DERIVED ARGUMENTS

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Abstract

The distinction between arguments and adjuncts is fundamental to most linguistic theories, yet the distinction is not always clear. In addition to clear arguments and clear adjuncts, there are a number of unclear, in-between cases. These cases include passive agents, benefactives, directionals, and a number of other types of phrases. We argue that the in-between status of the unclear cases can be explained if they are analyzed as derived arguments; i.e., arguments that are added to verbs at the grammatical level of argument structure.

1 Introduction

The distinction between arguments and adjuncts is crucial in linguistics. Psycholinguistic studies indicate that the distinction is also psycho-linguistically real (see Tutunjian and Boland 2008). In LFG, the distinction is relevant throughout the grammar: In the lexicon and at a(rgument)-structure, the lexical entries contain information about arguments only. At f(unctional)-structure, the classification of functions is partly based on whether they are arguments or adjuncts. At c-structure, arguments are typically attached closer to the verb than adjuncts.

There are no universally agreed-upon definitions of arguments and adjuncts, even though the concepts are important to linguistic theory. However, the general intuition is that, roughly speaking, arguments are the central, necessary participants in the event, whereas adjuncts provide "extra" information about where, when and how the event occurred. Here are some representative definitions from syntax textbooks:

> "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." (Tallerman, 2005, 98)
> "This distinction between arguments and adjuncts is important, but not always easy to make. The basic difference is that arguments are closely associated with the meaning of the predicate itself, while adjuncts are not." (Kroeger, 2004, 10)
> "The arguments are the participants minimally involved in the activity or state expressed by the predicate." (Haegeman, 1994, 44)
> "Verbs and adjectives, and some nouns, express properties of things [...] or relationships between things [...]. The arguments are the phrases that denote the things that have such properties or are involved in such relationships." (Culicover, 1997, 16)
> "The entities (which can be abstract) participating in the [predicate] relation are called arguments." (Carnie, 2006, 51)
> "From a semantic perspective, subjects and complements share in common the fact that they generally represent entities directly involved in

> the particular action or event described by the predicate: to use the relevant semantic terminology, we can say that subjects and complements are **arguments** of the predicate with which they are associated. [...] An expression which serves to provide (optional) additional information about the time or place (or manner, or purpose etc.) of an activity or event is said to serve as an **adjunct**. (Radford, 2004, 3–4)

There is widespread agreement that the distinction between arguments and adjuncts is important, and the basic intuition behind this distinction is clear. However, there are certain types of phrases that fall in between proto-typical arguments and adjuncts. For example, Grimshaw (1990) notes that event nominal possessives (*the enemy's* destruction of the city) and passive agents (the city was destroyed *by the enemy*) are neither proto-typical arguments nor proto-typical adjuncts. She refers to these classes of phrases as *argument-adjuncts*.

Dowty (2003) points out that the distinction between complements (arguments) and adjuncts is fluid, and he argues for a dual analysis, where "virtually all" complements can be analyzed as adjuncts, and adjuncts can be analyzed as complements. He specifically discusses different uses of *to*-PPs and the agentive phrase in passives. He suggests that a dual analysis is what makes sense formally, and we should leave to psycho-linguistics to determine how the cases differ in "mental processing".

Hedberg and DeArmond (2009) argue that we need to distinguish between not two, but three types of categories: adjuncts, primary complements and secondary complements. They argue this based on two syntactic tests: pseudoclefting and preposition stranding.

Zaenen and Crouch (2009) discuss *semantically restricted* OBL*iques* in LFG and suggest that they be classified as adjuncts. LFG distinguishes between two types of OBL: idiosyncratically marked OBL and semantically marked OBL. Idiosyncratically marked OBLs are marked with a 'quirky' case marker or preposition; the marker is not (fully) semantically predictable. For semantically marked OBLs, the preposition or case marker is meaningful. An example of the former is the *in*-PP in *trust in NP*, and an example of the latter is the *to*-PP in *give NP to NP*. Zaenen and Crouch (2009) argue that idiosyncractically marked OBL can be classified as such, but semantic OBL should be classified as ADJ. One of the arguments they provide for collapsing the categories is that that classic tests for argumenthood often do not work unambiguously.

