Arguments and adjuncts across levels

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Abstract

The distinction between arguments and adjuncts is useful and widely adopted. It is foundational to many formal approaches to grammar, including LFG. However, it is not always obvious whether a phrase should be classified as an argument or an adjunct. I propose that the multifaceted nature of language can explain why some elements seem to fall in between arguments and adjuncts. Arguments have a prototypical realization at each level of grammar and they are also typically core event participants of their predicate. However, there can be mismatches between levels, and arguments can display atypical characteristics at each level. The specifics of the proposal are formulated with reference to the different structures in LFG's parallel projection architecture.

1   Introduction

The distinction between arguments and adjuncts is fundamental to syntactic and semantic analysis. However, it has proven difficult to pinpoint an exact definition of argumenthood, and it is sometimes difficult to classify a phrase as a clear argument or a clear adjunct. I propose in this paper that the complications stem from mismatches between levels of analysis. Prototypical arguments are core event participants conceptually, occupy specifier or complement positions in the c-structure, carry core grammatical functions at f-structure, compose directly with the verb semantically rather than being predicates of events, are not marked with oblique cases or prepositions, etc. However, these characteristics do not always align, and this complicates the identification of arguments and adjuncts.

This paper is organized as follows: Section 2 reviews some of the reasons why linguists across theoretical frameworks have adopted the argument-adjunct distinction. After that, section 3 lists a number of well-documented problems with the argument-adjunct distinction. Section 4 proposes that the reason why it is sometimes hard to determine whether something is an argument is that there can be mismatches between levels of information. The proposal specifically makes use of the LFG parallel projection architecture. Uncontroversial arguments are "close" to the predicate at all levels of grammar and also conceptually, but conceptual core participants are not necessarily linguistic arguments. Also, there can be mismatches between grammatical levels which may lead to a situation where something is an argument (close to the predicate) at some levels of grammar but not others. Section 5 discusses some previous proposals on how to deal with problematic cases. The section is mainly devoted to the proposals of Arka (2014) and Rákosi (2006, 2012). Finally, section 6 offers some concluding remarks.

2   In defense of the argument-adjunct distinction

Arguments are selected by the verb, but adjuncts are not. Arguments have a closer relationship with the verb syntactically and semantically. In many cases, it is not

difficult to identify the arguments and adjuncts in a sentence. Consider, for example, the following two sentences (from Condoravdi 2021), which contain both arguments and adjuncts:

(1) Last year in Rome on 15th March, *Brutus* stabbed *Caesar* in the forum with a knife at midday in front of a large crowd of onlookers.

(2) Last year in Germany, *one or two people* were mugged every couple of hours in a few hidden corners of campus every weekday in some of the more dangerous university towns.

The phrases in italics are uncontroversial arguments of the verbs *stab* and *mug*. The other, more peripheral, dependents are adjuncts, except possibly the instrument *with a knife* in (1), whose status is less clear. Example (2) also contains a passive verb. Should the unexpressed agent of *mug* count as an argument? If the passive agent had been expressed as a *by*-phrase, would it then be an argument or an adjunct? We return to instruments and passive agents later.

The examples illustrate that while some phrases may be difficult to classify categorically as arguments or adjuncts, many (I think most) phrases are in fact easy to classify. As linguists, we can quite freely talk about verbs as intransitive, transitive, or ditransitive without worrying too much about possible complications or misunderstandings: it is generally clear how many arguments a verb (or other predicate) takes. Similarly, when a verb is used in a sentence, it is typically clear which dependents are arguments and which are adjuncts, and I will not argue for a rejection of the argument-adjunct distinction in this paper.

2.1 Predicate arguments and predicate adjuncts

This section reviews some data that will serve as a reminder of the value of the argument-adjunct distinction. First we consider the contrast between predicate arguments (3) and seemingly similar predicate adjuncts (4). The examples in (3–4) are from Bresnan et al. (2016, 286):

(3) a. Mary didn't sound *ashamed of herself*.
    b. Louise struck me *as a fool*.
    c. Jogging keeps Susan *in a bad mood*.

(4) a. Mary looked down, *ashamed of herself*.
    b. Louise enjoyed sports, naturally, *as a Southern Californian*.
    c. Susan arrived for lunch, *in a bad mood as usual*.

Bresnan et al. (2016, 286–288) show that predicate complements differ from adjuncts in a number of ways (the discussion is also included in the first edition, Bresnan 2001). For example, omission of the argument results in ungrammaticality or a shift in meaning of the main verb (Bresnan et al., 2016, 287):

(5)   a. ??Mary didn't sound.

      b. Louise struck me. (different meaning than 3b)

However, the adjunct can be omitted freely, as the reader can test by omitting the predicate adjuncts in (4).

    Another difference concerns predication. When a verb takes a predicate argument, it dictates what the subordinate predicate is predicated of. For example, the complement of *strike* is predicated of the subject (6a) and the complement of *regard* is predicated of the object (6b):

(6)   a. Mary struck Fred as proud of herself/*himself.

      b. Mary regards Fred as proud of himself/*herself.

Verbs do not impose such predication restrictions on adjuncts. Predicate adjuncts differ from complements in that they can in some cases be predicated of the subject (7a) or the object (7b):

(7)   a. Mary struck Fred, proud of herself for doing so.

      b. Mary struck Fred, so proud of himself for insulting her.

The examples in (7) make use of a reading of the verb *strike* that is different from the reading in (6a), and the subordinate predicate is an adjunct. Adjuncts are often predicated of the matrix subject regardless of what the matrix verb is, but it is also sometimes, like in (7b), possible for predicate adjuncts to be predicated of a non-subject. In sum, the matrix verb determines the interpretation of the subject of its predicate argument but not the interpretation of the subject of a predicate adjunct.

    There are also other differences pointed out in Bresnan et al. (2016, 286–288): A predicate argument can host a negative polarity item but a predicate adjunct cannot. The ordering of arguments is fixed compared to the ordering of adjuncts. Each verb takes a unique predicate argument, while it is possible to include multiple predicate adjuncts with a similar role. Predicate arguments allow extraction more easily than predicate adjuncts.

    In sum, traditional argumenthood tests yield stark contrasts in acceptability between predicate arguments and predicate adjuncts.

2.2   The adjunct condition

Adjuncts are *islands* in the sense of Ross (1967): they disallow certain kinds of linguistic material such as negative polarity items controlled from the matrix clause. They also disallow gaps, which is what we will focus on here: arguments permit extraction gaps more easily than adjuncts (Huang, 1982; Chomsky, 1986; Johnson, 2003). This generalization has been called *the adjunct condition* (for discussion of the adjunct condition in LFG, see Dalrymple et al. 2019, Ch. 17). The adjunct condition is one of the traditional argumenthood tests mentioned above. It will be considered in some detail here.

The examples in (8–9) illustrate that the adjunct condition governs extractability out of finite subordinate clauses in English. The subordinate clauses in (8) are arguments of *promise* and *hope*, respectively, and they contain gaps. The subordinate clauses in (9), on the other hand, are adjuncts, and the gaps render the examples ungrammatical.

(8)   a. Which plants did you say Maria liked _?

       b. Who did Farrah hope that Kevin would marry _?

(9)   a. *Who did you stay quiet so that Kevin would marry _?

       b. *Which cousin did Bill cry after he annoyed _?

There is strong support for the adjunct condition, but it is not completely unproblematic. Previous scholars have pointed to some examples where it is in fact possible to extract out of adjuncts (I present a few of those below). However, the counterexamples that have been identified constitute restricted subclasses of adjuncts and the condition otherwise holds. In other words, it seems that the adjunct condition predicts the majority of cases, but individual languages or dialects allow violations of the condition in specific constructions.

Counterexamples to the condition can be found in English non-finite clauses. While extraction out of nonfinite subordinate adjunct clauses is typically blocked (e.g., (10a)), Borgonovo and Neeleman (2000), Truswell (2007, 2011), and others have pointed out that there are exceptions (e.g., (10b)):[1]

(10)   a. *What did John appear whistling?

       b. What did John come home whistling?

