10 Morphology and Argument Structure

LOUISA SADLER AND ANDREW SPENCER

1 Introduction

In English we can say (1a) or (1b):

(1) (a) The peasants loaded hay onto the wagon.
(b) The peasants loaded the wagon with hay.

However, although we can say (2a), we can't say (2b):

(2) (a) The peasants poured water into the tank.
(b) *The peasants poured the tank with water.

And while we can say (3b), we can't say (3a):

(3) (a) *The peasants filled water into the tank.
(b) The peasants filled the tank with water.

Further, we can say (4a) or (4b):

(4) (a) Ira broke the vase.
(b) The vase broke.

Yet, although we can say (5a), we can't say (5b):

(5) (a) Ira cut the bread.
(b) *The bread cut.

In addition to the contrasts in examples (4) and (5), we have those exhibited by examples such as (6) and (7):

(6) (a) Children easily break such vases.
(b) Such vases are easily broken (by children).
(c) Such vases break easily (*by children).

(7) (a) An ordinary knife will easily cut such bread.
(b) Such bread is cut easily (with an ordinary knife).
(c) Such bread cuts easily (with an ordinary knife).

Examples such as these raise the question of how participants which are entailed by the lexical meaning of predicates are made explicit in the morphosyntactic representation, and whether and under what conditions they may remain implicit: that is, issues of valency. In addition, they raise the question of alternations: that is, where two morphologically related (or even identical) predicates differ in their lexical semantics and in the way participants are realized in the morphosyntax and, in particular, in morphology. This facet of the morphology–syntax interface has come to be referred to as 'argument structure'. This term means different things to different authors, and one of our aims will be to make explicit a number of distinctions between some of the different types of realization and different types of alternation that have fallen under this term.

We begin our discussion with a distinction between two sorts of operation which affect valency. Section 3 goes on to examine the question of linking, the way that grammars describe the associations between semantic and/or argument structure representations and surface grammatical relations. We describe how this is accomplished in two major frameworks: Lexical Functional Grammar and Principles and Parameters Theory. We also discuss the vexed question of unaccusativity and its representation, and conclude the section with brief mention of other frameworks. In the fourth section we provide three case-studies illustrating the architecture we propose: passives/middles in English, reflexives/reciprocals in Bantu, and causatives in Japanese, then close with a brief discussion of noun incorporation and synthetic compounding.

There are several important topics we cannot address for reasons of space. First, we are restricting our attention to verbs, and ignoring the argument structure properties of adjectives, nouns and prepositions. More specifically, we will side-step a number of difficult but important questions about participles and nominalizations, especially the inheritance of argument structure in deverbal nominalizations (cf. Grimshaw 1990: chs 3, 4). We are also unable to delve into the question of light verb constructions (and the related problem of serial verbs). Finally, there are interesting questions surrounding argument structure and derivational morphology (e.g. the argument structure of deverbal adjectives such as *readable* from *read*) which we leave untouched. However, we hope to have provided sufficient foundation in this chapter for the interested reader to investigate the primary literature in those areas with some confidence.

2 Two types of operations

Between them, lexical semantics and morphosyntactic theory must enable us to relate, at some level, the two uses of *load* in (1) and *break* in (4), and the passive voice to the active. There is by now a broad consensus that lexical semantics plays a large role in determining such morphosyntactic realizations, but disagreement as to whether it can all be reduced to semantics. For those who believe that semantics is insufficient on its own, it is necessary to stipulate some other level of representation to account for these phenomena. In addition, we would wish to see evidence that such extra structure is empirically or conceptually necessary.

Any verb will have some number of (optional or obligatory) syntactic dependents, and the lexicon and grammar of a language must therefore include information about these valency requirements. This information may be expressed in a variety of ways, appealing directly to grammatical functions such as subject and object, as in Lexical Functional Grammar (Bresnan 1996) or Relational Grammar (see Blake 1990), or to syntactic configurations, as in Principles and Parameters Theory (Chomsky 1981), or to some combination of grammatical functions and category labels, as in Head-Driven Phrase Structure Grammar (HPSG, Pollard and Sag 1994). In addition, there must be some representation of the linguistic aspects of word meaning: that is, a semantic level of representation characterizing the necessary properties of the semantic arguments of predicates. A number of different proposals have been put forward in the literature concerning the nature, structure and vocabulary of the level of lexico-semantic representation, summarized by Levin and Rappaport Hovav, Morphology and Lexical Semantics.

Given this background, two fundamentally important, and clearly related, issues arise:

(i) To what extent is syntactic valency idiosyncratic, and to what extent can it be said to be predictable from the lexico-semantic representations associated with individual predicates?
(ii) How can the relationships between different 'uses' of the same word form and between related word forms be captured/predicted in a non-redundant manner?

Our first response to these questions will be to follow a number of authors in drawing a distinction between two sorts of operation 'in' the lexico-semantic/syntax interface (cf. Levin and Rappaport Hovav, Morphology and Lexical Semantics, for a succinct summary of this claimed distinction). The first, 'meaning-changing' operation alters the semantic content of predicates, and we refer to such operations as 'morpholexical operations'. The second, 'meaning-preserving' operation alters the syntactic manifestation of a given semantic representation, particularly the way that it is mapped on to grammatical relations.

We will refer to these as 'morphosyntactic operations'.[1] In a sense, this division corresponds to the traditional distinction between derivation (lexeme-creating) and inflection (creation of distinct forms of a given lexeme), though it may not always be helpful to push this analogy. The distinction is reminiscent of that found in morphophonology, in which phrasal phonology becomes morphologized by giving rise to morphophonological alternations and ultimately suppletive allomorphy.

2.1 Morpholexical operations

To makes things more concrete, consider (8):

(8) Resultative construction
  (a) The blacksmith hammered the metal.
  (b) The blacksmith hammered the metal flat.

This example illustrates an operation which is appropriate for verbs in certain semantic classes (roughly, the meaning of the verb must be compatible with an eventual change of state), and adds a semantic argument to a predicate. This argument expresses the resultant state, flatness, of the object, *metal*. Evidently, the resultative construction increases the syntactic valency of the predicate – in (8b), *hammer* in the resultative complex *hammer flat* has a surface syntactic valency of three. The claim that result predication is a semantic or morpholexical operation is based on the assumption that the syntactically bivalent predicate illustrated in (8a) expresses a relation between just two semantic arguments, without entailing an end result. That is, (8b) crucially means that the blacksmith flattened the metal by means of hammering activity. Example (9) is a particularly clear case in which the main verb is atelic:

(9) They drank the teapot dry.

Since one cannot drink a teapot, (9) must be interpreted as 'they rendered the teapot dry by drinking (from it)'.

2.2 Morphosyntactic operations

Two constructions in English, dative shift and passive, are often taken to be examples of morphosyntactic operations. These are illustrated in (10) and (11):

(10) Dative shift
  (a) Tom gave a bone to his dog.
  (b) Tom gave his dog a bone.

(11) Passive
  (a) Tom broke the vase.
  (b) The vase was broken (by Tom).

Each operation brings about an alteration in the morphosyntactic manifestation of the semantic dependents of a predicate, but they do not alter the basic semantics of the predicate itself (though see section 3.3 for discussion of dissenting views).

The first of these alternations, dative shift, appears to involve a simple alternation between two different syntactic manifestations of the same semantic roles. In (10a) the direct object realizes the Theme role, and in (10b) it realizes the Recipient. Now, other things being equal, we might expect morphosyntactic operations to be unconstrained by the semantics of the predicate. This is largely true of the passive in English, for instance. On the other hand, dative shift is restricted in applicability to verbs of transfer respecting rather subtle semantic constraints (see Pinker 1989 for detailed discussion and for examination of some the consequences of this for learnability).

Turning now to the second alternation, it is common to treat passivization as a morphosyntactic operation involving the suppression of the external argument, or most prominent argument. If passive is a morphosyntactic operation, we would expect that the semantics of the predicate would remain constant across the voice alternation. A consequence of this in English and many other languages is that the Agent is available semantically, and enjoys a certain presence syntactically without necessarily being syntactically expressed. In many languages, this suppressed argument may be expressed as an oblique or an adjunct of some sort, as in the English optional *by* phrase illustrated in (11b). If the passivization process is simply one of syntactic suppression (as opposed to downright deletion), we would expect the first argument to be available for processes which are semantically rather than syntactically governed, and indeed this seems to be the case. This is discussed in more detail in section 4.1.

