypical adjuncts into two or three classes.[1] The second aim is to show that recent LFG approaches to the syntax-semantics interface already provide much of the machinery needed *not* to distinguish arguments from adjuncts, although – in order to make this non-distinction explicit – some changes in the feature geometry of f-structures (but not in the underlying LFG mechanisms) are necessary.

II Main tests for the argument–adjunct distinction A great number of tests for the argument–adjunct distinction have been proposed over the last almost 60 years (since Tesnière 1959), many quickly discarded. As noted by Tutunjian and Boland 2008, 633, "[t]he sheer number of these tests underlines the fact that no single test is entirely satisfactory". While the vast majority of linguists share the sentiment that "[t]he distinction between arguments and adjuncts is crucial in linguistics" (Needham and Toivonen 2011, p. 402), some have long noted that it is hardly possible to make it operational, e.g.: "The problem of how to differentiate between complements and adjuncts has not yet been solved satisfactorily" (Vater 1978, p. 21) or "No single criterion for this distinction has been found yet and it is rather doubtful that it can be found in the future" (Sawicki 1988, p. 17).

The most common escape strategy, exemplified also by recent LFG work mentioned above, is to make this a three- or more-way distinction, with a separate class (or classes) for difficult or borderline cases. An extreme exemplar of this strategy is Somers 1984, which splits dependents into six classes: *integral complements*, *obligatory complements*, *optional complements*, *middles*, *adjuncts* and *extraperipherals*. This strategy brings us a little closer to the position defended in this paper, i.e. that dependents form a continuum[2] which may be divided in various ways and according to various criteria, but it is even more difficult to justify than the original binary dichotomy, as now two or more distinctions need clear tests, and the authors postulating such intermediate classes are usually not explicit about their boundaries.

Before we conclude that – after over half a century of looking for convincing and stable tests for the argument–adjunct dichotomy – the burden of proof is on the proponents of this dichotomy, let us examine a couple of popular tests which are relatively language-independent, theory-independent and stable over time. **1.** The common intuition is that the meaning of arguments is more central to the meaning of the predicate; unfortunately, this intuition has never (to the best of our knowledge) been translated into an operational test splitting dependents into arguments and adjuncts. In fact, this common intuition already suggests that the notion of argument is gradable ("more central") rather than categorial. **2.** If there is one more or less operational test that almost all linguists agree about (but see e.g. Grimshaw and Vikner 1993 or Goldberg and Ackerman 2001), it is that the obligatory dependents are arguments. But this is not really a binary classifier; it does not say anything about optional dependents, and in some languages almost all dependents are to some extent optional. Also, in order to be operational, the notion of obligatoriness, which may be understood in a number of ways and is graded to some extent (Herbst and Roe 1996), should be made much more explicit than is common in discussions of the argument–adjunct dichotomy. **3.** A test assumed in theories as different as LFG and HPSG on one hand and Functional Generative Description (FGD; Sgall *et al.* 1986) on the other is the iterability test: "[A]djuncts may be iterated freely without any effect on syntactic well-formedness" (Williams 2015, p. 69). The much cited example showing iterability of adjuncts is (1) from Bresnan 1982, p. 164, contrasted with (2) from Bresnan 1982, p. 165, which is supposed to show that instruments are arguments ("[Inst]" added in (2) for the sake of parallelism with (1)):

(1) Fred *deftly* [Manner] handed a toy to the baby *by reaching behind his back* [Manner] *over lunch* [Temp] *at noon* [Temp] *in a restaurant* [Loc] *last Sunday* [Temp] *in Back Bay* [Loc] *without interrupting the discussion* [Manner].

(2) *John escaped from prison *with dynamite* [Inst] *with a machine gun* [Inst].

[1] It should be clear by now that, in the terminology assumed in this paper, *dependents = arguments + adjuncts*, and further *arguments = subject + complements*. Additionally, the terms *adjunct* and *modifier* are used interchangeably here.

[2] Obviously, we use the term *continuum* in a rather loose non-mathematical sense, as in Bloomfield's *dialect continuum*, and we do not imply that there are $2^{\aleph_0}$ different dependent types.