Truswell (2007) shows that extraction out of nonfinite adjunct clauses is restricted to a small subset of cases. Specifically, he argues that extraction is only possible if the event denoted by the subordinate predicate is identified with an event position in the semantic representation of the matrix predicate.

Huhmarniemi's (2009, 2012) careful investigation of non-finite forms in Finnish shows that the adjunct condition generally holds in Finnish as well. This is illustrated by the contrast in grammaticality between (11) and (12) from Huhmarniemi (2009):[2]

(11)   a. Pekka näki   Merjan kirjoittamassa runoja.
           P.NOM saw.3SG M.ACC write.MA.INE poems.PART
           'Pekka saw Merja writing poems.'

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[1] Example (10b) is from Borgonovo and Neeleman (2000) and (10a) is from Truswell (2007).

[2] Abbreviations used in glosses: ACC accusative, INE inessive, F feminine, M masculine, MA the third infinitive in Finnish, NOM nominative, OBJ objective case, OBV obviative, OM₂ non-affected object marker, PART partitive, PERF perfective, POSS possessive pronominal marker, REL relational, TI transitive inanimate, TS theme sign.

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  b. Mitä   Pekka näki Merjan kirjoittamassa?
    what.PART P.NOM saw.3SG M.ACC write.MA.INE
    'What did Pekka see Merja write?'

(12) a. Pekka yllätti   Merjan kirjoittamalla runoja.
    P.NOM surprised.3SG M.ACC write.ADE poems.PART
    'Pekka surprised Merja by writing poems.'
  b. * Mitä   Pekka yllätti   Merjan kirjoittamalla?
    what.PART P.NOM suprised.3SG M.ACC write.ADE

In (11), the non-finite verb *kirjoittaa* 'to write' heads an argument of the matrix verb, and an object gap is possible. By contrast, the non-finite *kirjoittaa* in (12) heads an adjunct, and the gap is not permitted.

  Huhmarniemi (2009, 2012) discusses the A-infinitive, VA-infinitive, five kinds of MA-infinitives (two of which are illustrated in (11–12) above), rationale and temporal infinitives in Finnish. She concludes that "... when it can be established independently that the phrase occupies an adjunct position, then it is an extraction island" (Huhmarniemi, 2012, 236). The argument-adjunct distinction accounts for most of the Finnish infinitive data, but there are a few potential counterexamples. For example, about 30% of the participants in an experiment allowed extraction of objects (but not subjects or adjuncts) out of the non-finite -ESSA temporal construction "in specific contexts" (182). Like in English, the adjunct condition is a solid starting point for the exploration of gap permissibility in Finnish. The condition alone covers the vast majority of the relevant data, and the potential counterexamples belong to specific grammatical subclasses of adjuncts.

  The adjunct condition governs extraction also beyond English and Finnish. For example, adjunct clauses are islands to *wh*-extraction in Norwegian (Kush et al., 2018), Italian (Sprouse et al., 2016), and Jordanian Arabic (Al-Aqarbeh and Sprouse, 2021). Stepanov (2007) presents a cross-linguistic review of the adjunct condition, and he concludes that no languages allow extractions out of adjuncts. Peripheral finite clauses seem to be strong islands in all languages that have been carefully investigated, but there is variation with respect to central adjuncts and non-finite adjuncts. We considered some violation examples from English and Finnish above, and more examples are provided by Müller (2019), who investigates the adjunct condition in Swedish (and other Scandinavian languages), where island effects generally are not as strong as in many other languages.

  The brief review of findings provided here has focused on gaps in *clausal* arguments or adjuncts, but non-clausal dependents have also been investigated. Prepositional phrases, for example, are quite permissive in many languages including English. A fuller review will not be attempted here, but see, for example Falk (2009, 2011) for relevant discussion within LFG. Falk proposes that in order to explain island effects, it is necessary to take into account pragmatics and processing in addition to syntax. Hofmeister and Sag (2010) and Hofmeister et al. (2012a,b) explore the possibility that island constraints can be completely reduced to processing constraints related to discourse linking and cognitive complexity. However, the

results of a growing number of studies indicate that island constraints cannot be reduced solely to processing (Sprouse et al., 2012a,b; Aldosari, 2015; Goodluck et al., 2017; Müller, 2019; Pham et al., 2020).

Taken together, the findings reviewed above indicate that the argument-adjunct distinction is a strong predictor of the permissibility of gaps. Careful investigation has pointed to circumscribed classes of counterexamples, which shows that the linguistic reality is complex, as is of course the case with all broad grammatical postulates. It is also important to keep in mind that the adjunct condition is not the only constraint on gaps (see Ross 1967 for more). Despite the complexities, the adjunct condition strongly supports the argument-adjunct distinction: the adjunct condition covers an impressive amount of data; data that would be left unexplained if the notion of argumenthood were abolished from grammatical theory.

2.3 Interim conclusion: Arguments differ from adjuncts

Section 2 is included here to serve as a reminder that there is strong support for the argument-adjunct distinction. First, the distinction deserves serious consideration because of its heritage. The idea that arguments have a distinct status has been assumed and argued for across scholarly traditions, sometimes independently. Grammarians and linguists in different time periods and endorsing a variety of theoretical perspectives adopt a distinction between arguments and adjuncts (see Barbu and Toivonen 2016a for a cross-theoretical overview). The intuition of argumenthood builds on centuries of work on language: the notion of direct dependents of the verb is implicitly assumed already in the works of Pāṇini (Dowty, 1991; Barbu, 2015).

Second, the classification of phrases as arguments and adjuncts is in many cases not at all controversial, as illustrated by the following example:

(13)   In the evening, *the lively zebra* peacefully enjoyed *the sunset* in the valley.

In (13), *the lively zebras* and *the sunset* are uncontroversial arguments and the other phrases are not arguments.

Third, systematic comparison between a specific class of arguments and a similar class of adjuncts reveals that the groups differ from each other strikingly in a number of predictable ways. This was illustrated by the comparison of predicate arguments and adjuncts in section 2.1.

Fourth, it is possible to identify specific ways in which arguments and adjuncts differ cross-linguistically. The adjunct condition is an example (section 2.2). The argumenthood diagnostics are not necessarily universal, and the generalizations are often implicational: if a language has characteristic X, and X yields distinctions in grammaticality, then arguments will display one pattern and adjuncts another. These characteristics are used as argumenthood tests.

Fifth, there is ample psycholinguistic and neurolinguistic evidence for the distinction. For example, Di Giovanni (2016) performed an EEG study on well-formed and nonsensical arguments and adjuncts. The nonsense arguments cor-

related with an early left anterior negativity and an N400 signal, whereas the nonsense adjunct condition triggered a P600. Di Giovanni further found that the processing of arguments correlated with a strong decrease in alpha activity, whereas there was instead a slight increase in alpha-band power with adjuncts. Other psycho- and neurolinguistic studies supporting the argument-adjunct distinction include Shapiro et al. (1989); Britt (1994); Boland (2005); Boland and Blodgett (2006); Tutunjian and Boland (2008); Frisch et al. (2004); Thompson et al. (2007, 2010); and Lee and Thompson (2011).[3]

I conclude that the argument-adjunct distinction rests on solid ground.

3 Problematic aspects

There are strong reasons to adopt the argument-adjunct distinction in linguistic theory, but a number of problematic aspects need to be addressed. One problem is that there is no straightforward and universally agreed-upon definition of *argument*. Textbooks provide definitions that are good enough to convey the intuition behind the concept, but they also tend to point out that the definitions are not foolproof. The definitions also vary between textbooks. Haegeman (1994, 44) offers the following: "The arguments are the participants minimally involved in the activity or state expressed by the predicate." This definition is not identical to the one provided by Carnie (2006, 51): "The entities (which can be abstract) participating in the [predicate] relation are called arguments." Tallerman (2005, 98) includes several relevant characteristics in her definition: "Adjuncts are always optional, whereas complements are frequently obligatory. The difference between them is that a complement is a phrase which is *selected* by the head, and therefore has an especially close relationship with the head; adjuncts, on the other hand, are more like 'bolt-on' extra pieces of information and don't have a particularly close relationship with the head." These characterizations are useful, but they don't always serve to clearly isolate arguments. For example, it is not clear where these definitions leave the instrument and unexpressed passive agent of examples (1–2) at the beginning of this chapter.