A distinction something like that between our morpholexical and morphosyntactic operations is widely assumed, and it is very often taken to motivate a further (third) notion of dependent and a third level of information. This conceptual level is often known as 'argument structure' or 'predicate–argument structure' (PAS), and it occupies the interface between the two sorts of operations. The morpholexical operations alter (add, delete, identify) semantic components of predicates and create new semantic representations, LCSs. Each of these is associated with its own argument structure, PAS. The morphosyntactic operations intervene between PAS and syntactic structures, resulting in a multiplicity of syntactic realizations for one and the same argument structure.

Argument structure is essentially a syntactic representation: in fact, it is the syntactic reflex of certain semantic properties. These properties determine the arity (adicity) of the predicate and the relative prominence of the dependence. Both these properties will determine the way the arguments project into the syntax. In a two-place predicate, if no morphosyntactic operations intervene,

the most prominent argument (the more 'agent-like') will map to the subject position, and the less prominent (the more 'theme-like') will map to the object position. In many accounts, the parallel between PAS and constituent syntactic structure proper is increased by distinguishing a special argument position, that of external argument (E. Williams 1980) or most prominent argument (Grimshaw 1990), which always surfaces as the subject. This is the argument of which the entire VP is predicated (hence, it is in a sense external to the verb as such). In a two-place predicate, the remaining argument is often called an internal argument, while a three-place predicate may distinguish a direct internal argument, generally associated with the direct object, and an indirect internal argument, associated with an indirect object. For many purposes it is convenient to assume a further PAS position, denoting events (cf. Higginbotham 1985). This is a position which can be bound by tense operators in the syntax, and to which certain sorts of adverbial may have access.

We give a simplified sketch of this architecture in an essentially theory-neutral fashion. We take examples (11) for illustration, ignoring various complexities such as the precise surface representation of tense elements, participles and so on:

(12) (a) Active form: *Tom broke the vase.*

[[*x* ACT] CAUSE [BECOME [BROKEN(*y*)]]]			LCS
break: <x <y>>			PAS
Tom SUBJECT	broke	the vase. OBJECT	syntax

(b) Passive form: *The vase was broken by Tom.*

[[*x* ACT] CAUSE [BECOME [BROKEN(*y*)]]]			LCS
broken: <(x) <y>>			PAS
The vase SUBJECT	was broken	(by Tom). OBLIQUE	syntax

In the PAS representations, the external argument is leftmost, the direct internal argument is written in its own set of angle brackets, . . . <y>. . . . In the passive representation, the suppression of the external argument is notated by means of parentheses <(*x*) . . . >. The reader must expect to see a number of notational variants on this theme. If we wish to include an event position, we would write the PASS as *break* <e <x <y>>> and *broken* <e <(x) <y>>> (assuming passive participles are 'eventive' in the appropriate sense).

In this section, we have motivated and illustrated Levin and Rappaport's (MORPHOLOGY AND LEXICAL SEMANTICS) distinction between two conceptually different sorts of relations between lexemes or word forms. The morpho-syntactic operations are meaning-preserving, but alter the syntactic realization

of the predicate. The morpholexical operations are meaning-altering, and add, delete or identify certain components of meaning. They therefore create slightly different lexemes with syntactic realizations different from those of the base predicate. Either type of operation may be, but is not necessarily, morphologically mediated. Morphosyntactic operations regularly arise when fully fledged syntactic processes become morphologized (as when a verb becomes an affix). Not infrequently a morphosyntactic operation becomes a morpholexical operation in historical change (lexicalization). As a result of this, one and the same piece of morphology may realize a morphosyntactic operation in one language/dialect and a morpholexical operation in a closely related language/dialect.

In most of the rest of this paper, we will be turning our attention to morphologically mediated operations of these two sorts. Before doing so, however, we will turn in the next section to the question of how the surface syntactic form (possibly through the mediation of PAS) is related to the LCS representation.

3 Linking

3.1 Standard cases in LFG and PPT/GB

In this section we provide a brief sketch of linking theories, within two frameworks, Lexical Mapping Theory (LMT), within Lexical Functional Grammar (LFG) (Bresnan and Kanerva 1989, Bresnan and Moshi 1990), and the Principles and Parameters Theory (PPT, also called Government Binding Theory, GB) of Chomsky 1981.

The lexical semantic representation in LMT uses a set of thematic roles, including Agent, Patient, Theme, Experiencer, Beneficiary, Goal, Instrument, Location.[2] For *break*, this lexical representation, known as the argument structure in LFG, would then be as in (13):

(13) *break*: <Agent, Patient>

The roles are ordered by the hierarchy given in (14) (Bresnan and Kanerva 1989):

(14) Agent < Benefactive < Goal/Experiencer < Instrumental < Patient/Theme < Locative . . .

The argument structure given in (13) is then mapped to a set of subcategorized grammatical functions, which are syntactic primitives in LFG (SUBJ, OBJ, etc.). These are decomposed into binary distinctive features as shown in (15):

(15) SUBJ [–r, –o]
OBJ [–r, +o]
OBJ2 [+r, +o]
OBL [+r, –o]

Subjects and ordinary objects can express any thematic role, so they are unrestricted, [–r]. Secondary objects and obliques are associated with some specific thematic role, and are hence restricted [+r].[3] Genuine objects are able to complement transitive verbs, but not, say, nouns or adjectives, and these are marked [+o]. Subjects and obliques lack this property. This leads to the classification given in (15).

Mapping is achieved as follows: first, a set of Intrinsic Classification (IC) principles associate thematic roles with particularly syntactic feature values, as exemplified in (16):

(16)

Agent	Patient/Theme	Locative
[–o]	[–r]	[–o]

The association of Patient/Theme with [–r] in (16) reflects the fact that Patients or Themes alternate between subject and object functions. Next, a set of Default Rules (DR) apply, filling in redundant values in accordance with (17):[4]

(17)

(a) $\hat{\theta}$	(b) θ
[–r]	[+r]

The symbol $\hat{\theta}$ stands for the highest thematic role. The effects of these can be seen in (18):

(18)

break	<Agent, Patient>		
	–o	–r	IC
	–r		DR

Notice that the system is monotonic, so it would be impossible for DR (17b) to override the intrinsic specification [–r] on the Patient role. Thus far, (18) guarantees that the Agent is mapped to the SUBJ position. To complete the derivation, we appeal to a principle of Function-Argument Biuniqueness which states that every lexical argument position must be uniquely associated with a grammatical function (and vice versa). This limits the specification for [o] which may be given to the Patient in (18). It cannot be [–o], as that would mean that the clause would have two subjects, thus violating bi-uniqueness. Hence, the Patient must be marked [+o], and therefore maps to OBJ.

Of course, we may find that the lexical form in (18) is altered by a valency-affecting (for us, morphosyntactic) operation such as Passive. In LFG passive is an operation which suppresses the highest thematic role:

(19) Passive $\hat{\theta}$ → ∅

The morphosyntactic operations apply before the Default Rules, a consequence of the Elsewhere Condition, under which the more specific of two rules in competition applies in preference to the more general (see Stump, INFLECTION, for general discussion of the Elsewhere Condition). The derivation for the passive of *break* (as in *The vase was broken*) would therefore be (20):

(20) break <Agent, Patient>

−o	−r	IC
∅		Passive

The Default Rule cannot apply (even vacuously). We now appeal to a further well-formedness condition which states that every clause must have exactly one subject. Thus, the Patient is mapped to the SUBJ function, as required.

These represent very simple cases, of course (the minimal requirement on a successful linking theory). Rather complex problems emerge when we look at more tricky types of predicate, especially those with double objects in some languages (cf. Alsina and Mchombo 1993, Bresnan and Moshi 1990) and, perhaps most notoriously, psychological predicates. The problem with the latter is that there are languages (such as English) which have two types of predicate with roughly the same meaning, as illustrated in (21):

(21) (a) Tom fears enclosed spaces.
(b) Enclosed spaces frighten Tom.