However, this contrast is ill-conceived, as all [Temp] phrases in (1) are different descriptions of *the same* time of the event, all [Loc] phrases – of *the same* location of the event, and all [Manner] phrases arguably describe aspects of a *single* manner; on the other hand, the two [Inst] phrases in (2) cannot describe the same instrument – dynamite and a machine gun are necessarily *different* entities. Examples such as (1) should rather be compared to the following two examples from Zaenen and Crouch 2009, p. 646, which illustrate the (perhaps more limited) possibility to iterate arguments:

(3) I count on you, on your kindness.

(4) He lives in France, in a small village.

In fact, also instrumental phrases may be iterated as long as they "concentrically" refer to the same entity (Goldberg 2002, pp. 334–335, 341):

(5) With a slingshot he broke the window with a rock.

(6) The robot opened the door with a key with its robotic arm.

In all the cases where two *different* entities are involved they should be expressed via coordination:

(7) Fred will perform [today and tomorrow] / *[today tomorrow].

(8) John escaped from prison [with dynamite and with a machine gun] / *[with dynamite with a machine gun].

(9) I count [on you and on his kindness] / *[on you, on his kindness].

(10) The robot opened the door with [an axe and a crowbar] / * [with an axe, with a crowbar].

4. Finally, another common test reflects the intuition that promiscuous types of phrases, happy to combine with a great number of different predicates, tend to be adjuncts, while arguments are restricted to smaller classes of predicates (see e.g. the semantic specificity of Koenig *et al.* 2003, § 3.2). This test has a different nature than previous tests, as it really classifies types of phrases rather than types of relations a dependent may bear to its predicate. For example, phrases expressing manner or duration, whose occurrence is predictable from general principles (roughly, the presence of an agent in case of manner phrases and the right aspect/Aktionsart in case of duration phrases), should always be classified as adjuncts, despite the fact that the relevant phrases of these types are commonly regarded as (obligatory!) arguments in *Stanley treated Stella badly* (manner), *Stanley behaved badly* (manner), *Mitch spent two hours apologising* (duration).

Many other tests, some of them still occasionally used today, have fallen into well-deserved disrepute. This includes the infamous *do so* test (and other similar *verbal pro-form* tests) argued against, e.g., in Przepiórkowski 1999a, ch. 7, and in Culicover and Jackendoff 2005, ch. 8; see also Williams 2015, pp. 71–72. Hence, it is reasonable to adopt the zero hypothesis that there is no single fundamental partition of possible dependents of a predicate into two or three classes.

III Argument–adjunct non-distinction already present in LFG Unlike transformational theories, LFG does not assume that adjuncts occupy positions different than arguments in constituency trees. Instead, the argument–adjunct dichotomy surfaces in f-structure: within semantic forms, i.e. values of PRED, and within syntax proper, by relegating adjuncts to values of (X)ADJ.

With much LFG work on semantics, we assume the resource-sensitive glue approach to semantic composition. As noted already in Dalrymple *et al.* 1993, pp. 13–14, and Kuhn 2001, § 1.3.3, this approach to semantics makes PRED – and also the principles of Completeness and Coherence (Dalrymple 2001, pp. 35–39) – largely superfluous. Asudeh and Giorgolo 2012 propose to retain PRED but with values reflecting the predicate *sans* its valency; for example, the lexical entry for *ate* will contain the equation $(\uparrow\ \text{PRED}) = \text{`eat'}$ rather than $(\uparrow\ \text{PRED}) = \text{`eat}\langle\text{SUBJ}, \text{OBJ}\rangle\text{'}$.

The second ingredient making it possible not to distinguish arguments from adjuncts in semantics is the neo-Davidsonian approach to semantic representation (Parsons 1990) assumed in LFG, which does not distinguish between arguments and adjuncts; for example, the information about an object which expresses the patient p in some event e, i.e. a prototypical argument, may be represented as $patient(e, p)$, and about a prototypical adjunct expressing the place p – as $location(e, p)$.