The authors listed above and others (e.g., Whaley 1993; McKercher 2001; Larson 1998; Croft 2001) have in common that they note the difficulties involved in distinguishing between arguments and adjuncts. Some authors suggest the distinction may not be useful at all, since it so unclear (e.g., McKercher 2001; Dowty 2003; Larson 1998), and others simply note that some types of phrases are difficult to classify. Certain cases do seem clearer than others. For example, time, place, manner and purpose modifiers such as the ones exemplified (1) are uncontroversial adjuncts:

(1) a. Susan graduated *last year*. (time)
b. Mandy read a book *in the park*. (place)
c. Lisa sings *very well*. (manner)
d. Sarah kicked the wall *in order to let out her aggressions*. (purpose)

Of course, time, place and manner phrases may be arguments as well, as in (2):

(2) a. The meeting lasted *for hours*. (time)
b. Jenna keeps her money *in the kitchen*. (place)
c. Sally behaved *impeccably*. (manner)

There are also some types of phrases that seem to be uncontroversial arguments; for example, agent subject NPs (such as *the woman* in (3)) and patient object NPs (such as *the steak* in (3)) of transitive verbs:

(3) The woman devoured the steak.

The following types of phrases are more difficult to classify: passive *by*-phrases, benefactives, *with*-themes, instruments, experiencers, directionals, and possessive phrases in event nominals. These cases are discussed in section 3, but first we present diagnostics that have been proposed in the literature to distinguish between arguments and adjuncts in section 2. Finally, we suggest in section 4 that phrases that fall in between clear arguments and clear adjuncts are derived arguments.

2 Argumenthood tests

This section briefly reviews a number of diagnostics that have been proposed for distinguishing between arguments and adjuncts. The most basic intuition behind the argument-adjunct distinction is that arguments denote core participants of an event, whereas adjuncts do not. This is a semantic test, as it refers to intuitions about the meaning of verbs. We call it the CORE PARTICIPANTS test. If we compare an eating event to a sleeping event, the eating event involves two entities (the eater and the eaten), but the sleeping event involves only one entity (the sleeper). The two verbs thus differ in how many participants are understood to be involved in the event. The events will also take place at some time in some location, but that is more generally true of events. This intuition of whether a participant is conceptually necessary is very basic, but it is not always useful. For example, an event described by the verb *saddle* involves three entities: the saddler, the saddle and the saddled (usually a horse). However, the verb only takes two arguments. Verbs like *saddle* have been discussed widely in the literature, see Bresnan 1982, Hale and Keyser 2002 and others.

The main problem that arises in connection with the core participants test can be solved if we consider the VERB SPECIFICITY test (Koenig et al., 2003). Even though an event normally takes place in some place at some time, time and place expressions are usually not arguments. What distinguishes true arguments from such expressions

is that arguments are tied to specific verbs or verb classes. For example, only verbs that can be performed volitionally can take an agent argument. Time and place expressions, on the other hand, can be added to the description of any event; they are not tied to specific verbs or verb classes.

Another test concerns the semantic content of the preposition. The more semantically contentful the preposition is in the PP accompanying a certain verb, the more likely it is to mark an adjunct (Pollard and Sag 1987, 136; Wechsler 1991, 123; and others). On the other hand, if it is more difficult to see how the preposition used relates to its basic meaning, then the preposition is more likely to mark an argument. We call this the PREPOSITIONAL CONTENT test. Compare (4) to (5–6):

(4) Louise rested {in the forest/beside the big tree/on the lawn}.

(5) a. Kim trusted in her own abilities
b. * Kim trusted on her own abilities.

(6) a. Kim relied on her own abilities
b. * Kim relied in her own abilities.

The prepositions in (4) are semantically contentful, in the sense that *in, beside,* and *on* are used with their basic meanings, meanings that remain the same across a variety of contexts. This can be contrasted with the prepositions *in* in (5) and *on* in (6). The basic meanings of *in* and *on* do not seem relevant here. The PPs in (4) are adjuncts and the PPs in (5–6) are arguments. This test is not without problems. First, it is not always easy to determine what the basic meanings of prepositions are. Second, there are cases when those basic meanings are used, and the PP is still an argument:

(7) Martha lives {beside the train station/in France/on a mountain}.

The PPs in (7) seem to make use of the basic meanings of the prepositions *beside, in* and *on*, yet the PP is an argument as determined by other tests (e.g., the CORE PARTICIPANTS test). This is of course because *live* (in this sense) takes a location as its argument, and the prepositions in question can all mark locations.

The next test is related to the PREPOSITIONAL CONTENT test, and we call it the FIXED PREPOSITION test. If the verb asks for a specific preposition, the PP is an argument (Wechsler, 1991, 123). For example, *trust* and *rely* require *in* and *on*, respectively (5–6), and the PPs are arguments. The verb places no requirements on the preposition in (4), and the PP is an adjunct. The verb *live* in (7) does not require a specific preposition, but it does require a locative phrase; non-locative prepositions are not permitted. The preposition in (7) is therefore restricted, but not fixed.