Suppose we say that these are exactly synonymous, so that the thematic relations borne by *Tom* and *enclosed spaces* are identical in each case: how do we then construct a linking theory which will obtain both mappings? This conundrum has been the subject of much recent debate (see e.g. Belletti and Rizzi 1988, Dowty 1991, Grimshaw 1990, Pesetsky 1995).

We now turn briefly to the second model, in which grammatical relations are not primitive labels or feature bundles, but are positions in a constituent structure. The PAS representation for *break* will be that of (22):

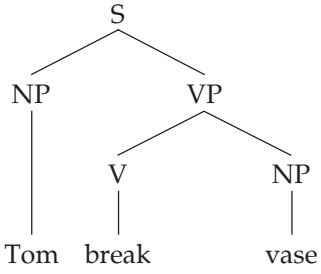
(22) *break*: <x <y>>

This representation conveys information about arity, just as representation (13) did, but it also contains limited information about prominence. In addition

to indicating that there are two syntactically realizable arguments, (22) also specifies the *x* argument as the external argument and *y* as the internal argument. This is obtained by means of rules mapping the LCS to the PAS. The semantic argument of an ACT (or CAUSE) predicate is more prominent than, say, the semantic argument of a stative predicate such as BROKEN (or BECOME[BROKEN]). (This is another way of saying that Agents are more prominent, or higher on a hierarchy, than Themes.) Most of what has been said about the use of a thematic hierarchy can be automatically translated into this framework (including the problems with psychological predicates!), so we will not rehearse this (see Jackendoff 1990 for detailed discussion).

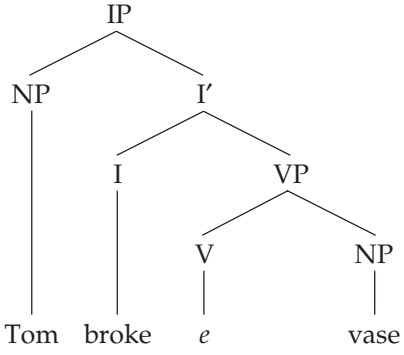
The next question is how (22) is related to a syntactic representation. In the standard Principles and Parameters Theory of Chomsky (1981) there is a D-structure representation, which reflects argument structure very directly, and this is mapped into S-structure by the general rule of Move-α (constrained in various ways). We therefore map the PAS (22) for sentence (11a) into the D-structure shown in (23):

(23)



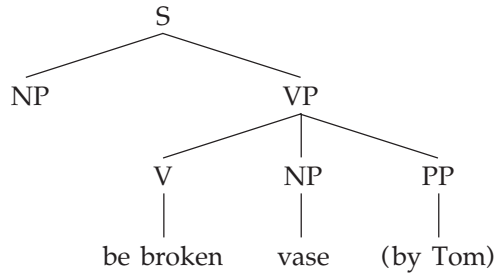
Representation (23) corresponds very closely to the S-structure representation. In PPT, nominals have to be licensed in syntactic form by receiving abstract Case. The subject position receives Nominative Case from I, the position associated with tense marking and subject agreement, while the direct object gets Accusative Case from the verb. These conditions are satisfied in (26), the S-structure derived from (23):

(24)



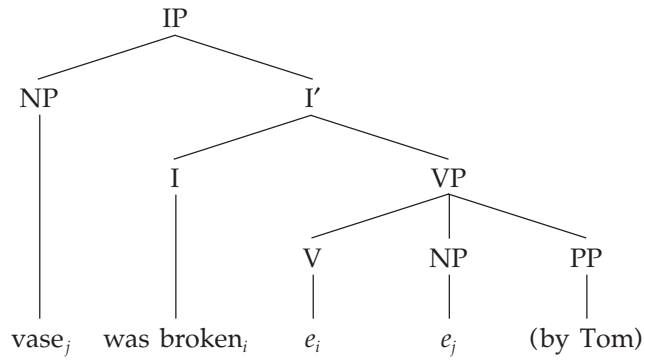
The passive operation is viewed as suppression of the external argument,[5] notated by putting it in parentheses. As in all other theories, there is then a rider permitting this argument to be expressed as an oblique of some kind in many languages. The passivized verb form, which in English is a periphrastic construction involving a participle and auxiliary verb *be* or *get*, is inserted into the D-structure and the internal argument, *vase*, is linked to the object position (technically, the nominal complement governed by the V head of the VP). However, the external argument has been suppressed, and cannot therefore be linked to the subject position. The best it can hope for is to be realized as an optional PP adjunct, as in (25):

(25)



There is a general principle known as Burzio's Generalization, which states that a predicate lacking an external argument cannot assign Accusative Case. This means that passive participles cannot assign Accusative Case and hence cannot license their own objects. This means that *vase* in (25) cannot remain where it is. It is therefore moved to the only landing site where it will receive a legitimate Case: namely, the (currently unoccupied) subject position. Hence, we obtain (26):

(26)



PPT, like LMT, is governed by ancillary assumptions: in particular, that all clauses must have a subject (the Extended Projection Principle) and all lexical

argument positions must map on to a structurally defined argument position in the syntax, and vice versa (the Theta Criterion).

It will be seen that although the details of the architecture differ, and a number of theoretical positions contrast starkly (e.g. whether grammatical relations are primitive or not), the two models manipulate very much the same ideas, especially with respect to argument-structure representations.

3.2 The mapping of intransitive verbs

As is well known, many languages distinguish morphosyntactically between two types of intransitive verb. In the first type, the unergative, the subject fulfils an active semantic role (such as the traditional Agent), while in the second, the unaccusative, the subject is more passive semantically, and corresponds to a Theme or Patient. The important point here is that there are sometimes morphosyntactic processes which treat the subject of an unaccusative and the direct object of a transitive verb as a single class, distinct from the subject of an unergative verb.[6] An example of this is found in the English resultative construction (seen in (8) and (9) above). We can say *They hammered the metal flat*, and also *The river froze solid*, but we can't say *She ran tired* with a resultative meaning 'she tired herself by running'. This corresponds to the fact that *freeze* has a Theme subject and is thus unaccusative, while *run* has an Agent subject and is thus unergative. In other languages the distinction is said to manifest itself in terms of the auxiliaries selected for certain tense/aspect forms (Italian, French, Dutch, Danish), whether an impersonal passive is permitted (Dutch, German and many other languages), whether a genitive subject is possible under negation (Russian), which argument certain quantificational or aspectual prefixes apply to (Slavic generally), or whether the argument can undergo noun incorporation (Mohawk, Chukchee and many other languages).

In LMT this distinction is coded in terms of the specification of grammatical function features. The Intrinsic Classification presented in (16) above will give us the representations (27) for the unergative and unaccusative verbs *run, freeze*:

(27) (a) *run*<Agent> (b) *arrive*<Theme>

−o	−r
SUBJ	SUBJ

We can now make those processes diagnostic of unaccusatives sensitive to the presence of a [–r] argument.

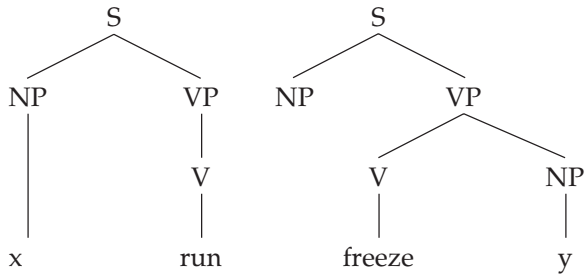
In the PPT/GB framework an unaccusative predicate can be characterized in two ways. First, we could say that it is a one-place predicate with no external argument; second, we could say that it is a one-place predicate whose argument occupies a D-structure object position. In principle, one might even expect to find different processes sensitive to these different characterizations, though such evidence is hard to come by.

The PAS representations for *run* and *freeze* are shown in (28), and the corresponding D-structures are given in (29):

(28) (a) *run*<x> (b) *freeze*<<x>>

Here we follow Grimshaw (1990) in representing the internal argument in double angled brackets.