Textbook authors often themselves point out that the the issue is complex. Kroeger (2004, 10), for example, remarks that "[t]his distinction between arguments and adjuncts is important, but not always easy to make."

3.1 Tricky cases

As remarked in section 2, many examples of arguments and adjuncts are uncontroversial. However, some cases are less straightforward. For example, numerous

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[3]Some psycholinguistic studies specifically indicate that certain speakers judge certain types of phrases as argumentlike in some ways but adjunctlike in others. A few such studies are presented in section 3.1. This, I will argue, is in line with the general proposal of this paper: there can be mismatches between levels.

studies show that instrument phrases display characteristics of both arguments and adjuncts (Koenig et al., 2003; Donohue and Donohue, 2004; Tutunjian and Boland, 2008; Needham and Toivonen, 2011; Kifle, 2011; Rissman, 2013; Rissman et al., 2015; Barbu, 2015, 2020; Russo, 2021, a.o.). Example (1) above contains the instrument phrase *with a knife*. Another example is provided in (14) below:

(14)   Frank wiped the table *with an old t-shirt*.

Roxana Barbu has conducted a series of studies designed to gauge intuitions on instruments (Barbu, 2015; Barbu and Toivonen, 2016b,a; Barbu, 2020). Barbu investigated English, Spanish, Romanian and Turkish, and her experiments involved two tasks. One task was designed to elicit intuitions about what event participants were necessary based on the meaning of verbs. The participants were provided with a list of verbs, and for each verb they were asked to specify the participants that were necessary in order for the event to take place. The other task was a sentence completion task, designed to elicit judgments about what phrases were necessary in the linguistic string. Specifically, participants specified what phrases had to be expressed in order for the sentence to sound complete. Barbu calls the first task *the semantic task* and the second one *the syntactic task*. For more details on her method, see Barbu (2020, Ch. 4).

The tasks in Barbu's web-based and anonymous studies were quite open-ended, and a certain amount of noise in the data is therefore expected. The results are nevertheless informative. Barbu included regular ditransitive verbs such as *send* and *deliver* in order to be able to compare indirect objects (uncontroversial arguments) to instruments. Figure 1 provides an overview of Barbu's results.

Figure 1: Mentions of indirect objects and instruments in Barbu's (2020) study
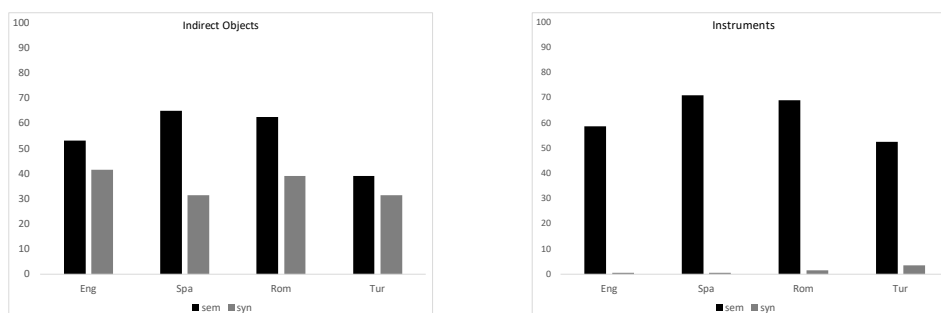
The chart on the left displays the proportion of times participants mentioned the indirect object when probed by a ditransitive verb. The chart on the right displays the proportion of times participants mentioned the instrument when probed by a verb that has been claimed to require an instrument (e.g., *draw, sweep, stab*).[4]

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[4]Barbu also investigated verbs that have been claimed to allow but not require instruments. Those

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Figure 1 separates the results by language. The results of the syntactic task are illustrated with black columns and the results of the semantic task are illustrated with grey columns.

The semantic task elicited more mentions than the syntactic task in general, but the difference between the two is much greater for instruments than indirect objects. In each language, participants mentioned instruments more than half of the time in the semantic task, but instruments were almost not mentioned at all in the syntactic task, even though the same verbs were included in both tasks. Barbu's results indicate that instruments are viewed as core participants of certain verbs, but they nevertheless do not need to be overtly expressed.

Russo (2021) applies standard argumenthood diagnostics to instrument phrases in English and Turkish. The results are summarized in Table 1, adapted from Russo (2021, 33).

Table 1: Argumenthood tests for English and Turkish (Russo, 2021)

Test	English	Turkish
Core participant	ARG/ADJ	ARG/ADJ
Iterativity	ARG/ADJ	ARG/ADJ
Alternation	ARG	ARG
Verb specificity	ARG	ARG
Optionality	ADJ	ADJ
VP anaphora	ADJ	ADJ
Pseudocleft	ADJ	ADJ

Russo's results are mixed: instruments are argument-like in some ways and adjunct-like in others. The notation ARG/ADJ indicates that instruments of some verbs (typically verbs that require instruments) pattern with arguments, and instruments of other verbs (typically verbs that allow but do not require instruments) pattern with adjuncts. It is interesting to note that the results are the same for English and Turkish.

The evidence from Barbu (2020), Russo (2021), and others shows that it is not obvious whether instruments should be classified as arguments or adjuncts. A number of other classes of phrases are also difficult to classify. Some examples from English include passive *by*-phrases, benefactive NPs, personal datives, result phrases, *with*-themes, and telic directional PPs. An example of each of these along with a reference to relevant work is given in (15–20):[5]

(15)   The event was stopped *by the police*. (Kibort, 2004)

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results are not included here.

[5]The constructions are discussed in the sources provided, but the examples are my own, except for (17) which is from Conroy (2007). Note that personal datives are not accepted in all varieties of English; see Wood and Zanuttini (2018).

Table 2: Argumenthood tests

optionality	core participant	word-order dependent meaning
alternations	verb specificity	weak island extraction
iterativity	VP anaphora	wh-word conjunction
VP ellipsis	fixed preposition	prepositional content
VP-preposing	relative ordering	VP-focussed pseudoclefts
"that happened"	the Adjunct Condition	

(16)   Flory roasted *us* a chicken. (Toivonen, 2013)

(17)   I'm gonna write *me* a letter to the president. (Wood and Zanuttini, 2018)

(18)   Claudine beat the metal *flat*. (Christie, 2015)

(19)   The garden swarmed *with bees*. (Lewis, 2004)

(20)   Sandeep jumped *onto the platform*. (Van Luven, 2018)

3.2   Diagnostics

A large number of argumenthood diagnostics or tests have been proposed in the literature. Table 3 provides a list of many of them; see Van Luven and Toivonen (2018) for references and examples. The tests are useful, as illustrated in the discussion of the adjunct condition in section 2.2, but they have also been criticized. This section reviews some problematic aspects of a few of the tests.

Each argumenthood test is connected to characteristics that have been noted to align with arguments or adjuncts. For example, it has been observed that arguments tend to be obligatory while adjuncts are optional. This observation lies behind the *optionality* test: Phrases that can be omitted without rendering an example unacceptable are adjuncts, and phrases that cannot be omitted are arguments. However, this test does not work perfectly. Many verbs (e.g., *eat, write, drive*) take optional objects, for example, even though those objects are clearly arguments. Furthermore, many languages (e.g., Turkish, Vietnamese) allow the dropping of all or almost all arguments, given the right discourse context.

It has also been argued that not all adjuncts are optional (Jackendoff, 1990; Grimshaw and Vikner, 1993; Goldberg and Ackerman, 2001). For example, English middle constructions need adverbial modification to be acceptable:

(21)   a. Cotton shirts iron *(easily).