The OPTIONALITY test is the most common test for distinguishing adjuncts from arguments: adjuncts are syntactically optional, arguments are not. Consider (8):

(8) Sammy destroyed my reputation last year.

The subject *Sammy* and the object *my reputation* are obligatory in (8), but the time expression *last year* is optional. *Sammy* and *my reputation* are arguments, but *last year* is an adjunct. However, some arguments are also optional:

(9) a. John likes to drink (tea).

b. Mandy ate (a pizza).

The direct objects in (9) are optional, even though they are arguments. Even though they are optional, they are semantically obligatory, in the sense that in an eating event, something must be eaten, and in a drinking event, something must get drunk (recall the CORE PARTICPANTS TEST). Given examples like (9), we can adopt a weaker version of the test: if a phrase is obligatory, it is an argument. However, this version of the test is also problematic, as there are expressions that seem to require an adjunct (Jackendoff, 1990):

(10) a. Selma elbowed her way into the crowd.

b. *Selma elbowed her way.

Example (10) illustrates the *way*-construction, which requires a PP adjunct, such as *into the crowd* in (10). There are also other examples of obligatory adjuncts, as discussed by Goldberg and Ackerman (2001). Since some arguments are optional and some adjuncts are obligatory, the OPTIONALITY test must be used with care.

According to the ITERATIVITY test, adjuncts can be iterated whereas arguments cannot. The following example is from Bresnan (1982):

(11) 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].

Example (11) shows that adjuncts with the same function (e.g., temporal) can be repeated. However, arguments are *unique*; there can only be one subject, one (direct) object, etc. Zaenen and Crouch (2009) point out that this test requires agreement of what counts as the same or different. They compare the following examples:

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

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

The phrase *on you* in (12) is an argument and *in France* in (13) is an adjunct. In (12), we must then analyze *on your kindness* as a parenthetical, whereas *in a small village* in (13) can be analyzed as a second instance of a locative adjunct. Apart from the assumption that arguments are unique, it is unclear what motivates this analysis. Even though the ITERATIVITY test is useful, we must conclude that it is problematic.

The following test is the ALTERNATION test. Arguments can alternate with subjects and objects, but adjuncts cannot. Note that the claim is not that all arguments can alternate, the claim is that if a phrase can alternate, then it is an argument. Consider the next examples:

(14) a. The garden swarmed with bees.

b. Bees swarmed in the garden.

(15) a. Mandy gave a present to Lisa.

b. Mandy gave Lisa a present.

The PP *with bees* alternates with the subject in (14), and *to Lisa* alternates with the object in (15). The PPs in (14–15) should therefore be analyzed as arguments, according to the ALTERNATION test. Although it seems reasonable to analyze *with bees* and *to Lisa* above as arguments, some cases are less clear:

(16) a. Linda wrote a poem for Kenny.

b. Linda wrote Kenny a poem.

The PP *for Kenny* does not seem to be an argument according to some of the previous tests mentioned; e.g., OPTIONALITY, PREPOSITIONAL CONTENT, and CORE PARTICIPANTS. Example (16) thus illustrates that it is unclear whether the ALTERNATION test works for separating arguments from adjuncts.

According to the PREPOSITION STRANDING test (Hedberg and DeArmond, 2009; Huang, 1982), arguments allow preposition stranding, whereas adjuncts do not:

(17) a. I rely on Mario.

b. Who do you rely on?

(18) a. I talked about Canada Day.

b. What day did you talk about?

(19) a. I saw her on Canada Day.

b. *What day did you see her on?

The preposition can be left behind in examples like (17–18), but not in (19), and we conclude that *on Mario* and *about Canada Day* in (17–18) are arguments but *on Canada Day* in (19) is an adjunct.

Another classic test is the VP ANAPHORA test: adjuncts may be added to 'do so' clauses, but arguments may not (Lakoff and Ross 1966; Baker 1978, and others):

(20) John ate the cake yesterday and Bill did so today.

(21) *John ate the cake and Bill did so the frosting.

In (20), *today* is added and contrasted with *yesterday*, and *yesterday* and *today* are adjuncts. By contrast, *the frosting* cannot be added to the *do so* clause in (21); *the cake* and *the frosting* are arguments. The assumption here is that *do so* refers to the verb and its complements, without necessarily including the adjuncts. Hedberg and DeArmond (2009) note that the grammaticality judgements are not always clear when this construction is used as an argumenthood test.