(29) (a) *run* – unergative (b) *freeze* – unaccusative



By Burzio's Generalization, the unaccusative predicate cannot assign Accusative Case (because it has no external argument), so the 'y' argument has to move to subject position to receive Nominative Case.

3.3 Alternative approaches to argument structure

This chapter is investigating the idea that argument structure is an independently definable level of representation, and for that reason we have not delved into those approaches under which alternations are the result of head movement in the syntax (Baker 1988a, D. G. Miller 1993, Ackema 1995; for review see Carstairs-McCarthy 1992, Spencer 1991). It is not clear how this relates to PAS/LCS representations, especially in a theory such as Baker's which countenances an autonomous morphology module. It is worth mentioning, though, that most approaches to morphological causatives treat them at some level as a kind of

complex predicate (see section 4.3), which is reminiscent of Baker's view that they have the morphosyntax of V–V compounds.

An interesting offshoot of Baker's work which links it to the notion of LCS is that of Hale and Keyser (1992, 1993). They propose that argument structure be described in terms of lexical argument structures or lexical relational structures (LRS), essentially a sparse form of LCS built up out of binary-branching syntactic structures and obeying syntactic principles from PPT such as the Empty Category Principle. The idea is that the argument positions are represented by NP or PP complements, and the differences in argument structure associated with various verb types are coded as occurrences of (generally empty) V, A or sometimes P slots in the LRS. Thus, a causative verb is one which has a lexical VP structure headed by a V slot (corresponding roughly to a causative predicate in other frameworks).

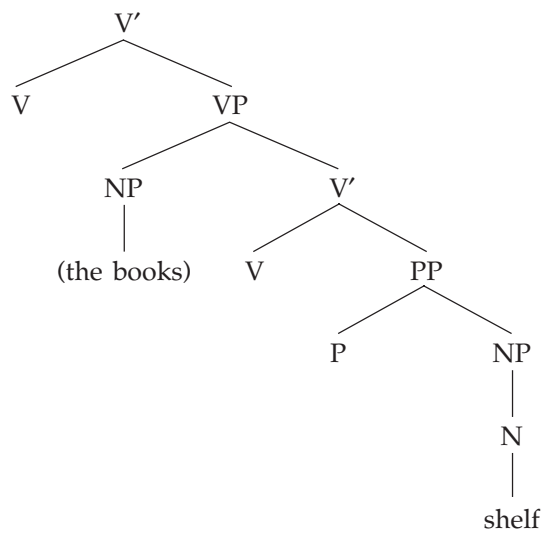
Hale and Keyser consider location verbs such as *shelve*, in which the incorporated noun corresponds to a locative prepositional phrase:

(30) She shelved the books.

Cf.
(31) She put the books on the shelf.

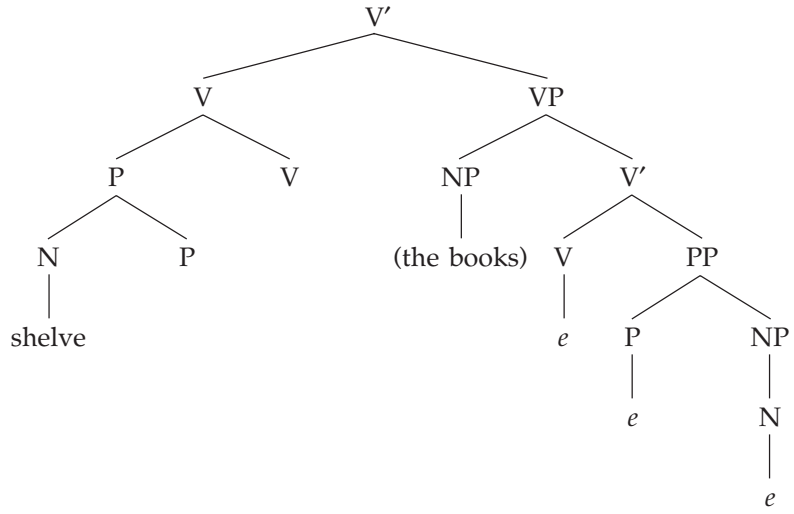
They argue that the LRS for *shelve* is (32), akin to the syntactic structure corresponding to (31):

(32)



The final verb form is derived by multiple application of head movement of *shelf*, successively through P, V and V:

(33)



Hale and Keyser argue that similar derivations account for cases such as *saddle* (*Harriet saddled the horse*; cf. *Harriet provided the horse with a saddle*). They claim that syntactic principles explain why this is not possible when the converted noun corresponds to an indirect object. Thus, although we can say *Harriet donated a fortune to the church*, we can't say **Harriet churched a fortune*. They also analyse causative/inchoative pairs in terms of movement of nouns or adjectives through empty V positions (*The gravy thinned, The cook thinned the gravy*). In this theory there appears to be no room for a distinction between morpholexical and morphosyntactic operations. Most of the alternations Hale and Keyser discuss are lexically restricted, and are clearly morpholexical (e.g. conversion from *shelf* to *shelve*).

One very interesting alternative to the two-level architecture presented here is the theory of argument-structure alternations developed by Goldberg (1995) within the framework of Construction Grammar. For Goldberg, an alternation such as dative shift or the locative alternation is the result of fusing the lexical structure of an individual lexical item with a more general frame, the dative shift construction. A construction modulates the original verb entry, and is even capable of adding extra arguments or underlying predicates such as CAUSE. The framework is a particularly attractive way of handling alternations in which a semantic component is added, such as causatives and resultatives. It is less obvious how it handles cases of argument identification (e.g. reflexivization) or suppression (passives, antipassives). There is little scope in such a framework for the LCS/PAS distinction, because all alternations are regarded as on a par.

4 Morpholexical and morphosyntactic operations

Having discussed background notions and general theoretical approaches to argument structure, we will now illustrate our overall typology of operations with specific examples. We will discuss three sets of alternations which are each similar except that one can be regarded as a morpholexical relationship while the other can be viewed as a morphosyntactic operation. In the first morphosyntactic operation, passive, an argument position is suppressed. A similar morpholexical operation (which is not expressed morphologically) is English middle formation. In Chichewa reflexivization we see a process in which one argument position is linked with another referentially. The morphological reciprocal turns out to be morpholexical, however. In productive causatives an argument position is added. This has a drastic effect on the LCS, but in regular cases this is a predictable side-effect of the morphosyntactic change brought about by fusing the argument structure of the base verb with that of the causative. Finally, we look briefly at noun incorporation and at some of the theoretical responses to this phenomenon.

4.1 Passives and middles

In both the passive and the middle alternations in English an argument is lost and fails to be projected in the syntax. Consider (34, 35) (cf. Ackema and Schoorlemmer 1995: 175):

(34) (a) Tom painted the walls.
(b) The walls were painted (by Tom). (Passive)

(35) These kinds of walls paint easily. (Middle)

The suppressed external argument of the passive is still syntactically 'active' to some extent. It can appear as a *by* phrase more or less irrespective of the semantics of the verb (34b), and it can license agent-oriented adverbials (36), and can control the null subject of purposive clauses (37):

(36) The walls were painted on purpose.

(37) The walls were painted to protect them against the rain.

As is well known, the middle construction imposes semantic constraints: the resulting sentence is interpreted as a stative, and stylistically is preferred, therefore, with a generic subject. In addition, the construction is generally difficult or impossible without adverbial support (in the form of adjuncts referring to ease or difficulty).

An important contrast between passives and middles is that the lost subject is not syntactically available, even where the above felicity conditions are met:

(38) (a) *These kinds of walls paint easily by professional painters.
(b) *These kinds of walls paint easily on purpose.
(c) *These kinds of walls paint easily to protect them against the rain.

English passives are possible with a great variety of verb construction types, including raising verbs (39), double object constructions (40) and with idiom chunks, as in (41):

(39) (a) The coach expected Tom to win.
(b) Tom was expected to win (by the coach).

(40) (a) Tom gave Dick a book.
(b) Dick was given a book (by Tom).