Since arguments are not necessarily obligatory and adjuncts are not necessarily optional, the optionality test is problematic.

Another common test is the core participants test. Arguments are core participants of the verb, and adjuncts are more peripheral participants. This test captures

the basic intuition behind argumenthood. However, some participants are core participants even though they seem to be adjuncts in other respects. Instruments, discussed above, constitute an example. Price phrases are similarly conceptually necessary for verbs like *buy, sell* and *rent*, even though they are not clear arguments. A buying event must involve a price otherwise it is a taking, trading or bartering event (Apresjan 1992). Conversely, expletives display many argument characteristics, but they are not core participants conceptually.

According to the VP-anaphora test, adjuncts may be added to 'do so' clauses, but arguments may not (Lakoff and Ross, 1966; Baker, 1978; Whaley, 1993):

(22)   a. Nalini published a book in January and Joanne did so in February.

        b. *Nalini published a book and Joanne did so an article.

In this construction, *do* is a main verb, (Hankamer and Sag, 1976, fn. 27) and anything that can modify 'do so' is acceptable in the clause. In other words, this test is a test of what can modify 'do so' rather than a test of what arguments the main verb takes. The VP-focussed pseudocleft test and the 'do something' test similarly involve the main verb 'do'.

The argumenthood tests accurately distinguish between arguments and adjuncts in many cases. However, several of the tests are problematic, and every test needs to be applied with care. The adjunct condition serves as an example of this: the condition was presented in section 2.2 as a phenomenon that shows genuine sensitivity to the argument-adjunct distinction. However, it was also pointed out in that section that certain subclasses of phrases seem to escape the condition, and there are crosslinguistic differences. Almost all tests have been criticized by previous scholars, many of them referenced below in sections 3.3 and 5.

3.3   Section summary

Section 3.1 pointed out that some elements seem to display characteristics of both arguments and adjuncts. Section 3.2 showed that argumenthood tests often give unclear results. Such complications are widely acknowledged; see, e.g., Cennamo and Lenci (2019); Moura and Miliorini (2018); Andrason (2018); Ackema (2015); Hole (2015); Williams (2015); Forker (2014); Bosse et al. (2012); Hedberg and DeArmond (2009); Ágel and Fischer (2009); Koenig et al. (2003); Dowty (2003); Vater (1978). Difficulties with the argument-adjunct distinction have also been noted within the LFG literature: Rákosi (2006, 2012); Zaenen and Crouch (2009); Needham and Toivonen (2011); Kifle (2011); Arka (2014); Przepiórkowski (2016).

The complications have led some authors to conclude that the argument-adjunct distinction should be abolished from linguistic theory. Przepiórkowski (2016, 575), for example, calls the distinction "just another linguistic hoax". Other scholars have argued that the distinction between arguments and adjuncts is real and useful, but gradient (e.g., Forker 2014; Arka 2014). I return to a few previous proposals of how to deal with the tricky cases after I sketch my own proposal in section 4.

4 Arguments at different grammatical levels

Language is not monolithic. A sentence may be insightfully analyzed with focus on one or more of the following aspects: truth-conditional meaning, participant roles, grammatical functions, word classes, prosody, illocutionary force, etc. I propose that the multi-faceted nature of grammar explains why certain phrases are difficult to categorize as arguments or adjuncts.

In LFG, different facets of language are analyzed at distinct grammatical levels: c-structure, f-structure, a-structure, s-structure, and so on. This division of labour will be useful for modelling elements that do not seem to be clear arguments or adjuncts. An element can be argument-like at one level even though it is adjunct-like at another. This section goes through the notion of argumenthood at some of the relevant levels.

4.1 Conceptual event participants

Predicates correspond to events and states in the world, and speakers form mental representations of those events and states. This representation includes intuitions about the number and type of participants events require and allow. However, as pointed out by Levin and Rappaport Hovav (2005, 168) and Jackendoff (1990, 156), a participant can be associated with an event denoted by a verb without being a linguistic argument of that verb.

The maximum number of possible linguistic arguments is more restricted than the maximum number of conceptual event participants. The maximum number of linguistic arguments of a given predicate is typically assumed to be three or four, but the number of possible event participants can be higher.

Apresjan (1992) provides examples of verbs denoting events that take many participants ("actants"). For example, he lists the following five actants for the event denoted by the verb *lease*: he who leases, that which is leased, he from whom it is leased, that in exchange for which it is leased (i.e. the pay), and the period of time (for which it is leased). Apresjan concludes that "these actants are sufficient and necessary" (117). However, *lease* takes less than five linguistic arguments. This is an example of a mismatch between linguistic arguments and event participants. The price phrase of *lease*, for example, is a necessary conceptual event participant but not a linguistic argument. Other verbs that take price as an event participant but not an argument include *buy* and *rent*. On the other hand, *pay* and *cost* take price as both an event participant and a linguistic argument.

All (or almost all) events and states can be modified by location, time, and manner phrases. These are also not linguistic arguments, but they differ from price phrases in that they are not associated with the meaning of specific verbs. These general descriptors are not considered core conceptual event participants and are therefore excluded from the discussion here. This follows Koenig et al.'s (2003) "verb specificity" constraint for what is lexically encoded information.

Like price phrases, instrument phrases are necessary conceptual event partic-

ipants but not linguistic arguments of many verbs. This was proposed in section 3.1 and is also argued by Rissman et al. (2015). A verb like *slice* denotes an event that cannot take place without an instrument. However, the verb does not take a linguistic instrument argument. Some verbs of course allow instruments as arguments. For example, in *the key opened the door*, the instrument is the subject argument of *open*. Also, in some languages instrument arguments can be added through applicativization. The Tigrinya examples in (23) (from Kifle 2011, 68–69) illustrate the applicativization of an instrument:

(23) a. Yonas bɨ-manka-y   bäliʕ-u
          Yonas spoon-POSS.1SG PERFS.eat-SM.3MSG
          'Yonas ate with my spoon.'

     b. Yonas n-ät-a   manka-y
          Yonas OBJ-DET-3FSG spoon-POSS.1SG
          bäliʕ-u-la
          PERFS.eat-SM.3MSG-OM$_2$.3FSG
          'Yonas ate with my spoon.'

In (23a), the instrument 'spoon' is marked with the preposition *bɨ-*. In the applied version (23b), 'spoon' is an applied direct object and obligatorily indexed on the verb (Kifle, 2011, 11).

In sum, prices and instruments can in principle be arguments. However, they are often linguistic adjuncts, even when they appear with verbs that require them as necessary conceptual event participants.

4.2   Argument structure

The number and ranking of arguments of individual predicates are modelled at argument structure (a-s) in LFG. A-s is therefore the level which determines what the actual linguistic arguments are. If an element is listed on the a-s of a predicate, then it is an argument of that predicate. However, there might be disagreements among linguists about how to best analyze the a-s of a given predicate. It is also important to take into account that certain operations operate at a-s. For example, the standard LFG analysis of passives is formulated at a-s: the passive form of a verb is linked to one less argument than the active form. The highest argument of an active verb does not correspond to an argument of the passive form, but it can be expressed as a *by*-phrase, which is syntactically an adjunct.

A-s lists can also be augmented. This is the case for causatives and applicatives, for example: they are accompanied by one more argument than the basic form.

Applicative-like operations whereby arguments are added in a regular fashion are not always accompanied by special morphology. For example, English benefactive NPs (like in (16)) can be analyzed as optionally added arguments that correspond to a restricted class of benefactive *for*-adjuncts. The restriction seems to be that the added argument is interpreted as a recipient, and not just a benefactor in the broader sense; see Toivonen (2013) for references and discussion.

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Similarly, personal datives (like in (17)) are added arguments. Personal datives are pronouns which are co-referential with the subject, but nevertheless do not appear in the reflexive form. Personal datives are restricted by grammatical constraints that differ between dialects. For example, some dialects allow second and third person in addition to first person personal datives. It also seems that some dialects allow PP personal datives.[6] Southern US dialects are generally more permissive than other English dialects with respect to personal datives. These generalizations are all from Wood and Zanuttini (2018), who list many attested examples.