Adjuncts can occur after *do* in a VP-focussed pseudocleft, but arguments cannot:

(22) What Mia did in her room was sleep.

(23) *What Lara did at the monument was point.

The PP *in her room* in (22) is an adjunct, whereas the PP *at the monument* in (23) is an argument. Example (22) is grammatical, whereas (23) is not. This is the PSEUDO-CLEFT test (Hedberg and DeArmond, 2009).

Another argumenthood diagnostic that involves *do* is the VP-PREPOSING test. Arguments must move with the verb in VP-preposing, but adjuncts can be left behind:

(24) *Kylie wanted to draw a picture and draw she did a picture.

(25) Kylie wanted to leave on Monday and leave she did on Monday.

Finally, we will consider the WH-WORD CONJUNCTION test. Two *wh*-words that refer to arguments with different semantic roles cannot be conjoined:

(26) Sam showed Kim the picture.

(27) *What and who did Sam show?

However, two adjuncts with different semantic roles can be conjoined:

(28) Jolanda met a friend in Minneapolis on Friday.

(29) Where and when did Jolanda meet a friend?

When using this test it is important to keep in mind that an argument *wh*-word cannot be conjoined with an adjunct *wh*-word:

(30) Linda read a book last Friday.

(31) *What and when did Linda read?

In (30), *last Friday* is an adjunct even though it cannot be conjoined in (31). This is because *a book* is an argument, not because the adjunct status of *last Friday* is unclear.

This section has reviewed diagnostics for argumenthood previously proposed in the literature. The following ten tests were presented and illustrated: (1) the core participant test, (2) the verb specificity test, (3) the prepositional content test, (4) the fixed preposition test, (5) the optionality test, (6) the iterativity test, (7) the alternation test, (8) the preposition stranding test, (9) the VP anaphora test, (10) the VP preposing test, (11) the pseudocleft test, and (12) the *wh*-word conjunction test. This section has focused on phrases that are reasonably clear arguments or adjuncts. Nevertheless, most of the tests have some weaknesses and must be used with care.

3 Unclear cases

The diagnostics reviewed in the previous section work fairly well for classifying clear adjuncts and clear arguments. However, there are also less clear cases, and we will discuss a number of such cases in this section, from an English language perspective. We will not evaluate each according to every test discussed in the previous section. Instead, we will focus on data that has already been reported in the literature, and some new data where the judgements seem clear.

3.1 The passive *by*-phrase

The understood subject of passive verbs (the phrase which would be the subject of the corresponding active sentence) is in English expressed with a *by*-phrase:

(32) The letter was signed by Lottie.

The passive *by*-phrase is often but not always an agent. In *the letter was received by Lottie*, for example, *Lottie* is not an agent. The passive *by*-phrase displays mixed argumenthood properties: it is an argument by the CORE PARTICIPANTS test, but the phrase is nevertheless syntactically optional.

The standard LFG treatment of passive is formulated in Lexcial-Mapping Theory (LMT; Levin 1986; Bresnan and Kanerva 1989; Alsina and Mchombo 1989). In the passive, the highest role of a verb is "suppressed". In LMT, this means that the highest role is stripped of its association with argument function features (the features *r* and *o*) (see section 4). Stripped of its argument features, the phrase must be realized as an ADJ(UNCT) at f-structure, if it is realized at all (Bresnan and Zaenen 1990, 50, Bresnan 2001, 310). However, many LFG researchers nevertheless analyze the passive *by*-phrase as an OBL(IQUE) (i.e. oblique argument) at the f-structure (Bresnan 2001, 21; Cook 2006). The intuition that the demoted phrase in the passive is an argument presumably comes from the argument-like characteristics of the phrase. In addition to the fact that it is a core participant of the clause, it may also participate in binding and control in an argument-like way, as discussed by Cook (2006) for German.

3.2 Possessive phrases of event nominals

Grimshaw (1990) calls subjects of nominal predicates argument-adjuncts. She points out that they are always optional, like passive *by*-phrases:

(33) the enemy's destruction of the city

(34) the destruction of the city

The optionality indicates that *the enemy's* in (33) is an adjunct. However, it is a core participant of the event, and in that sense, it is like an argument.

3.3 Benefactives

Benefactive *for*-phrases can sometimes but not always alternate with objects in the double object construction:

(35) a. Robert baked a cake for Christa.
b. Robert baked Christa a cake.

(36) a. Robert washed his hair for Linda.
b. *Robert washed Linda his hair.