(41) (a) The used-car salesman took advantage of Tom.
(b) Tom was taken advantage of by the used-car salesman.
(c) Advantage was taken of Tom by the used-car salesman.

Middles fail in such cases:

(42) Such committed athletes readily expect to win.

(This is ungrammatical on a reading synonymous with *are readily expected to win*.)

(43) (a) *Such well-educated children give books easily.

(Also **Such books give easily to young children*.)

(44) (a) *Tom takes advantage of easily.
(b) *Advantage takes easily of Tom.

We will follow Ackema and Schoorlemmer (1995) in assuming that middles are formed by a 'pre-syntactic' – for us a morpholexical – process, whereas passives are formed by a morphosyntactic process. The middle, then, has a single syntactically projectable argument (an external argument, according to Ackema and Schoorlemmer, hence the middle is an unergative form) and no syntactically available implicit argument. This lone argument corresponds to a patient argument in semantic structure (and, of course, corresponds to the patient argument which is associated with the direct internal argument of the ordinary active form of the verb). The passive, however, has an internal argument which is linked to subject position in the syntax, and a suppressed,

but implicit, argument corresponding to the external argument of the active form. The existence of such an implicit argument is, for us, a sufficient condition for a morphosyntactic valency-reducing operation.[7]

Given the logic of the overall architecture of grammar which we have taken as our descriptive starting-point, the active and passive alternants of a verb are forms of one and the same lexeme, while the middle form is effectively a closely related lexeme, with slightly different semantics. The difference in syntactic projection in the middle follows from the difference. The fact that there are fairly strict lexical and semantic restrictions on the formation of middles should come as no surprise. However, this is not to say that all verb forms in a given language which behave like the English middle with respect to argument structure necessarily exhibit such restrictions.

In Bantu languages – for instance, Swahili – verbs accept a wide range of suffixes to form new voices or new lexemes. Swahili has a form which is generally referred to as a passive, formed by a suffix *-w-*. Hence, from *pika* 'cook' we have *pikwa* 'be cooked', *funga* 'close', *fungwa* 'be closed'. The Swahili passive permits expression of the suppressed external argument, as in (45):

(45) Chakul kili-pik-wa na mwanamke yule.
food PAST-cook-PASS by woman that
'The food was cooked by that woman.'

In addition, we find a class of derivates known as 'stative verbs', formed regularly by suffixation of *-k*. Thus, we have verb stems such as the following (Wilson 1985: 63; Ashton 1944: 226–8):

(46)	(a)	vunja	'break'	vunjika	'be broken'
	(b)	pasua	'crack'	pasuka	'be cracked'
	(c)	funga	'close'	fungika	'be closed'
	(d)	fungua	'open'	funguka	'be opened'

Stative verbs refer to a resultant state without any indication of an agent. Thus, we have examples such as (47) and (48) (Ashton 1944: 229, 361):

(47) Sikuvunja kikombe hiki, kimevunj-ika tu
NEG.I.broke cup this broke-STAT just
'I didn't break this cup; it merely broke.'

(48) Sikufunga mlango, umefungika tu.
NEG.I.open door open-STAT just
'I didn't shut the door, it shut of itself.'

The difference between *mlango ulifungwa* 'The door was closed (*passive*)' and *mlango umefungika* 'The door is shut' is essentially the same as in the English translations: the passive refers to an event, the stative to a state (cf. Mchombo's discussion of similar facts, in Chichewa (Bantu).

Very intriguingly, the stative form is associated with a potential meaning in addition to the simple intransitive meaning illustrated so far. Thus, the stems *fungika* and *funguka* can also mean 'be closeable/openable' respectively. This is reminiscent of the meaning of the English middle (*This book reads easily* ⇔ *It is easy to read this book*).

Wilson (1985: 65) claims that 'any verb, provided its meaning allows it, can be made into a stative form', by which we take it that the verb's lexical semantics must be such as to imply the possibility of a resultant state. Thus, stative formation is very productive, and arguably part of the paradigm of the verb. However, from the brief descriptions provided here, it would seem to have the same argument structure as the English middle. Here, then, is a case in which we have something akin to English passive and middle constructions, but both are realized by regular and productive suffixation. The difference is that the passive merely suppresses the external argument, leaving it syntactically available, while the stative disposes of that argument altogether.[8]

4.2 Reflexives and reciprocals

Many languages have within their inventory of morphological operations a class of processes which may be viewed as deriving reflexive or reciprocal verb forms from transitive verb forms (see e.g. the brief discussion and exemplification in Levin and Rappaport Hovav, Morphology and Lexical Semantics). Syntactically, these operations are valency-reducing, resulting in predicates which do not permit a direct function to be assigned to an NP corresponding to the reflexive or reciprocal affix or clitic, as in the French examples (49):

(49) (a) Jean voit l'homme dans le miroir.
Jean sees the.man in the mirror.
'Jean sees the man in the mirror.'

(b) Jean se voit dans le miroir (*l'homme).
Jean REFL sees in the mirror (the.man).
'Jean sees himself in the mirror.'

Levin and Rappaport Hovav (Morphology and Lexical Semantics) suggest that such processes result in a predicate with the same semantic representation as the input predicate, and on this basis we might be tempted to classify all such processes as morphosyntactic. There are a number of issues here. First, although intuitively speaking it is clear that the basic verb and its reflexive or reciprocal form have the same semantics, these operations clearly have a semantic effect: namely, that of identifying the semantics of the fillers of two role slots (and, in the case of reciprocal, placing a constraint on plurality). The question is whether this identification is brought about syntactically (by syntactic binding) or whether it falls purely within the lexical domain. Second,

we have argued that the prototypically morphosyntactic processes are simply relation-changing alternations. These operations, of which the best examples are voice alternations, may be viewed as doing nothing more than providing different sets of syntactic prominence arrays for sets of roles, or as mapping between alternative syntactic realizations for the arguments of predicates. In this context, then, we may ask whether reflexivization and reciprocalization are morphosyntactic in the appropriate sense, specifically:

(i) Do they provide different grammatical function arrays/surface realizations for arguments?
(ii) Does the reflexive or reciprocal 'role' remain accessible in the syntax (in the way that the suppressed argument of a passive remains accessible)?

Both these questions are addressed in Mchombo's (1993a) discussion of reflexives and reciprocals in the Bantu language Chichewa. In Chichewa the object marker (OM) is optional, and Mchombo treats it as an agreement marker (unlike the subject marker, SM, which is ambiguous in status between an agreement marker and an incorporated argument/function). Reflexives are realized by a prefix *-dzi-* occupying the OM slot (FV = 'final vowel'):

(50) Mkângo u-na-dzí-súpul-a
3-lion 3SM-past-REFL-bruise-FV
'The lion bruised itself.'

Mchombo offers a most interesting argument for the syntactic 'presence' of the reflexive marker on the basis of ambiguities in comparative clauses. In (51) the reflexive gives rise to strict as well as sloppy identity readings, and also to a comparative object (rather than subject) reading:

(51) Alenje á-ma-dzi-nyóz-á kupósá asodzi
2-hunters 2SM-hab.-reflex.-despise-FV exceeding 2-fishermen
(i) The hunters$_i$ despise themselves$_i$ more than the fishermen$_i$ (despise themselves$_i$) – sloppy identity reading.
(ii) The hunters$_i$ despise themselves$_i$ more than the fishermen$_j$ (despise them$_i$) – strict identity reading.
(iii) The hunters despise themselves more than (the hunters despise) the fishermen – comparative object reading.

The existence of strict identity and comparative object deletion readings points to the presence of a syntactic argument (for Mchombo, in fact, an object) corresponding to the reflexive in the two clauses.

Given Mchombo's reasoning, it follows that at least at PAS, reflexivized predicates have two arguments, so they remain bivalent even if they are not transitive in surface syntax. This indicates that reflexivization in Chichewa is

a morphosyntactic operation. If, furthermore, Mchombo is correct that the reflexive really *is* an object, then we have no difference in surface grammatical function, although we do have a difference in surface expression (as an affix rather than an independent NP).