The third useful ingredient which is already in place is presented in Asudeh *et al.* 2008, 2013, Asudeh and Giorgolo 2012 and Asudeh *et al.* 2014, and consists in the possibility of adding arguments – also their semantic contributions – via calls to templates such as @AGENT and @PATIENT for the usual (deep) subjects and objects, @BENEFACTIVE for the derived benefactive argument (Asudeh and Giorgolo 2012, Asudeh *et al.* 2014), or @TRANSITIVE-OBLIQUE in the analysis of Swedish Direct Motion Construction (DMC; Asudeh *et al.* 2008, 2013). What is important is that such calls may be made not only within lexical entries, but also within grammatical rules – this is exactly the analysis of the Swedish DMC, which is signalled by a special c-structural configuration (Asudeh *et al.* 2013, §§ 2.2 and 4.1). This possibility solves the potential problem of the iterability of some (perhaps most; see the reference to Zaenen and Crouch 2009 above) kinds of dependents – such dependents may be added by c-structure rules involving a Kleene star (for iterating dependents of the same type) or allowing for recursive application. However, in the example below, we use a mechanism simpler than c-structure calls of such complex templates.

IV Main idea Once the principles of Completeness and Coherence are made superfluous by Glue Semantics, some of the motivation for separate grammatical function attributes vanishes. Hence, we propose to explore an alternative successfully employed in HPSG, namely, to replace separate representations of grammatical functions with a single list, to be called DEPS,[3] reflecting some version of the obliqueness hierarchy of Pollard and Sag 1987, §§ 3.2 and 5.2, the accessibility hierarchy of Keenan and Comrie 1977 or the functional hierarchy of LFG (Bresnan *et al.* 2015, p. 97; see also the a-structure of Falk 2006, ch. 2). Just as in HPSG, some of the elements of this list may also be values of separate attributes; e.g., Heinz and Matiasek 1994

[3] An attribute of this name was introduced in Bouma *et al.* 2001, p. 6, but unlike there, we assume that it contains all dependents and that there is no separate ARG-ST list; see also Przepiórkowski 1999a, § 9.2.1 for discussion.

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. In case of LFG, a conservative solution would perhaps be to retain separate attributes for at least those grammatical functions which take part in agreement (SUBJ, as well as OBJ in some languages), but perhaps also in control and argument mapping from the semantic argument structure (i.e., also OBJ_θ and OBL_θ, for some values of θ). Singling out only such a subset of arguments would also attenuate the long standing embarrassment of various versions of the Lexical Mapping Theory (LMT; Bresnan *et al.* 2015, ch. 14), which have nothing to say about argument functions such as COMP and XCOMP. A slightly different approach will be adopted in the example below.

V An example Let us exemplify the gist of the proposed analysis with sentence (11); in the process, we will have to make various simplifications, but also flesh out some details which are still not fully stable, given the early stage and potentially far-reaching consequences of this proposal.

(11) John lived in France for two years, in a small village called Saint-Couat-d'Aude.

In order to simplify the exposition, we will not consider the internal structure of nominal phrases and we will pretend that all NPs in (11) semantically contribute constants of type e: j in case of *John*, f in case of *France*, ty in case of *two years* and asv in case of *a small village*.... Also, unlike Asudeh and Giorgolo 2012 and Asudeh *et al.* 2014, we don't make here any assumptions about the internal structure of the semantic projection, apart from assuming the attribute EVENT on semantic structures of verbs.

For the purposes of this example, we assume that DEPS is a named list, with each element named with the grammatical role it plays. It is an open question, to what extent these grammatical roles should correspond to standard LFG grammatical functions, but – minimally – the grammatical function ADJ should be replaced with specific roles such as DUR(ation), LOC(action), MANNER, etc.[4] Technically, such a named list means that instead of the attribute FIRST (or HEAD) in the usual feature structure encoding of lists in terms of attributes such as FIRST and REST (or HEAD and TAIL), an attribute indicating the role of the dependent is used, as illustrated in (13); alternatively, an abbreviated notation illustrated in (14) may be used, which ignores grammatical roles.