The fact that some benefactives alternate with objects indicates that they are arguments, by the ALTERNATION test. Benefactive phrases such as the ones illustrated in (35–36) are always optional, and they do not seem to be core participants of the verb. These characteristics indicate that benefactives are adjuncts. However, benefactives allow preposition stranding, which indicates that they are arguments:

(37) a. Who did Robert bake a cake for?

b. Who did Robert wash his hair for?

Like the passive *by*-phrase, benefactives are neither clear arguments nor clear adjuncts. However, benefactives differ from displaced passive agents in that there seem to be different types or classes of benefactives. Fore example, note the difference between (35) and (36): some benefactive *for*–PPs alternate with direct objects and some do not. There also seem to be different interpretations of benefactives, one which implies transfer of the object and one which does not. In (35), Robert is likely to give the cake to Linda. However, (36) has no such interpretation, Robert is simply washing his hair for Linda's general benefit. That interpretation is also possible for (35); perhaps Linda was supposed to bake a cake for Tom's birthday, but she got sick and Robert helped Linda out by baking a cake to give to Tom. It seems like only the transfer examples allow the double object construction, which indicates that those examples are more argument-like.

3.4 Displaced themes

The type of displaced theme under discussion here is the English *with*-phrase theme. The argument status of English *with*-themes are investigated in detail by Lewis (2004). Examples of *with*-themes are given in (38–39):

(38) We loaded the truck with furniture.

(39) The garden swarmed with bees.

Lewis (2004) notes that many *with*-themes are argument-like, since they can alternate with subjects and objects, and they are sometimes obligatory. A comparison of (38) and (40) shows that *with*-themes can alternate, and (39–41) show that *with*-themes can be obligatory.

(40) We loaded furniture onto the truck.

(41) *The garden swarmed.

Lewis (2004) shows that there are several classes of *with*-themes, and they vary in how they fare in tests of argumenthood. However, she concludes that none of the *with*-themes are clear arguments or adjuncts.

3.5 Instruments

Instrumental *with*-PPs are optional:

(42) I opened the door (with a key).

Potential exceptions to the generalization that instruments are optional are verbs that can take an instrument as a subject or an object:

(43) The key opened the door.

(44) The nurse used a key to open the door.

However, note that instruments cannot be added freely to any event; instruments are only added to agentive verbs (Reinhart, 2002). By the VERB SPECIFICITY test, they should be classified as arguments, since they are only allowed with a specific class of verbs.

On the basis of different types of examples with instrumentals from a range of languages, Donohue and Donohue (2004) argue that some instrumentals are arguments and others are adjuncts. Other authors who have commented on the ambiguous status of instrumentals include Koenig et al. (2003), Van Valin and LaPolla (1997), and Schütze (1995).

3.6 Experiencers

Many verbs of perception can optionally take a *to*-PP experiencer (or 'goal of perception', Asudeh and Toivonen 2007):

(45) It looks to me like it's going to rain.

(46) The market seems to the experts to be slowing down.

(47) John sounded to them like he had a cold.

The *to*-experiencer is restricted in use to verbs of perception, which indicates that it is an argument. However, the fact that it is optional indicates that it is an adjunct. Moreover, the preposition stranding test aligns the *to*-experiencer with adjuncts. Compare (45–47) to (48–50):

(48) *Who does it look to like it's going to rain.

(49) *Who does the market seem to to be slowing down?

(50) *Who did John sound to like he had a cold.

The preposition *to* cannot be stranded in experiencer PPs.

In sum, experiencer *to*-PPs display mixed behavior with respect to argumenthood. This is discussed further in Asudeh and Toivonen (2012). See also Rákosi (2006a,b).

3.7 Directionals

PPs denoting a direction, source or goal are implied with verbs of motion, but rarely obligatory:

(51) John ran (towards the station)

(52) Laura arrived (from Paris) yesterday.

(53) Fabian went to the store.

These PPs are similar to adjunct locations in that they are optional and refer to places. However, they are different in that they are tied to verbs that refer to motion. Furthermore, the preposition can be stranded:

(54) Which station did John run towards?

(55) Which city did Laura arrive from yesterday?

(56) Which store did Fabian go to?

The preposition stranding test indicates that the direction PPs are arguments, and this is also consistent with the fact that these PPs are limited to a specific class of verbs. However, the preposition is restricted but not completely fixed, so the result of the FIXED PREPOSITION test is ambiguous. Finally, directional PPs are typically optional, like adjuncts.