Mchombo presents further data to support this position. In (52) we see that under gapping, the reflexive verb patterns in a way parallel to a normal transitive verb:

(52) Alenje á-ma-dzi-nyóz-á kupósá asodzi alimi.
2-hunters 2SM-hab.-reflex.-despise-FV exceeding 2-fishermen 2-farmers
'The hunters despise themselves more than the fishermen the farmers.'

The essence of Mchombo's claim concerning the Chichewa (and by extension, the Bantu) reflexive is that it is present in the syntax, as an anaphoric syntactic element, subject to syntactic binding. Since the domain of binding is syntax, and this domain is separate from that of the morpholexical rules, reflexivization cannot be a morpholexical rule.

The behaviour of the reflexive morpheme contrasts sharply with that of the reciprocal. The reciprocal marker is a suffix to the verb root, hence part of the verb stem. This means that in contrast to the reflexive marker, the reciprocal participates in the process of vowel harmony, reduplication, nominalization and imperative formation. This puts the reciprocal in the same position as exponents of morphosyntactic operations such as passive, applicative and causative; but this does not mean that it is a morphosyntactic operation itself. To see this, note its behaviour in comparative clauses. As seen in (53), the reciprocal gives rise only to the sloppy identity reading:

(53) Alenje á-ma-nyoz-án-á kupósá asodzi
2-hunters 2SM-hab.-despise-recip.-FV exceeding 2-fishermen
'The hunters$_i$ despise themselves$_i$ more than the fishermen$_j$ (despise themselves$_j$).'

This strongly suggests that the process involved identifies the fillers of the two semantic role slots lexically and not syntactically; that is, we have a (productive) semantic derivation providing a predicate with a slightly altered semantic representation. In parallel fashion, the counterpart of (52) is impossible with reciprocal verbs.[9]

4.3 Causatives

In a causative construction a bare verb, V, an adjective, A, or sometimes a noun stem, N, alternates with a verb meaning 'cause/allow/persuade/help . . . to V' or 'cause/allow/persuade/help . . . to become A/N'. In many genetically and typologically varied languages this is realized morphologically in a

completely regular fashion. The causative alternation has been the subject of considerable research, to which we can hardly do justice here. At first blush this would seem to be an instance of the creation of an entirely new lexeme, as in English *They darkened the room* (from adjective *dark*) or *They enslaved the populace* (from noun *slave*). This is because there is an additional semantic component of causation. Moreover, this component often receives subtly different interpretations (as indicated in our glosses above), such as persuasion, instruction ('tell someone to do something') or permission ('allow someone to do something'). However, many researchers regard the morphological causative as an instance of an argument-structure alternation, rather than lexemic derivation proper. This is particularly attractive when the causative is completely productive and lacking in lexical idiosyncrasies.

Japanese has an interesting and well-studied causative morphology. For convenience we will follow the discussion in Tsujimura's (1996) overview of Japanese grammar (cf. also Shibatani 1976). The examples in (54) are adapted from Tsujimura (1996: 247):

(54) (a) Hanako-ga arui-ta.
Hanako-NOM walk-PAST
'Hanako walked.'

(b) Taroo-ga Hanako-o aruk-ase-ta.
Taroo-NOM Hanako-ACC walk-CAUSE-PAST
'Taroo made Hanako walk.'

(c) Taroo-ga Hanako-ni aruk-ase-ta.
Taroo-NOM Hanako-DAT walk-CAUSE-PAST
'Taroo had Hanako walk.'

The causative morpheme is a suffix taking the form *-(s)ase* (*-sase* occurs after vowel-final stems). As is typical cross-linguistically, the subject of the basic verb *walk* in (54a), *Hanako*, is expressed as a direct object marked by *-o* in the causative version in (54b). This sentence means something like 'Taroo forced Hanako to walk'. In (54c), however, *Hanako* is marked with a dative case marker *-ni*, and the interpretation is closer to 'Taroo persuaded Hanako to walk'.

When a transitive verb is causativized, the embedded subject is always marked with dative case, as in (55):

(55) (a) Taroo-ga hon-o yon-da.
Taroo-NOM book-ACC read-PAST
'Taroo read a book.'

(b) Hahaoya-ga Taroo-ni hon-o yom-ase-ta.
mother-NOM Taroo-DAT book-ACC read-CAUSE-PAST
'His mother made/had Taroo read a book.'

This has been linked to a general prohibition in Japanese against two nominals marked with *-o* in one clause. In other languages it is quite common for the embedded subject of a transitive verb to be marked as an (optional) oblique rather than as a direct object, but Japanese is only accidentally similar to this type.

Morphological causatives in Japanese are very productive, and are relatively free of lexical restrictions or idiosyncrasies. Moreover, there is good evidence (cf. Shibatani (ed.) 1976) that at some level a causativized transitive sentence such as (56) behaves like two clauses, much like the bi-clausal English translation (again, adapted from Tsujimura 1996: 255):

(56) Taroo-ga Ziroo-o/ni zibun-no heya-de benkyoo-sase-ta.
Taroo$_i$-NOM Ziroo$_j$-ACC REFL$_{i/j}$-GEN room-in study-CAUSE-PAST
'Taroo made Ziroo study in his own room.'

Reflexivization in Japanese is subject-oriented, so (56) suggests that both *Taroo* and *Ziroo* correspond to subjects at some level. We can say that, in a certain sense, *Ziroo* is the subject of *study*, while *Taroo* is the subject of CAUSE. Evidence from ambiguities with temporal and subject-oriented adverbs points the same way. We can call a causative construction of this sort 'bi-clausal'.

In what sense is a productive morphological causative a morphosyntactic operation? One viewpoint, which in some ways incorporates the insights of Baker (1988a), is to say that the causative operation comprises the fusion or union of two argument structures. Thus, suppose we take the argument structure of predicates such as *walk* or *hit* as something like (57):

(57) (a) walk: <arg. 1>
(b) hit: <arg. 1, arg. 2>

Then we can say that the causative will be (58):

(58) (a) cause-walk: <arg. 0 <arg. 1>>
(b) cause-hit: <arg. 0 <arg. 1, arg. 2>>

To some extent it is immaterial for our typology whether structures such as (58a,b) are the result of an operation 'in the lexicon' or the result of V-movement 'in the syntax'. The point is that it makes sense to say that the operation is defined over an essentially unrestricted set of predicates and results in an argument structure representation along the lines of (58), such that all three of the arguments are syntactically visible in some sense. The operation thus qualifies as morphosyntactic in our sense.[10]

Languages differ in how these three arguments are realized (see Baker 1988a for a detailed study of this). Cross-linguistically, *arg. 1* in (58a) is uniformly realized as a canonical direct object. However, the (58b) structure (where it exists) will sometimes realize *arg. 1* as a direct object, and sometimes *arg. 2* retains the

direct object status, depending on the language. When *arg. 1* becomes the derived direct object, *arg. 2* is generally marked as a second object, though this will often be inert to object-oriented processes like passive. Thus, despite the fact that *Taroo-ni* in (55b) is an obliquely marked phrase, it is in fact the direct object of the causative. This is clear when we try to passivize a causative. Consider the data in (59) (cf. Tsujimura 1996: 259):

(59) (a) Ziroo-ga Mitiko-ni kodomo-o home-sase-ta.
Ziroo-NOM Mitiko-DAT child-ACC praise-CAUSE-PAST
'Ziroo made Mitiko praise the child.'

(b) Mitiko-ga Ziroo-ni kodomo-o home-sase-rare-ta.
Mitiko-NOM Ziroo-DAT child-ACC praise-CAUSE-PASS-PAST
'Mitiko was made to praise the child by Ziroo.'

Here, *Mitiko-ni* in (59a) has been promoted to subject when (59a) is passivized, while *kodomo-o* 'child-ACC' remains marked as an accusative. However, if we try to passivize on the accusative marked object in (59a), *kodomo-o*, we get an ungrammatical sentence:

(60) *Kodomo-ga Ziroo-ni Mitiko-ni home-sase-rare-ta
child-NOM Ziroo-DAT Mitiko-DAT praise-CAUSE-PASS-PAST
'The child was made praised by Mitiko by Ziroo.'