The usual c-structure rules should be modified as indicated in (15)–(16).[5] We assume that the subject is the first element of a verb's DEPS, so it is sufficient to replace the usual equation $\downarrow = (\uparrow\ \text{SUBJ})$ with $\downarrow = (\uparrow\ \text{DEPS SUBJ})$ in (15). In case of objects, we could have used the equation $\downarrow = (\uparrow\ \text{DEPS REST OBJ})$ in (16), as there always is a subject in English, but we generalise it to $\downarrow = (\uparrow\ \text{DEPS (REST) OBJ})$, with the optional subject,[6] to account for languages like Russian, in which some verbs don't have any subjects (see, e.g., Babby 2009, ch. 1), not even expletive or PRO subjects. The most important aspect of the rule in (16) is the equation under the iterable PP specification: here we don't make any assumptions about the exact place in the DEPS list of locative or durative (or any other, apart from SUBJ and perhaps OBJ) dependents – hence the Kleene star on REST. On the other hand, appropriate constraints should be added to the effect that there is only one attribute DUR, etc., and that the list contains no gaps. The latter requirement may be formalised by the off-path constraint $(\leftarrow \text{GR})$ added to REST in the PP part of (16), where GR is an abbreviation for the alternative of all possible grammatical roles, or by $(\leftarrow \text{FIRST})$, in a version without grammatical role attributes within DEPS.

The former requirement, concerning at most one occurrence of DUR, LOC, etc., is dealt within appropriate lexical entries,[7] such as (17)–(18) for the two semantic prepositions occurring in (11). Unlike in implemented LFG/XLE grammars (see, e.g., Butt *et al.* 1999), we do not use here the attributes PTYPE and PSEM; instead, the information that these are semantic prepositions is encoded in their meaning constructors, specifically in the definition of the local name %HD, which ensures that the f-structures of these PPs are values of appropriate attributes within DEPS: LOC or DUR. In order to ensure that there is only one occurrence of LOC (similarly, DUR) within DEPS, the REST in the inside-out functional uncertainty used to define %HD should be annotated with the off-path constraint: $\neg(\leftarrow \text{LOC})$ (and similarly for DUR). Apart from the definition of %HD, these lexical entries are similar to the lexical entry for the benefactive *for* in Asudeh *et al.* 2014 (their (64)).

Finally, the lexical entry for *lived* is given in (19). We assume that the templates for AGENT and PAST are largely analogous to those proposed in Asudeh *et al.* 2014 (their (48) and (54)). The only new aspect of this lexical entry is the constraint requiring the presence of a LOC dependent. The reader is invited to verify that, given these rules and lexical entries, as well as various assumptions made above, the resulting f-structure is as in (13), and that the resulting meaning representation is as in (12).

(12) $\exists e.[live(e) \wedge agent(e, j) \wedge duration(e, ty) \wedge location(e, f) \wedge location(e, asv) \wedge past(e)]$

Note that there is no fundamental difference between the representation of the durative *for two years*, a prototypical adjunct in (11), and the two locative phrases, at least one of which is obligatory and, hence, an argument. In fact, while other approaches would treat one locative phrase as an argument, and the other as an adjunct, they both contribute to the value of the same LOC feature in (13), and have fully parallel semantic representations in (12).

VI Conclusion We hope to have shown that getting rid of the ill-defined argument–adjunct dichotomy is desirable and – given recent advances on valency in LFG – relatively easy. The most conservative variant of the proposal makes it possible to retain specific grammatical functions taking part in earlier analyses, such as SUBJ, OBJ and $\text{OBL}_{\text{AGENT}}$, either as top-level attributes pointing at appropriate elements of DEPS, or as attributes within DEPS, as in (13). It is our impression that, while the argument–adjunct dichotomy has been assumed in LFG, it hasn't really played an important role in actual analyses, but, obviously, this impression should be carefully verified. Also, we haven't tried to show the interaction of the current proposal with the recent formalisation of LMT (Findlay 2014, Asudeh *et al.* 2014), but we do not envisage any fundamental problems here. We believe that the current proposal, while undoubtedly controversial, is ready for public scrutiny.

[4] See work on valency within FGD, esp., Panevová 1974, 1975 and Žabokrtský 2005, pp. 117–118, for a possible repertoire of such roles.

[5] We adopt the usual abbreviatory conventions concerning the omission of head equations $\uparrow=\downarrow$ (Dalrymple 2001, p. 119, Bresnan *et al.* 2015, p. 106).

[6] We can ensure that the dependent preceding the object is the subject by adding appropriate off-path constraints to REST; see below.

[7] Ultimately, within templates called from such entries, to avoid missed generalisations.