The personal datives are similar to *affected experiencers* in German, which are discussed in Bosse et al. (2012) and given an LFG analysis in Arnold and Sadler (2012), where example (24) is from:

(24)   Alex zerbrach mir Bens Vase.
       Alex broke   me Ben's vase
       'Alex broke Ben's vase 'on me'.'

Arnold and Sadler (2012) provides an analysis of the interesting semantics of these elements. Syntactically, the affected experiencers are dative objects at f-structure and complements within the VP at c-structure (a regular object position). An affected experiencer is thus a syntactic argument, even though it is not a member of the basic a-s list of the verb. However, it can be viewed as an added a-s argument: a product of a regular a-s operation similar to applicativization.

4.3   Functional structure

Functional structure (f-s) functions are divided into argument functions (SUBJECT, OBJECT, OBJECT$_\theta$, OBLIQUE, COMP, XCOMP) and adjunct functions (ADJ, XADJ). However, an argument function of a verb does not necessarily correspond to elements that are arguments or argument-like at all levels. For example, raising-to-subject verbs like *seem* and raising-to-object verbs like *expect* have a SUBJECT and an OBJECT, respectively, that are not event participants or semantic arguments of the verbs. The embedded verb whose SUBJ or OBJ has raised shares that function with the raising verb at f-s, but the SUBJ/OBJ does not correspond to any elements in a c-structural subject or object position. Raising thus results in a mismatch between conceptual structure, s-s and f-s for the raising verbs and a mismatch between conceptual structure, s-s, c-s, and f-s for the embedded verbs.

East Cree relational morphology provides a striking example of an f-s argument that does not correspond in any obvious way to elements at other grammatical levels. The examples here are drawn from East Cree, but relational morphology is widespread in Algonquian. The examples in (25), from Junker and Toivonen (2015), illustrate the phenomenon:

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[6]Wood and Zanuttini (2018) cite *I'm gonna go and play with me and cat* and other examples of PP personal datives.

(25) a. ni-wâpahte-n mistikw.
          1-see.TI-1   wood
          'I see a stick.'

      b. ni-wâpahtam-**w**-â-n mistiku-yû.
          1-see.TI-REL-TS-1   wood-OBV
          'I see a stick (but she does not)/(over at her place).'

The relational morpheme *-w-* adds a third person animate participant to the interpretation of the sentence. The participant is often a possessor, but it can also be some other participant who is salient from the context, like in (25). Curiously, the participant cannot be expressed with an NP as a dependent of the verb. It can be expressed as a possessor embedded within an NP, but not as an NP dependent of the verb.

East Cree morphosyntax offers strong evidence that the introduced participant is an f-structure argument, specifically an OBJECT. First, when the verb carries relational morphology, the NPs in the sentence must be obviative. Cree has a requirement that at most one third person participant can be proximate, all others must be obviative. The fact that no NP can be proximate when relational morphology is present thus suggests that the introduced relational participant holds an argument function, and it further suggests that this participant is interpreted as being proximate (in the foreground). Second, relational verbs all have a transitive animate theme sign (TS). This theme sign indicates that the clause has an animate OBJECT.

East Cree thus allows for a certain class of clauses to have an f-structure OBJECT, even though that object is not a basic argument or core participant of the verb, and it cannot be overtly expressed as a dependent of the verb in the c-structure. The introduced element is an f-structure argument, but it is not an argument at c- or a-structure.

4.4 Constituent structure

Constituent structure (c-s) is key for the analysis of some elements that seem difficult to classify with respect to argumenthood. For example, expletives are not semantic arguments, but they occupy argument positions at c-s.

Prototypical arguments have specific realizations at c-structure: they are nominal, and they occupy specifier or complement positions. However, not all arguments are NPs. The sentence *Kamala lives in Toronto* contains a PP argument. It is also possible for adjuncts to be expressed as NPs:

(26) Frankie was surprised by his family *that evening*.

NPs are often arguments and PPs are often adjuncts, but this is a tendency and not a rule. It is possible to state generalizations about how arguments and adjuncts are typically realized in terms of c-structure categories (word classes), but mismatches are not uncommon.

In configurational languages, arguments are specifiers or complements at c-structure whereas adjuncts are adjoined (their mother and sister nodes are of the same category). However, non-configurational languages do not conform to these rules. In configurational language as well arguments can be expressed in other positions as dislocated topics or focussed phrases.

4.5 S-structure

The argument-adjunct distinction is foundational in many theoretical approaches to semantics, classical Montague Grammar, for example. Semantic structure is therefore likely to be crucial to the understanding of the argument-adjunct distinction, but exactly how depends in part on what semantic formalism is adopted. The LFG architecture is compatible with a variety of formalizations of meaning, which may require distinct conceptions of s-s, and the LFG community has not decided on one such formalization as the LFG standard. However, LFG+GLUE is emerging a common platform for semantic analysis in LFG (see Asudeh (To appear) for a recent overview). The argument-adjunct distinction has recently been tackled within LFG+GLUE by Asudeh and Giorgolo (2012); Asudeh et al. (2014); Lowe (2015); and Findlay (2016, 2020), who incorporate a-s into s-s and thereby eliminate a-s as a separate level of grammar. If this approach proves successful, then the analyses that were originally cast within Lexical-Mapping Theory at a-s will need to be revisited at s-s.

Several empirical puzzles that concern the argument-adjunct distinction have already been addressed from this perspective. Asudeh et al. (2014) discuss cognate objects such as *(sleep) a great sleep* and *(laugh) a terrible laugh*. Cognate objects are interesting because they are semantically like modifiers, even though they are direct objects syntactically. Cognate objects do not appear without modification (*great* and *terrible* in our examples). Also, the verbs that take cognate objects are not regular transitive verbs: most direct objects are not possible: **sleep the bed, *laugh a friend*. Asudeh et al. (2014) treat cognate objects as modifying adjuncts and not as arguments in the compositional semantics. However, they are nevertheless OBJECTs in the f-structure.

Asudeh and Giorgolo (2012) similarly make use of LFG's parallel levels in order to account for optional arguments of verbs such as *eat* and *read*. In their analysis, the omitted but understood objects are absent at c-s and f-s but present at s-s. This analysis is attractive and seems to work well for the examples that Asudeh and Giorgolo adress. However, it raises an interesting question: Should all entailed core participants be analyzed as s-s arguments? For example, do we want to posit that all verbs that require instruments (*sweep, slice*, etc.) have (possibly unexpressed) instrument arguments at s-s? Do we want to posit that verbs that take four or more conceptual participants (*buy, rent, dispatch, expatriate*, etc.) take four or more arguments at s-s? Asudeh and Giorgolo (2012) seem to limit their analysis to optional elements that are syntactic arguments when they are present in the syntax. Instruments of verbs like *sweep* and *chop* and price phrases of verbs

like *sell* and *rent*, by contrast, are "understood" participants but they do not behave syntactically like arguments when they appear in the sentence.

4.6 Section summary

This section provided a brief overview of how arguments and adjuncts are represented at the different LFG levels. A-structure is central: this structure lists the elements that the researcher deem are the genuine linguistic arguments of each predicate. There are prototypical ways in which these arguments map to elements at other levels. Mismatches are not uncommon, as pointed out with reference to a number of examples in this section. These mismatches explain why it is sometimes difficult to identify a given participant as an argument or an adjunct.

5 Previous proposals

Many previous scholars have noted that it is not always easy to determine whether an element is an argument (see section 3.3 for references). I suggested above that difficult cases can be explained by taking the multifaceted nature of grammar into account. Several other interesting proposals for how to handle this issue have been put forward, and a few of them will be briefly reviewed here.