Thus, *kodomo-o* behaves like an inert, or frozen, second object. Such 'freezing' of the second object is typical, though in some languages both objects retain full object properties, including passivization, object agreement marking and so on (see Baker 1988a and Bresnan and Moshi 1990 for discussion of variation in Bantu in this respect).

In other languages *arg. 2* in (58b) is treated as the object of the causative, with *arg. 1* becoming an oblique marked adjunct, generally optional. This is how causatives work in Turkish, for instance. Consider (61) (Comrie 1976: 268):

(61) Dişçi mektub-u müdür-e imzala-t-tı.
dentist letter-ACC director-DAT sign-CAUSE-PAST
'The dentist made the director sign the letter.'

Here the object of the basic verb, *letter*, remains the object of the derived causative verb, while the subject of the basic verb, *director*, appears as a Dative marked oblique.

In general, when *arg. 2* is treated as the derived (as well as basic) object, the causative construction behaves syntactically like a single clause. Thus, if the object is a reflexive pronoun, it can only refer back to the surface subject, *arg. 0*, and not to *arg. 1*. In other words, *arg. 1* cannot be treated as a kind of subject for the purposes of reflexivization, and we have a monoclausal causative construction. This is in contrast to the biclausal causative of Japanese.[11]

The semantic effects of the causative operation will differ somewhat from language to language, and, importantly, from construction to construction, so Japanese causatives with *-o* marked objects have the coercive or the adversity reading, while those with the *-ni* object have the permissive reading. However, the basic semantic relationships are the same cross-linguistically.

Japanese also has verb pairs which we can interpret as lexical causatives, often related by non-productive ablaut. Some examples are given in (62) (Tsujimura 1996: 260):

(62)

causative	intransitive	
tomeru	tomaru	'stop'
ageru	agaru	'rise/raise'
sageru	sagaru	'lower'
okosu	okiru	'wake up'
nekasu	neru	'sleep'

Despite the meanings of these pairs, the causative member does not behave like a morphological causative derived with *-(s)ase*. Thus, with reflexives we get a monoclausal patterning. Compare (63) with (56):

(63) Taroo-ga Ziroo-o zibun-no heya-no mae-de tome-ta.
Taroo$_i$-NOM Ziroo$_j$-ACC REFL$_{i/*j}$ room-GEN front-at stop-PAST
'Taroo stopped Ziroo in front of his room.'

In (63) *Ziroo* is a 'pure' object, and hence cannot be the antecedent to the reflexive. Contrast this with (64), in which the intransitive *toma-* is causativized morphologically, not lexically:

(64) Taroo-ga Ziroo-o zibun heya-no mae-de tomar-ase-ta.
Taroo$_i$-NOM Ziroo$_j$-ACC REFL$_{i/j}$ room-GEN front-AT stop-CAUSE-PAST
'Taroo made Ziroo stop in front of his room.'

Here, *his room* can refer to Taroo or to Ziroo.

Clearly, we want to relate the intransitives to their lexical causatives by means of a morpholexical operation, while we will argue that the morphological causatives (at least in Japanese) are the result of morphosyntactic operations. A further piece of semantic evidence in favour of this is that the lexical causatives signify direct causation, in which the agent must come into direct contact with the patient. Morphological causatives, however, denote indirect causation. Thus, (64) could refer to a situation in which Ziroo is brought to a stop outside Taroo's room by a large obstacle which Taroo has left there. Taroo could be hundreds of miles away when Ziroo is thus halted. Sentence (63) cannot have such an interpretation.

Discussion of how exactly the linking to grammatical functions is achieved would require a separate chapter in itself, and would require a detailed analysis

of the morphosyntax of various subject- and object-oriented processes in the languages which have such causatives. However, we must address one question which arises with a morphosyntactic analysis of causatives. Since there is a sharp shift in meaning (the addition of a CAUSE predicate), in what sense can any causative be morphosyntactic: that is, an operation over argument structures? We assume that what is actually happening here is that the causative operation involves addition of an argument structure, consisting minimally of an external argument position and a further argument position corresponding to the embedded proposition. This then 'fuses' or 'merges' with the argument structure of the basic predicate. Language-particular principles dictate exactly what happens to the elements of the embedded PAS. We thus obtain a representation such as (65):

(65) CAUSE(*x*, *Ev*) [$_{EV}$STOP(*y*)]

<*x* <*y*>>

This is a complex predicate, whose overall argument structure is a function of two independent argument structures. However, the fusion takes place at the level of PAS, not LCS. The LCS portion of (65) is what we would see in a syntactic causative, so the causative predicate and clausal semantic argument can behave, to some extent, independently.

In the lexical causatives we simply have a causative LCS which includes the embedded predicate:

(66) [CAUSE(*x*)[STOP(*y*)]]

<x <y>>

This does not differ significantly from the representation for any (monomorphemic) transitive verb with a causative component.

4.4 Noun incorporation

Levin and Rappaport (MORPHOLOGY AND LEXICAL SEMANTICS) illustrate English verbs derived by conversion from nouns, such as *butter* in *to butter toast (with margarine)*. Here the converted noun corresponds to an object in a syntactic construction such as *to spread butter on the toast*. In some languages the conversion is signalled morphologically, by affixation: for example, Dutch *ver-botter-en* from the noun *botter*, Hungarian *meg-vaj-az* from the noun *vaj*. In other languages, we can create a lexical unit akin to the VP *to spread butter* by means of noun incorporation. An example from Chukchee is cited by Gerdts (INCORPORATION), from Polinskaja and Nedjalkov 1987: 240:

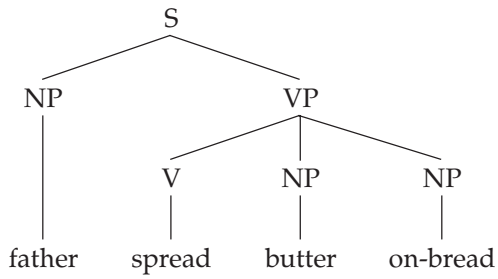
(67) ətləg-e kawkaw mətqə=rkele-nin.
father-ERG bread.ABS butter=spread.on=AOR.3SG:3SG
'Father spread the bread with butter.'

This corresponds to (68) without incorporation:

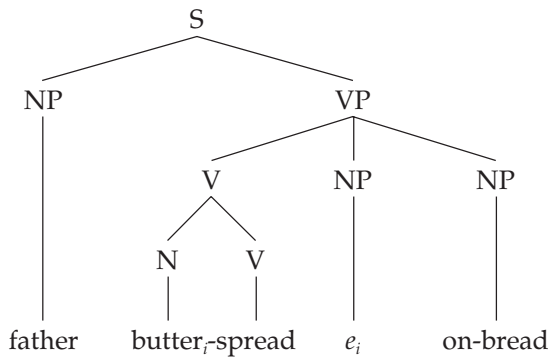
(68) ətləg-e kawkaw-ək mətqəmət kele-nin.
father-ERG bread-LOC butter.ABS spread.on=AOR.3SG:3SG
'Father spread the butter on the bread.'

In the model proposed by Baker (1988a) such an alternation would be the result of movement applying to the head noun of the object NP *butter*, forming a compound verb as in (69):

(69) (a)



(b)



The movement of butter leaves a trace, e_i, which has to be properly governed by the verbal complex. Given this analysis, Baker is able to account for a number of important features of NI, such as the stranding of modifiers in some languages. In this type of approach, the fact that the noun *butter* is interpreted as the direct object of the verb is a consequence of the fact that it is, indeed, the verb's object in the syntactic representation. Further discussion of some of the implications of this type of approach is given in Borer (Morphology and Syntax).