(13)
$$\begin{bmatrix} \text{PRED} & \text{‘LIVE’} \\ \text{TENSE} & \text{PAST} \\ \text{DEPS} & \begin{bmatrix} \text{SUBJ} & \begin{bmatrix} \text{PRED} & \text{‘JOHN’} \end{bmatrix} \\ \text{REST} & \begin{bmatrix} \text{LOC} & \left\{ \begin{bmatrix} \text{PRED} & \text{‘IN’} \\ \text{DEPS OBJ} & \text{“FRANCE”} \end{bmatrix}, \begin{bmatrix} \text{PRED} & \text{‘IN’} \\ \text{DEPS OBJ} & \text{“A SMALL VILLAGE...”} \end{bmatrix} \right\} \\ \text{REST} & \begin{bmatrix} \text{DUR} & \left\{ \begin{bmatrix} \text{PRED} & \text{‘FOR’} \\ \text{DEPS OBJ} & \text{“TWO YEARS”} \end{bmatrix} \right\} \end{bmatrix} \end{bmatrix} \end{bmatrix} \end{bmatrix}$$

(14)
$$\begin{bmatrix} \text{PRED} & \text{‘LIVE’} \\ \text{TENSE} & \text{PAST} \\ \text{DEPS} & \left\langle \begin{bmatrix} \text{PRED} & \text{‘JOHN’} \end{bmatrix}, \left\{ \begin{bmatrix} \text{PRED} & \text{‘IN’} \\ \text{DEPS} & \langle \text{“FRANCE”} \rangle \end{bmatrix}, \begin{bmatrix} \text{PRED} & \text{‘IN’} \\ \text{DEPS} & \langle \text{“A SMALL VILLAGE...”} \rangle \end{bmatrix} \right\}, \left\{ \begin{bmatrix} \text{PRED} & \text{‘FOR’} \\ \text{DEPS} & \langle \text{“TWO YEARS”} \rangle \end{bmatrix} \right\} \right\rangle \end{bmatrix}$$

(15)
$$\text{IP} \longrightarrow \begin{array}{cc} \text{NP} & \text{I}' \\ \downarrow = (\uparrow \text{ DEPS SUBJ}) & \end{array}$$

(16)
$$\text{I}' \longrightarrow \begin{array}{ccc} \text{I} & (\quad \text{NP} \quad) & (\quad \text{PP} \quad)^{*} \\ & \downarrow = (\uparrow \text{ DEPS (REST) OBJ}) & \downarrow \in (\uparrow \text{ DEPS REST}^{*} \ \{\text{LOC}|\text{DUR}\}) \end{array}$$

(17) *in* P
$$\begin{array}{l} (\uparrow \text{ PRED}) = \text{‘IN’} \\ \%\text{HD} = (\text{DEPS REST}^{*} \text{ LOC} \uparrow) \\ \lambda x \lambda P \lambda e.[P(e) \wedge \mathit{location}(e,x)] : \\ \quad (\uparrow \text{ DEPS OBJ})_{\sigma} \multimap [(\%\text{HD}_{\sigma} \text{ EVENT}) \multimap \%\text{HD}_{\sigma}] \\ \quad \multimap (\%\text{HD}_{\sigma} \text{ EVENT}) \multimap \%\text{HD}_{\sigma} \end{array}$$

(18) *for* P
$$\begin{array}{l} (\uparrow \text{ PRED}) = \text{‘FOR’} \\ \%\text{HD} = (\text{DEPS REST}^{*} \text{ DUR} \uparrow) \\ \lambda x \lambda P \lambda e.[P(e) \wedge \mathit{duration}(e,x)] : \\ \quad (\uparrow \text{ DEPS OBJ})_{\sigma} \multimap [(\%\text{HD}_{\sigma} \text{ EVENT}) \multimap \%\text{HD}_{\sigma}] \\ \quad \multimap (\%\text{HD}_{\sigma} \text{ EVENT}) \multimap \%\text{HD}_{\sigma} \end{array}$$

(19) *lived* I
$$\begin{array}{l} (\uparrow \text{ PRED}) = \text{‘LIVE’} \\ @\text{AGENT } @\text{PAST} \\ (\uparrow \text{ DEPS REST}^{*} \text{ LOC}) \\ \lambda e.\mathit{live}(e) : (\uparrow_{\sigma} \text{ EVENT}) \multimap \uparrow_{\sigma} \end{array}$$

References

AlQurashi, I. S. (2015). An analysis of simple and construct-state noun phrases in Modern Standard Arabic. In Müller (2015), pages 6–26.