Zaenen and Crouch (2009) argue that all semantically marked obliques should be treated as adjuncts in ParGram, because they are computationally clunky to parse and they lead to too many ambiguities. However, they seem to imply that this is an interim solution, because they remark (p. 647): "It seems then that in the current state of affairs no linguistic theory is developed enough to give criteria that allow us to straightforwardly distinguish arguments from adjuncts in many cases. So, even in the cases where we can hope one day to make the distinction based on syntactic and lexical criteria we are not able to do it now."

Arka (2014) argues that there is no clear-cut argument-adjunct distinction. His claim is based on the observation that Balinese locatives that can undergo applicativization do not exactly correspond to locatives that would normally be classified as arguments. Example (27) (from Arka 2014) shows that some but not all OBLIQUE locatives (arguments) can undergo applicativization:

(27) Tiang ngentung-in   anak-e   ento / *kema lulu.
     1   AV.throw-APPL person-DEF that   to.there rubbish
     'I threw rubbish to the person/there.'

Example (28) (also from Arka 2014) shows that some but not all ADJUNCT locatives can be applicativized:

(28)   a. Tiang pules (di dampar-e   / di alas-e)
          1   sleep at bench-DEF   in forest-DEF
          'I slept on the bench / in the forest.'

b. Tiang mules-in   dampar-e   / ?*alas-e
   1   AV.sleep-APPL bench-DEF   forest-DEF
   'I slept on the bench / ?*in the forest.'

Specific properties of the locative phrase, not the valency of the verb, determine whether it can appear as an applied object or not.

Based on these data, Arka (2014) concludes that the distinction between arguments and adjuncts is gradient. He proposes an *argument index*: A syntactic unit is assigned an argument index between 1 and 0, and the index is calculated based on 14 characteristics (6 general, 8 language-specific). An index value of 1.00 indicates "definitely a core argument" and an index of 0.00 indicates "definitely an adjunct". Arka further proposes that only locatives that receive a high *argument index* can be promoted to applied objects.

Arka (2014) shows that locatives that are nominal, affected by the event, specific, and individuated in space can be applicativized. According to Arka, this is because these factors grant them a high argument index value, which means they are more argumentlike than other locatives.

Arka's interesting proposal is an explicit attempt to account for the intuition that certain elements (e.g., nominals and participants directly affected by the event) are especially argumentlike, or suitable for argumenthood. In the proposal spelled out in section 4, this intuition would be captured less directly: at each level of grammar, elements can be realized in ways that are more or less compatible with argumenthood. An element can be argumentlike at all levels or adjunctlike at all levels. However, there may be mismatches. For example, a c-structure PP can be an argument, even though PPs are more commonly adjuncts than arguments.

Arka suggests that criteria for argumenthood can be specific to languages and even individual constructions. I propose instead that some of the factors he discusses are indeed language-specific, but they do not determine argumenthood but rather applicativization. In other words, the criteria Arka identifies are simply constraints on the applicativization of locatives in Balinese. Whether or not a locative can undergo applicativization does not depend on its argument index. Instead, it is determined by the factors that Arka convincingly argues are relevant: word class, specificity, individuation, and affectedness.

Rákosi (2006, 2012) analyzes adjuncts that seem somewhat argument-like. He specifically addresses circumstantial PPs such as instruments and benefactives. He proposes that these PPs are *thematic adjuncts*: adjuncts that receive a thematic role. He contrasts examples like the following (Rákosi, 2006):

(29)   a. This appeals **to me**. THEMATIC ARGUMENT

       b. This is important **to me**. THEMATIC ADJUNCT

       c. **To me**, this is nice. NON-THEMATIC ADJUNCT

According to Rákosi, a participant PP such as *to me* in (29b) receives thematic specifications labeled with the features [+/-m, +/-c] of Reinhart (2002). The feature [m] indicates *mental state* and [c] indicates *cause change*.

It seems to me that our proposals are broadly compatible. Rákosi's theory is based on Reinhart (2002) whose theta system is intended as "the central system of the systems of concepts" (Reinhart, 2002, 229). The features are thus intended to cover conceptual structure, which is relevant for the linguistic system, but the two systems are nevertheless separate.

In my view, the proposal sketched here complements Rakosi's proposal rather than competes with it. Many phrases that Rákosi (2006, 2012) analyzes as thematic adjuncts would be treated here as core conceptual event participants that are not linguistic arguments. For example, that would be the analysis of *to me* in (29b), while *to me* in (29a) is an argument, and *to me* in (29c) is a regular adjunct that is not a core participant. Adopting Reinhart's system for a fuller understanding of the adjuncts would not in principle contradict my proposal. However, there are cases where my core conceptual event participants that are not linguistic arguments do not align with Rákosi's thematic adjuncts. For example, recall that some verbs (e.g., *cut*) require instruments as event participants whereas others merely allow them (e.g., *break*). Rákosi treats the required instruments as arguments and the allowed instruments as thematic adjuncts. I would treat them all as adjuncts, while recognizing that the required instruments are core event participants conceptually. Also, Rákosi treats comitative *with*-phrases in a sentence like *John cleaned the room with Kate* like thematic adjuncts, but this class of phrases does not align with core event participants. The difference seems to boil down to the fact that my proposal assumes that there is a distinction between adjuncts that denote necessary participants of the event/state denoted by the verb and other adjuncts. Rákosi's proposals does not seem to adopt this distinction.

6   Concluding remarks

The argument-adjunct distinction is foundational to many analyses. It is often easy to identify arguments, but some cases are less straightforward. I propose in this paper that the unclear cases can be explained by recognizing that there can be mismatches between linguistic levels and also between grammar and our general conceptualization of events that predicates refer to. The levels can be schematically described as in Table 3.

In LFG, the a-s representation determines which elements are arguments. However, the a-s analysis relies at least in part on information represented at other levels. Elements with argument functions at f-s are likely to correspond to a-s arguments. In English, elements that are nominal and specifiers or complements of the verb at c-s are likely to correspond to a-s arguments, but c-s representations can vary quite drastically between languages. Participants that are conceptually necessary event participants (entailed participants) are likely to correspond to arguments. Mismatches are not uncommon, and they complicate argumenthood judgments. However, careful analysis reveals that what might seem like gradience or uncertainty is in fact a reflection of the flexibility of mappings between levels.

Table 3: Levels

INTUITION	THEORETICAL	LFG
world knowledge	event participants	not linguistic
storage	initial argument list	lexicon, a-s
manipulation	altered argument list	a-s
syntactic info & relations	abstract syntax	f-s
expression	surface syntax	c-s
interpretation	semantics	s-s

In many cases, there are no mismatches. Consider a sentence like *The woman picked berries in the forest.* *The woman* and *berries* are straightforward arguments/argumentlike at all levels and *in the forest* is an adjunct at all levels.

Arguments and adjuncts can be compared to other linguistic concepts that are useful and widely adopted even though it might be difficult to pinpoint a definition that is universally accepted and clearly covers all and only the appropriate cases. Examples that come to mind are subjects, word classes like nouns and verbs, vowels/consonants, and tense/lax vowels. Even the basic notion *word* is difficult to define. My view is that these concepts are all based on important intuitions and it makes more sense to put effort into understanding what the intuitions reflect rather than rejecting the concepts altogether.

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References

Ackema, Peter. 2015. Arguments and adjuncts. In Tibor Kiss and Artemis Alexiadou (eds.), *Syntax: Theory and Analysis*, pages 246–274, Berlin: De Gruyter.

Ágel, Vilmos and Fischer, Klaus. 2009. Dependency Grammar and Valency Theory. In Bernd Heine and Heiko Narrog (eds.), *The Oxford Handbook of Linguistic Analysis*, pages 223–255, Oxford: Oxford University Press.

Al-Aqarbeh, Rania and Sprouse, Jon. 2021. Island effects and resumption in spoken Jordanian Arabic: an auditory acceptability judgment study, ms.

Aldosari, Saad. 2015. *The Role of Individual Differences in the Acceptability of Island Violations in Native and Non-native Speakers*. Ph. D.thesis, University of Kansas.