A similar kind of analysis is available in principle for an English synthetic compound such as *butter-spreader* (e.g. Roeper 1988, Lieber 1992), though here

there are important questions surrounding the fact that the verb is nominalized and cannot occur in finite forms, as witnessed by the ungrammaticality of **Tom butter-spreads his toast every morning (with margarine)*. An alternative analysis, which is also open to noun incorporation proper, would say that the incorporated element discharges an argument position, but not in the same way as a syntactic direct object. Sproat (1985) and DiSciullo and Williams (1987) propose rather different solutions, which, however, are alike in not appealing to syntactic movement. This is especially attractive for synthetic compounding, in which compounding renders the verb syntactically intransitive: there is no stranding of modifiers, and no 'doubling' is possible: **butter-spreader of bread with rancid* e_i, **butter-spreader of bread with margarine*.

What is the argument-structure status of *butter-spreader*? Here, again, we have a combination of lexemes, which produces what is morphologically more akin to a single word than to a genuine phrase. We can then say that the argument structure of the noun *butter* is somehow 'fused' with that of the verb stem *spread* in such a way that *butter* is interpreted as the direct internal argument of *spread*. If this is a direct operation over the verb argument structure, then presumably we have to say that the nominalizing suffix *-er* is attached after the internal argument is discharged. This means we must assume that the grammar creates an otherwise non-existent verb stem *[butter-spread]* which then triggers discharge of the internal role. Only then does suffixation take place to give *[[butter-spread]er]* (cf. Sproat 1985). On the other hand, we might argue that the argument structure of the verb is in some way inherited by the nominalization. Thus, *[[spread]er]* retains at least the direct internal argument of the verb stem. This argument can then be projected either as an *of* phrase (*a spreader of butter (on bread)*), or as part of the compound to give *[bread [spread-er]]* (cf. DiSciullo and Williams 1987).

Approaches to synthetic compounding which appeal to operations over argument structures leave a number of questions unresolved, of course (see Carstairs-McCarthy 1992 for discussion). One of these is the status of the notion of 'inheritance' of argument structure (see Lieber 1992 for discussion of this). Another concerns the generality of the approach. As stressed by Roeper and Siegel (1978) in an early generative treatment of synthetic compounds, English permits compounds in which an adverbial modifier is incorporated, as in *quick-drying (paint), sun-dried (tomatoes), home-made (cakes)* and many others. Recent discussion has tended to ignore these cases. An approach which appeals solely to the discharge of argument-structure positions has little to say about them.

The situation is rendered more interesting by the fact that incorporation of adverbials is observed in some noun-incorporating languages. Thus, in Chukchee it is possible to say things like *Tom quick-ran* or *The mother tent-sewed the shirt* (i.e. the mother sewed the shirt in the tent) (cf. Muravyova, Chukchee (Paleo-Siberian). The incorporation of adverbials is a distinct embarrassment to the framework of Baker (1988a), which is so constructed as to explicitly exclude such constructions (for extensive discussion of this point see Spencer 1995). It seems to us that there is merit in exploring the idea that incorporative

structures of this sort can, in part at least, involve something akin to the complex predicate formation we proposed for morphological causatives. Thus, the Chukchee example in (67) might involve a representation along the lines of (70), in which the verb and its object have distinct LCS representations but at PAS that of the object *butter* is indexed with the verb's internal-argument position, thereby saturating it and preventing it from being realized syntactically:

(70) [[x ACT] CAUSE [y BECOME-ON z [$_{BY}$ x SPREAD y]] [BUTTER(w)]

spread <x <w, P_{loc} z>>

This can be thought of as the PAS equivalent of syntactic incorporation in such theories as those of Baker (1988a) or Sadock (1991) (for the latter, cf. Sproat, MORPHOLOGY AS COMPONENT OR MODULE). In the relatively rare cases like Chukchee where adverbials can be incorporated, we can adopt a similar analysis, in which the adverbial's argument structure is fused with an event position at PAS.

Noun incorporation in many languages is lexically restricted, non-productive and idiosyncratic, much like noun-to-verb conversion of the type *butter the toast* in English (see Mithun 1984 for extensive discussion of this). For such languages, we would argue that the incorporation takes place at the LCS level, despite being realized morphologically by compounding, giving a representation such as (71):

(71) [[x ACT] CAUSE [*BUTTER* BECOME-ON z [$_{BY}$ x SPREAD *BUTTER*]]

This could then correspond to any of the PAS representations in (72), depending on the language, corresponding to syntactic structures (73):

(72) (a) *spread* <x <P_{loc} z>>
(b) *spread* <x <z>>
(c) *spread* <x <y, P_{loc} z>>

(73) (a) butter=spread on to the toast
(b) butter=spread the toast
(c) butter=spread margarine on to the toast

5 Summary

We have argued that valency alternations can be of two distinct types: morpholexical operations at a semantic level and morphosyntactic operations at a level of argument structure. The morpholexical operations are likely to be semantically or lexically restricted, and to bring with them semantic changes which

cannot always be predicted from the valency shift as such. Morphosyntactic operations are more often semantically unrestricted, and are thus often defined solely in terms of input/output conditions on argument-structure representations, independently of the semantic representation. They generally do not give rise to additional semantic affects (modulo other aspects of the construction). The result of a morpholexical operation tends to behave syntactically in the same way as a corresponding monomorphemic predicate, whereas syntactic processes may have access to the individual parts of the result of a morphosyntactic operation (cf. the difference between morphological and lexical causatives). We illustrated these distinctions by contrasting passives/middles in English (and Bantu), reflexives/reciprocals in Bantu, and morphological/lexical causatives in Japanese. We finally discussed noun incorporation and synthetic compounding as possible instances of complex predicate formation, in which PAS positions (rather than LCS positions) are saturated morphologically.

NOTES

1 The terminology, with essentially this interpretation, is due to Ackerman (1992). We acknowledge that the nomenclature is potentially rather misleading, particularly given that 'morpholexical', which already has a number of unrelated uses in linguistics, is used to refer to both our morpholexical operations and our morphosyntactic operations in the LFG literature.

2 In practice, thematic role labels are used for convenience, not out of theoretical commitment to these labels. It is generally understood that they stand for more complex LCS representations, perhaps of the kind argued for by Jackendoff 1990. Alternatively, some theorists take Dowty's (1991) Proto-roles as their starting-point (cf. Ackerman 1992).

3 Though this is a rather complex matter: see Ackerman 1992, Alsina and Mchombo 1993, Bresnan and Moshi 1990, for discussion.

4 There are various formulations of these operations in the literature.

5 There are languages in which this restriction does not hold: e.g. Turkish, in which unaccusative predicates, including passivized verbs, can be passivized. See Spencer 1991 for brief discussion.

6 This explains in part the alternative term used for unaccusative predicates, 'ergative'. However, this is a rather misleading term, since ergative patterning would lead one to expect objects to pattern with all intransitive subjects. The more appropriate alternative to 'ergative' would therefore be 'inactive', though as far as we know, no one has ever made this terminological proposal.

7 The reader should bear in mind that this conclusion is meant to follow for English passives and English middles. Constructions which are called 'passive' or especially 'middle' in other languages, e.g. French (Levin and Rappaport Hovav, MORPHOLOGY AND LEXICAL SEMANTICS), may well

have different properties from the ones described here (French middles can be eventive, for instance). In addition, many factors govern whether a semantic argument is accessible to syntactic processes, so absence of an implicit argument cannot be taken as criterial for a morpholexical valency-reducing operation.

8 We haven't investigated the full set of properties of the Bantu passive and stative constructions. Given the level of disagreement over the status of Germanic middles in the recent syntactic literature, a detailed cross-linguistic study of that sort on Bantu might be rather timely.

9 A terminological warning: Mchombo uses the term 'morpholexical', but does not explicitly make our terminological distinction between 'morpholexical' and 'morphosyntactic'.

10 Alsina (1992), to whom the approach here offers a certain debt, provides a detailed analysis of causatives in Chichewa along similar lines, except that for him the arg. 1 position is an argument of the causative itself. It is a matter of considerable debate whether the 'real' argument of causation is a patient ('causee') and an event, or just an event, or whether these represent direct and indirect causation respectively. The matter is tangential to our main concerns here.

11 In some languages of the Japanese type, it is *only* arg. 1 which can be the antecedent of a reflexive in a causative. Japanese allows arg. 0 to serve as antecedent, because its reflexive allows 'long-distance' binding, by the subject of a higher clause.