Asudeh, A. and Giorgolo, G. (2012). Flexible composition for optional and derived arguments. In M. Butt and T. H. King, editors, *The Proceedings of the LFG'12 Conference*, pages 64–84, Stanford, CA. CSLI Publications.

Asudeh, A., Dalrymple, M., and Toivonen, I. (2008). Constructions with lexical integrity: Templates as the lexicon–syntax interface. In Butt and King (2008), pages 68–88.

Asudeh, A., Dalrymple, M., and Toivonen, I. (2013). Constructions with Lexical Integrity. *Journal of Language Modelling*, **1**(1), 1–54.

Asudeh, A., Giorgolo, G., and Toivonen, I. (2014). Meaning and valency. In Butt and King (2014), pages 68–88.

Babby, L. H. (2009). *The Syntax of Argument Structure*. Cambridge University Press, Cambridge.

Bouma, G., Malouf, R., and Sag, I. A. (2001). Satisfying constraints on extraction and adjunction. *Natural Language and Linguistic Theory*, **19**(1), 1–65.

Bresnan, J. (1982). Polyadicity. In J. Bresnan, editor, *The Mental Representation of Grammatical Relations*, MIT Press Series on Cognitive Theory and Mental Representation, pages 149–172. The MIT Press, Cambridge, MA.

Bresnan, J., Asudeh, A., Toivonen, I., and Wechsler, S. (2015). *Lexical-Functional Syntax*. Blackwell Textbooks in Linguistics. Wiley-Blackwell, 2nd edition.

Butt, M. and King, T. H., editors (2008). *The Proceedings of the LFG'08 Conference*, University of Sydney, Australia. CSLI Publications.

Butt, M. and King, T. H., editors (2014). *The Proceedings of the LFG'14 Conference*, Stanford, CA. CSLI Publications.

Butt, M., Dipper, S., Frank, A., and King, T. H. (1999). Writing large-scale parallel grammars for English, French, and German. In M. Butt and T. H. King, editors, *The Proceedings of the LFG'99 Conference*, University of Queensland, Brisbane. CSLI Publications.

Culicover, P. W. and Jackendoff, R. (2005). *Simpler Syntax*. Oxford University Press.

Dalrymple, M. (2001). *Lexical Functional Grammar*. Academic Press, San Diego, CA.

Dalrymple, M., Hinrichs, A., Lamping, J., and Saraswat, V. (1993). The resource logic of complex predicate interpretation. In *Proceedings of ROCLING 1993*, pages 3–21.

Falk, Y. N. (2006). *Subjects and Universal Grammar*. Cambridge University Press.

Findlay, J. (2014). Mapping theory without argument structure. Unpublished manuscript, University of Oxford.

Goldberg, A. E. (2002). Surface generalizations: An alternative to alternations. *Cognitive Linguistics*, **13**(4), 327–356.

Goldberg, A. E. and Ackerman, F. (2001). The pragmatics of obligatory adjuncts. *Language*, **77**, 798–814.

Grimshaw, J. and Vikner, S. (1993). Obligatory adjuncts and the structure of events. In E. Reuland and W. Abraham, editors, *Knowledge and Language*, volume II, pages 143–155. Kluwer, Dordrecht.

Heinz, W. and Matiasek, J. (1994). Argument structure and case assignment in German. In J. Nerbonne, K. Netter, and C. Pollard, editors, *German in Head-Driven Phrase Structure Grammar*, number 46 in CSLI Lecture Notes, pages 199–236. CSLI Publications, Stanford, CA.

Herbst, T. and Roe, I. (1996). How obligatory are obligatory complements? An alternative approach to the categorization of subjects and other complements in valency grammar. *English Studies*, **2**, 179–199.

Keenan, E. L. and Comrie, B. (1977). Noun Phrase accessibility and Universal Grammar. *Linguistic Inquiry*, **8**, 63–99.

Koenig, J.-P., Mauner, G., and Bienvenue, B. (2003). Arguments for adjuncts. *Cognition*, **89**, 67–103.

Kuhn, J. (2001). Resource sensitivity in the syntax-semantics interface: Evidence from the German Split NP construction. In D. Meurers and T. Kiss, editors, *Constraint-Based Approaches to Germanic Syntax*, pages 177–215. CSLI Publications, Stanford, CA.