3.8 Summary

This section has discussed phrases that are not easily classified as arguments or adjuncts. Many of these cases have been previously recognized in the literature as falling in between arguments and adjuncts. There are no doubt more in-between cases than the ones listed here, especially if languages other than English are taken into account. The phrases discussed here have cross-linguistic parallels (see, e.g., Rákosi 2006a, Donohue and Donohue 2004). There are also potential in-between cases to be found in some languages but do not occur in English. Examples include perceptual sources, such as the *på*-PP in Swedish (57) and Dyirbal applicatives (58):

(57) Det verkar på Sune som om han är trött — SWEDISH
it seems on S. as if he is tired
'Sune seems as if he is tired.'

(58) a. yabu nguma-nggu balga-n yugu-nggu — DYIRBAL
mother.ABS father.ERG hit stick-INSTR
'Father hit mother with a stick.'

b. yugu nguma-nggu balgal-ma-n yabu-gu
stick.ABS father.ERG hit mother-DATIVE
'Father hit mother with a stick.'

Swedish *på*-sources are argument-like in that they only occur with a certain class of verbs, perceptual verbs. However, they are adjunct-like in that they are optional. For a more detailed discussion of these expressions, see Asudeh and Toivonen (2012). In applicatives, the applied argument is adjunct-like in that it is optional, yet it has the argument-like characteristic of alternating with a direct object.

Phrases that are neither clear arguments nor clear adjuncts are difficult to analyze in most theories of syntax and argument structure. In LFG, it is crucial to determine the argument status of PPs, as it affects the assignment of grammatical function: argument PPs are OBLs and adjunct PPs are ADJs at f-structure. The notion of grammatical functions is fundamental to LFG.

4 Towards an LFG understanding of the in-between cases

Consider an example with an instrument, such as *The patient opened the door with a key*. Is the PP *with a key* an argument or an adjunct? How does this affect an LFG analysis of the sentence? If *with a key* is classified as an argument, it will be in the argument structure of the PRED feature of *open*, it will be treated as an OBL at f-structure, and it will be a sister of the verb at c-structure. If *with a key* is classified as an adjunct, it will not be in the argument structure of the PRED feature of *open*, it will be treated as an ADJ at f-structure, and it will be adjoined to VP at c-structure. The argument/adjunct status of the PP thus has consequences throughout the grammar, and the fact that instruments and several other types of phrases display some characteristics of arguments and some characteristics of adjuncts is therefore problematic.

We propose that the solution to this problem can be found at a-structure. Bresnan (2001, 310) notes: "The lexical stock of a-structures in a language can be extended by morphological means." This implies that there is a basic lexical stock that is a subset of the entire lexical stock. The analysis that we propose assumes that arguments listed in the basic a-structure of verb have a different status than arguments listed in the manipulated a-structure.

In LEXICAL MAPPING THEORY, phenomena such as passivization are handled with suppression rules (Bresnan, 2001, 310), where one of the basic arguments is suppressed. We analyze instruments and the other types of phrases listed in section 3 as *derived arguments*, arguments *added* to the argument structure of verbs by a lexical rule. This idea is suggested for instrumentals already in Bresnan (1982):

> "It is possible to define a lexical rule of *Instrumentalization* (analogous to lexical rules of *Causativization*) which converts an *n*-adic predicate argument structure *P* to an $n+1$-adic predicate argument structure *P-with* whose $n+1$st argument is assigned the grammatical function INSTR OBJ [instrumental object]." (p. 165)

Our treatment of instrumentalization differs slightly from Bresnan's (see section 4.1), but the basic idea is the same. We do not not view lexical rules as procedural deriva-

tions, instead, a lexical rule is intended as a statement relating two possible lexical entries, one basic entry and one augmented entry.

The analyses in this section are cast in LMT (Bresnan and Moshi 1990; Alsina 1996; Bresnan and Zaenen 1990; Bresnan 2001, and others), where the basic argument functions are defined in terms of the features [±r] and [±o]. The feature [+r] singles out the grammatical functions that are semantically *restricted*. The syntactic functions that are marked [−r] are not semantically restricted; in fact, they have the option of being associated with no semantic role at all. The feature [+o] refers to the *objective* functions, i.e., functions that complement transitive V or P. The basic argument functions are thus grouped as shown in (59):

(59)

	−r	+r
−o	SUBJ	OBL_θ
+o	OBJ	OBJ_θ

Patientlike roles are classified as $[-r]$, secondary patientlike roles are [+o], and other semantic roles are [−o]. Lexical specifications may override this classification.