Andrason, Alexander. 2018. The argument-adjunct distinction: Applied nominal and locative phrases in Xhosa. *Linguistic Discovery* 16(2), 47–71.

Apresjan, Yuri D. 1992. *Lexical Semantics: User's guide to contemporary Russian vocabulary*. Ann Arbour: Karoma Publishers.

Arka, I Wayan. 2014. Locative-related roles and the argument-adjunct distinction in Balinese. *Linguistic Discovery* 12(2), 56–84.

Arnold, Doug and Sadler, Louisa. 2012. Affected experiencers and mixed semantics in LFG/Glue. In Miriam Butt and Tracy H. King (eds.), *Proceedings of the LFG12 Conference*, pages 1–20, Stanford, CA: CSLI Publications.

Asudeh, Ash. To appear. Glue Semantics. *Annual Review of Linguistics* 8, 1–21.

Asudeh, Ash and Giorgolo, Gianluca. 2012. Flexible Composition for Optional and Derived Arguments. In Miriam Butt and Tracy H. King (eds.), *Proceedings of the LFG12 Conference*, pages 64–84, Stanford, CA: CSLI Publications.

Asudeh, Ash, Giorgolo, Gianluca and Toivonen, Ida. 2014. Meaning and valency. In Miriam Butt and Tracy H. King (eds.), *Proceedings of the LFG14 Conference*, pages 66–88, Stanford, CA: CSLI Publications.

Baker, C.L. 1978. *Introduction to Generative-Transformational Syntax*. New York: Prentice-Hall.

Barbu, Roxana-Maria. 2015. *Verbs and participants: Non-linguists' intuitions*. Masters Thesis, Carleton University.

Barbu, Roxana-Maria. 2020. *On the psycholinguistics of argumenthood*. Ph. D.thesis, Carleton University.

Barbu, Roxana-Maria and Toivonen, Ida. 2016a. Arguments and adjuncts at the syntax-semantics interface. In Ellen Thompson (ed.), *Proceedings of FLYM3*, pages 1–12, Miami, FL.

Barbu, Roxana-Maria and Toivonen, Ida. 2016b. Event participants and linguistic arguments. In A. Papafragou, D. Grodner, D D. Mirman and J.C. Trueswell (eds.), *Proceedings of the 38th Annual Meeting of the Cognitive Science Society*, pages 1961–1966, Austin, TX: Cognitive Science Society.

Boland, Julie E. 2005. Visual arguments. *Cognition* 95, 237–274.

Boland, Julie E. and Blodgett, Allison. 2006. Argument status and PP-attachment. *Journal of Psycholinguistic Research* 35, 385–403.

Borgonovo, Claudia and Neeleman, Ad. 2000. Transparent adjuncts. *Canadian Journal of Linguistics* 45, 199–224.

Bosse, Solveig, Bruening, Benjamin and Yamada, Masahiro. 2012. Affected experiencers. *Natural Language and Linguistic Theory* pages 1–35.

Bresnan, Joan. 2001. *Lexical-Functional Syntax*. Oxford, UK: Blackwell.

Bresnan, Joan, Asudeh, Ash, Toivonen, Ida and Wechsler, Stephen. 2016. *Lexical-Functional Syntax, Second edition*. Hoboken, NJ: Wiley-Blackwell.

Britt, M. A. 1994. The interaction of referential ambiguity and argument structure

in the parsing of prepositional phrases. *Journal of Memory and Language* 33, 251–283.

Carnie, Andrew. 2006. *Syntax: A Generative Introduction*. Oxford: Blackwell.

Cennamo, Michela and Lenci, Alessandro. 2019. Gradience in subcategorization? Locative phrases with Italian verbs of motion. *Studia Linguistica* 73(2), 369–397.

Chomsky, Noam. 1986. *Barriers*. Cambridge, MA: MIT Press.

Christie, Elizabeth. 2015. *The English Resultative*. Ph. D.thesis, Carleton University.

Dalrymple, Mary, Lowe, John J. and Mycock, Louise. 2019. *The Oxford Reference Guide to Lexical Functional Grammar*. Oxford: Oxford University Press.

Di Giovanni, Daniel. 2016. *Neural and predictive effects of verb argument structure*. Masters Thesis, Carleton University.

Donohue, Cathryn and Donohue, Mark. 2004. On the special status of instrumentals. In Miriam Butt and Tracy H. King (eds.), *Proceedings of the LFG04 Conference*, pages 209–225, Stanford, CA: CSLI Publications.

Dowty, David. 1991. Thematic proto-roles and argument selection. *Language* 67(3), 547–619.

Dowty, David. 2003. The Dual Analysis of Adjuncts and Complements in Categorial Grammar. In Ewald Lang, Claudia Maienborn and Cathrine Fabricius-Hansen (eds.), *Modifying Adjuncts*, Berlin: Mouton de Gruyter.

Falk, Yehuda. 2009. Islands: a mixed analysis. In Miriam Butt and Tracy H. King (eds.), *Proceedings of the LFG09 Conference*, pages 261–281, Stanford, CA: CSLI.

Falk, Yehuda. 2011. Multiple-gap constructions. In Miriam Butt and Tracy H. King (eds.), *Proceedings of the LFG11 Conference*, pages 194–214, Stanford: CSLI.

Findlay, Jamie Y. 2016. Mapping theory without argument structure. *Journal of Language Modelling* 4(2), 293–338.

Findlay, Jamie Y. 2020. Mapping Theory and the anatomy of a verbal lexical entry. In Butt and Toivonen (eds.), *Proceedings of the LFG20 Conference*, pages 127–147, Stanford: CSLI.

Forker, Diana. 2014. A canonical approach to the argument/adjunct distinction. *Linguistic Discovery* 12(2), 27–40.

Frisch, S., Hahne, A. and Friederici, Angela. 2004. Word category and verb-argument structure information in the dynamics of parsing. *Cognition* 91(3), 191–219.

Goldberg, Adele and Ackerman, Farrell. 2001. The pragmatics of obligatory adjuncts. *Language* 77(4), 798–814.

Goodluck, Helen, Tsiwah, Frank and Saah, Kofi. 2017. Island constraints are not the result of sentence processing. In *Proceedings of the Linguistic Society of America 2*, pages 1–5.

Grimshaw, Jane and Vikner, Sten. 1993. Dependent indefinites. In Eric Reuland and Werner Abraham (eds.), *Knowledge and Language, Volume II: Lexical and*

conceptual structure, pages 143–155, Dordrecht: Kluwer.

Haegeman, Liliane. 1994. *Introduction to Government and Binding Theory*. Oxford: Blackwell.

Hankamer, Jorge and Sag, Ivan. 1976. Deep and surface anaphora. *Linguistic Inquiry* 7(3), 391–428.

Hedberg, Nancy and DeArmond, Richard C. 2009. On complements and adjuncts. *Snippets* 19, 11–12.

Hofmeister, Philip, Casasanto, Laura and Sag, Ivan. 2012a. How do individual cognitive differences relate to acceptability judgments? A reply to Sprouse, Wagers, & Phillips. *Language* 88(2), 390–400.

Hofmeister, Philip, Casasanto, Laura and Sag, Ivan. 2012b. Misapplying working memory tests: A reductio ad absurdum? *Language* 88(2), 408–409.

Hofmeister, Philip and Sag, Ivan. 2010. Cognitive constraints and island effects. *Language* 86(2), 366–415.

Hole, Daniel. 2015. Arguments and adjuncts. In Tibor Kiss and Artemis Alexiadou (eds.), *Syntax: Theory and Analysis. An International Handbook*, pages 1285–1321, Berlin and New York: De Gruyter Mouton.

Huang, C.-T. J. 1982. *Logical Relations in Chinese and the Theory of Grammar*. Ph. D.thesis, Massachusetts Institute of Technology, Cambridge, MA.

Huhmarniemi, Saara. 2009. Extraction islands in Finnish. *Biolinguistica Fennica Working papers* 1, 21–78.