Müller, S., editor (2015). *Proceedings of the HPSG 2015 Conference*. CSLI Publications, Stanford, CA.

Needham, S. and Toivonen, I. (2011). Derived arguments. In M. Butt and T. H. King, editors, *The Proceedings of the LFG'11 Conference*, pages 401–421, Stanford, CA. CSLI Publications.

Oshima, D. Y. (2015). Ellipsis of SAY, THINK, and DO in Japanese subordinate clauses: A constructional analysis. In Müller (2015), pages 157–176.

Panevová, J. (1974). On verbal frames in Functional Generative Description. Part 1. *The Prague Bulletin of Mathematical Linguistics*, **22**, 3–40.

Panevová, J. (1975). On verbal frames in Functional Generative Description. Part 2. *The Prague Bulletin of Mathematical Linguistics*, **23**, 17–52.

Parsons, T. (1990). *Events in the Semantics of English: A Study in Subatomic Semantics*. The MIT Press, Cambridge, MA.

Pollard, C. and Sag, I. A. (1987). *Information-Based Syntax and Semantics, Volume 1: Fundamentals*. Number 13 in CSLI Lecture Notes. CSLI Publications, Stanford, CA.

Pollard, C. and Sag, I. A. (1994). *Head-driven Phrase Structure Grammar*. Chicago University Press / CSLI Publications, Chicago, IL.

Przepiórkowski, A. (1999a). *Case Assignment and the Complement-Adjunct Dichotomy: A Non-Configurational Constraint-Based Approach*. Ph.D. dissertation, Universität Tübingen, Tübingen.

Przepiórkowski, A. (1999b). On case assignment and 'adjuncts as complements'. In G. Webelhuth, J.-P. Koenig, and A. Kathol, editors, *Lexical and Constructional Aspects of Linguistic Explanation*, pages 231–245. CSLI Publications, Stanford, CA.

Przepiórkowski, A. (1999c). On complements and adjuncts in Polish. In R. D. Borsley and A. Przepiórkowski, editors, *Slavic in Head-Driven Phrase Structure Grammar*, pages 183–210. CSLI Publications, Stanford, CA.

Sag, I. A. (2007). Remarks on locality. In S. Müller, editor, *Proceedings of the HPSG 2007 Conference*, pages 394–414, Stanford, CA. CSLI Publications.

Sawicki, L. (1988). *Verb-Valency in Contemporary Polish*. Number 319 in Tübinger Beiträge zur Linguistik. Gunter Narr Verlag, Tübingen.

Sgall, P., Hajičová, E., and Panevová, J. (1986). *The Meaning of the Sentence in Its Semantic and Pragmatic Aspects*. Reidel, Dordrecht.

Somers, H. L. (1984). On the validity of the complement-adjunct distinction in valency grammar. *Linguistics*, **22**, 507–530.

Tesnière, L. (1959). *Éléments de Syntaxe Structurale*. Klincksieck, Paris.

Toivonen, I. (2013). English benefactive NPs. In M. Butt and T. H. King, editors, *The Proceedings of the LFG'13 Conference*, pages 503–523, Stanford, CA. CSLI Publications.

Tutunjian, D. and Boland, J. E. (2008). Do we need a distinction between arguments and adjuncts? Evidence from psycholinguistic studies of comprehension. *Language and Linguistics Compass*, **2**(4), 631–646.

Van Eynde, F. (2015). *Predicative Constructions: From the Fregean to a Montagovian Treatment*. CSLI Publications, Stanford, CA.

Vater, H. (1978). On the possibility of distinguishing between complements and adjuncts. In W. Abraham, editor, *Valence, Semantic Case and Grammatical Relations*, volume 1 of *Studies in Language Companion Series (SLCS)*, pages 21–45. John Benjamins, Amsterdam.

Williams, A. (2015). *Arguments in Syntax and Semantics*. Cambridge University Press.

Zaenen, A. and Crouch, D. (2009). OBLS hobble computations. In M. Butt and T. H. King, editors, *The Proceedings of the LFG'09 Conference*, pages 644–654, Trinity College, Cambridge, UK. CSLI Publications.

Žabokrtský, Z. (2005). *Valency Lexicon of Czech Verbs*. Ph.D. Thesis, Charles University, Prague.