LMT gives a theory of the mapping between a(rgument)-structure and f(unctional)-structure. A-structure is a syntactic level of representation which links the lexical semantics of predicates and their arguments to f-structure. The arguments of a predicate are ordered for their relevant prominence according to the thematic hierarchy:

(60) **Thematic Hierarchy:**
agent ≻ beneficiary ≻ experiencer/goal ≻ instr ≻ patient/theme ≻ loc

The mapping between a-structure and f-structure is governed by the principles in (61), adapted from Bresnan (2001, 311). The logical subject is defined as the most prominent semantic role of a predicator.

(61) **Mapping Principles:**

a. Subject roles:
   i. The logical subject marked [−o] is mapped onto SUBJ when initial in the a-structure; otherwise:
   ii. The semantic role marked with [−r] is mapped onto SUBJ.

b. Other roles are mapped onto the lowest compatible function (according to the following partial ordering: SUBJ ≻ OBJ, OBL_θ ≻ OBJ_θ).

We devote the remainder of the paper to a discussion of each of the examples introduced in section 3.

4.1 Instruments

Our analysis of PP-instruments builds on the analysis suggested in Bresnan (1982), mentioned above. Although we do treat *with*-instruments as obliques, not objects, the spirit of the rule is the same.

(62) Optionally add the following argument to verbs whose first argument is an agent:

$$\begin{array}{c} \text{y} \\ [-\text{o}] \\ | \\ \text{OBL}_{instr} \end{array}$$

The restriction that the first argument must be an agent comes from Reinhart (2002), who notes that instruments are added to "agent verbs". This accounts for the asymmetry between (63) and (64), noted by Bresnan (1982):

(63) a. John killed Harry.

b. John killed Harry with dynamite.

(64) a. An explosion killed Harry.

b. #An explosion killed Harry with dynamite.

Only the unlikely interpretation that *an explosion* is an agent would render (64b) acceptable.

Under this analysis, *with*-instruments are arguments. However, they are not listed as part of the basic argument structure of verbs, but optionally added with the rule in (62).

4.2 The passive *by*-phrase

Active verbs relate to passive verbs by the following rule:

(65)
$$\begin{array}{c} \hat{\theta} \\ | \\ \emptyset \end{array}$$

The rule in (65) states that the highest argument (the most prominent role according to the thematic hierarchy, $\hat{\theta}$) in a verb's argument list is suppressed. Rule (65) accounts for instances of the passive where the highest argument is suppressed. However, the highest argument can also be expressed as an *by*-phrase. Originally, LMT simply stated that that the most prominent role can be linked to an "argument-adjunct" like the *by*-phrase (Bresnan, 2001, 310). However, the notion of an "argument-adjunct" has no official status in LFG. An analysis must account for the fact that the *by*-PP has the same semantic role as the active subject. This is illustrated in (66–67):

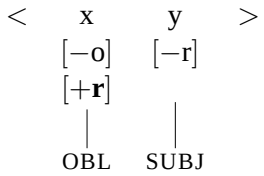
(66) Kelly shot the rabbit. The rabbit was shot by Kelly.

(67) Miriam received two packages. Two packages were received by Miriam.

In (66), *Kelly* is an agent both when expressed as a subject and when expressed as a *by*-PP. Similarly, in (67), *Miriam* is a recipient in both examples.

In order to account for the remapping from SUBJ to OBL in passives, we adopt the analysis proposed in Kibort (2001). Kibort suggests that the feature **[+r]** may be added to the highest argument of a passive verb. The highest argument then has the feature combination [−o, +r], which maps it onto an OBL function:

(68) Add the feature [+r] to passive verbs. Passive-OBL



At a-structure, either the rule (65) or the rule in (68) applies to a passive verb. Since the passive *by*-phrase is part of the manipulated argument structure of the verb, it is a derived argument, and we expect it to display mixed argumenthood characteristics.

4.3 Possessive phrases of event nominals

Nouns that refer to events can express a participant of the event as a possessive NP: *the enemy's destruction, the city's destruction*. The possessive can correspond to the subject of the verb (*enemy's*) or the object of the verb (*city's*). The possessive NP is argument-like in that it expresses a core participant of the event, but its adjunct-like in that it is optional.

Consider a transitive verb like *destroy.* Loosely based on Laczkó (2000) and Falk (2001), we assume that *destruction* and other event nominals inherit the argument structure specification of the verb, and the realization of the arguments depends on which of the three following lexical rules applies:

(69) The arguments are suppressed.

(70) Add [−r] to the highest role, which is specified as [−o].