Huhmarniemi, Saara. 2012. *Finnish A′-movement: Edges and Islands*. Ph. D.thesis, University of Helsinki, Helsinki, Finland.

Jackendoff, Ray. 1990. *Semantic Structures*. Cambridge, MA: MIT Press.

Johnson, Kyle. 2003. Towards an etiology of adjunct islands. *Nordlyd* 31(1), 187–215.

Junker, Marie-Odile and Toivonen, Ida. 2015. East Cree ghost participants. In Miriam Butt and Tracy H. King (eds.), *Proceedings of the LFG15 Conference*, pages 125–144, Stanford, CA: CSLI Publications.

Kibort, Anna. 2004. *Passive and passive-like constructions in English and Polish*. Ph. D.thesis, University of Cambridge.

Kifle, Nazareth Amlesom. 2011. *Tigrinya applicatives in lexical Functional Grammar*. Ph. D.thesis, University of Bergen.

Koenig, Jean-Pierre, Mauner, Gail and Bienvenue, Breton. 2003. Arguments for adjuncts. *Cognition* 89, 67–103.

Kroeger, Paul R. 2004. *Analyzing Syntax: A Lexical-functional Approach*. Cambridge: Cambridge University Press.

Kush, Dave, Lohndal, Terje and Sprouse, Jon. 2018. Investigating variation in island effects: A case study of Norwegian wh-extraction. *Natural Language and Linguistic Theory* 36(3), 743–779.

Lakoff, George and Ross, John R. 1966. Criterion for Verb Phrase Constituency, technical Report NSF-17, Aiken Computation Laboratory, Harvard University.

Lee, Jiyeon and Thompson, Cynthia K. 2011. Real-time production of arguments

and adjuncts in normal and agrammatic speakers. *Language and Cognitive Processes* 26(8), 985–1021.

Levin, Beth and Rappaport Hovav, Malka. 2005. *Argument Realization*. Cambridge: Cambridge University Press.

Lewis, Heather. 2004. *The with-phrase theme in English: Argument or adjunct?*. Masters Thesis, University of Canterbury.

Lowe, John. 2015. Complex predicates: an LFG+glue analysis. *Journal of Language Modelling* 3(2), 413–462.

Moura, Heronides and Miliorini, Rafaela. 2018. Toward a comprehension of an intuition: Criteria for distinguishing verbal arguments and adjuncts. *Alfa: Revista de Linguística* 62(3), 575–593.

Müller, Christiane. 2019. *Permeable islands: A contrastive study of Swedish and English adjunct clause extractions*. Ph. D.thesis, Lund University, Lund.

Needham, Stephanie and Toivonen, Ida. 2011. Derived arguments. In Miriam Butt and Tracy H. King (eds.), *Proceedings of the LFG11 Conference*, pages 401–421, Stanford, CA: CSLI Publications.

Pham, Catherine, Covey, Lauren, Gabriele, Alison, Aldosari, Saad and Fiorentino, Robert. 2020. Investigating the relationship between individual differences and island sensitivity. *Glossa: A Journal of General Linguistics* 5(1), 94, 1–17.

Przepiórkowski, Adam. 2016. How *not* to distinguish arguments from adjuncts in LFG. In Doug Arnold, Miriam Butt, Berthold Crysmann, Tracy H. King and Stefan Stefan Müller (eds.), *Proceedings of the Joint 2016 Conference on Head-driven Phrase Structure Grammar and Lexical Functional Grammar*, pages 560–580, Stanford: CSLI.

Rákosi, Györgi. 2006. On the need for a more refined approach to the argument-adjunct distinction: The case of dative experiencers. In Miriam Butt and Tracy H. King (eds.), *Proceedings of LFG06*, Stanford, CA: CSLI Publications.

Rákosi, Györgi. 2012. Non-core participant PPs are adjuncts. In Miriam Butt and Tracy H. King (eds.), *Proceedings of the LFG12 Conference*, pages 524– 543, Stanford, CA: CSLI Publications.

Reinhart, Tanya. 2002. The theta system – an overview. *Theoretical Linguistics* 28, 229–290.

Rissman, Lilia. 2013. *Event participant representations and the instrumental role: A cross-linguistic study*. Ph. D.thesis, Johns Hopkins University, Baltimore.

Rissman, Lilia, Rawlins, Kyle and Landau, Barbara. 2015. Using instruments to understand argument structure for gradient representation. *Cognition* 142, 266–290.

Ross, John. 1967. *Constraints on Variables in Syntax*. Ph. D.thesis, Massachusetts Institute of Technology, Cambridge, MA.

Russo, Lara. 2021. *Arguments, adjuncts and instruments in English and Turkish*. Masters Thesis, Carleton University.

Shapiro, Lewis P., Zurif, Edgar and Grimshaw, Jane. 1989. Verb representation and sentence processing: Contextual impenetrability. *Journal of Psycholinguis-*

tic Research 18, 223–243.

Sprouse, Jon, Caponigro, Ivano, Greco, Ciro and Cecchetto, Carlo. 2016. Experimental syntax and the variation of island effects in English and Italian. *Natural Language and Linguistic Theory* 34, 307–344.

Sprouse, Jon, Wagers, Matt and Phillips, Colin. 2012a. A test of the relation between working memory capacity and syntactic island effects. *Language* 88(1), 82–123.

Sprouse, Jon, Wagers, Matt and Phillips, Colin. 2012b. Working-memory capacity and island effects: a reminder of the issues and the facts. *Language* 88(2), 401–407.

Stepanov, Arthur. 2007. The end of CED? Minimalism and extraction domains. *Syntax* 10(1), 80–126.

Tallerman, Maggie. 2005. *Understanding Syntax, 2nd ed*. London: Hodder Arnold.

Thompson, Cynthia K., Bonakdarpour, B and Fix, SC. 2010. Neural mechanisms of argument structure processing in agrammatic aphasia and healthy age-matched listeners. *Journal of Cognitive Neuroscience* 22(9), 1993–2011.

Thompson, Cynthia K., Bonakdarpour, B., Fix, SC, Blumenfeld, HK, Parrish, TB, Gitelman, DR and Mesulam, MM. 2007. Neural correlates of verb argument structure processing. *Journal of Cognitive Neuroscience* 19(11), 1753–1767.

Toivonen, Ida. 2013. English benefactive NPs. In Butt and King (eds.), *Proceedings of the LFG13 Conference*, pages 503–523, Stanford: CSLI.

Truswell, Robert. 2007. Extraction from adjuncts and the structure of events. *Lingua* 117, 1355–1377.

Truswell, Robert. 2011. *Events, Phrases and Questions*. Oxford Studies in Theoretical Linguistics, Oxford: Oxford University Press.

Tutunjian, Damon and Boland, Julie E. 2008. Do we need a distinction between arguments and adjuncts? Evidence from psycholinguistic studies of comprehension. *Language and Linguistic Compass* 2, 631–646.

Van Luven, Katie. 2018. *Pseudoclefts*. Masters Thesis, Carleton University.

Van Luven, Katie and Toivonen, Ida. 2018. Argumenthood tests: notes, manuscript in preparation, Carleton University.

Vater, Heinz. 1978. On the possibility of distinguishing between complements and adjuncts. In Werner Abraham (ed.), *Valence, Semantic Case, and Grammatical Relations: Workshop studies prepared for the 12th International Congress of Linguists*, pages 21–45, Amsterdam and Philadelphia: John Benjamins.

Whaley, Lindsay. 1993. *The Status of Obliques in Linguistic Theory*. Ph. D.thesis, State University of New York, Buffalo.

Williams, Alexander. 2015. *Arguments in syntax and semantics*. Cambridge: CUP.

Wood, Jim and Zanuttini, Raffaela. 2018. Datives, data and dialect syntax in American English. *Glossa* 2(1), 87, 1–22.

Zaenen, Annie and Crouch, Dick. 2009. OBLs hobble computations. In Miriam Butt and Tracy H. King (eds.), *Proceedings of the LFG09 Conference*, pages 644–654, Stanford, CA: CSLI Publications.