(71) Add [−o] to the lowest role, which is specified as [−r].

If rule (69) applies, no argument is expressed. If (70) applies, the highest role is expressed as a [−r, −o] role, which normally is the subject. However, in nominals, this role is expressed as the possessor. If (71) applies, the lower role (corresponding to the verb's object) is expressed as a [−r, −o] role. Many questions remain, of course. For example, why does the 'subject' of a nominal get possessive morphology? Also, how can the object of the verb be expressed as the 'subject' of the nominal? Some discussion of these issues can be found in Laczkó (2000) and Falk (2001). Setting these important issues aside, we suggest that the answer to the question at hand is related to the fact that the possessor of event nominals is permitted only by the application of a lexical rule. This means that the possessive phrase is a derived argument, which explains its mixed behavior.

4.4 Experiencers

Experiencers such as *to me* in (72) display some characteristics of arguments and some of adjuncts:

(72) It looks to me as if John has forgotten to bring his notes today.

We propose that an experiencer can be added by the following rule:

(73) For verbs of perception, optionally add: $\begin{array}{c} \text{y} \\ [-\text{o}] \\ | \\ \text{OBL}_{goal} \end{array}$

For further discussion of the treatment of experiencers in LFG, see Rákosi (2006b,a) and Asudeh and Toivonen (2012).

4.5 Benefactives

In section 3, benefactives were included as an example of phrases that fall between arguments and adjuncts. However, it is difficult to narrow down a class of verbs that take benefactives, other than verbs that denote events that can be performed for the benefit of another person, and Koenig et al. (2003) conclude that benefactives are in fact adjuncts. We will not attempt an analysis of benefactives here, but note that only some benefactives *for*-PPs alternate with direct objects.

4.6 Directionals

Verbs of motion can occur with obliques denoting some direction (goal, source, path). The oblique is generally optional, even though it is semantically understood. For example, if someone is *running*, the running is taking place along some path. We propose the following rule for verbs of motion:

(74) For verbs of motion, optionally add: $\begin{array}{c} \text{y} \\ [-\text{o}] \\ | \\ \text{OBL}_{goal/source/path} \end{array}$

This solution is unlikely to cover all relevant examples, as there are many types of motion verbs.

4.7 Displaced themes

Themes are sometimes expressed as *with*-PPs in English (e.g., *swarm with bees* and *fill with sand*). So-called *with*-themes are not a uniform class (Levin, 1993; Lewis, 2004), and their behavior depends on what verb class they occur with. Lewis (2004) demonstrates that distinct types of *with*-themes behave differently with respect to argumenthood. Each type of *with*-theme must be considered separately, but we will

not attempt to formulate an explicit proposal for each class. However, we want to point out that our general approach to in-between cases makes certain predictions. For example, consider (75):

(75) a. Bees swarmed in the garden.
b. The garden swarmed with bees.

According to our analysis, *with bees* in (75b) is a derived argument, since it shows mixed argument-adjunct characteristics (Lewis, 2004). It is of course possible that both examples of *swarm* given in (75) are less basic than some other version of *swarm*, but most straightforwardly, (75a) would be considered basic. It is then necessary to investigate whether there is support for this hypothesis, which may seem reasonable for the examples in (75), but perhaps less natural for examples such as those in (76).

(76) a. Excitement buzzed at the party.
b. The party buzzed with excitement.

We leave this issue for future research.

5 Conclusion

The distinction between arguments and adjuncts is crucial for many linguistic theories and frameworks, including LFG. Yet many phrases are difficult to classify as either clear arguments or clear adjuncts; they seem to fall in between. In this paper, we have discussed a number of such cases and we have proposed that the phrases that display mixed behavior are *derived arguments*. If this proposal is correct, it still needs to be determined exactly what the different argumenthood diagnostics are testing. It is possible that some tests distinguish between arguments and non-arguments, some between core and non-core arguments, and others between c-structure categories (NPs versus PPs, for example), and finally, according to the present claims, some tests may distinguish between basic and derived arguments.

This paper has discussed a number of phrases, such as experiencers, passive agents, etc. These distinctions are sure to be too crude, as was already mentioned in the section on *with*-themes. For further discussion of experiencers, see Rákosi (2006b,a). For a discussion of kinds of instrumentals, see Donohue and Donohue (2004), who argue that some instrumentals are included in the Lexical-Conceptual Structure of verbs, but others are not.

The examples and arguments here are based on English only, even though many of the references cited include data from a variety of languages. A fuller understanding is of course likely be gained from cross-linguistic investigations.

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