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3

On The Complex Nature Of Simple Predicators

KEN HALE AND JAY KEYSER

1 Introduction[1]

In the conception of argument structure which we have been exploring during the past several years (e.g., in Hale and Keyser, 1991, 1992, 1993), a certain degree of complexity is inherent in all verbal predicators. No ordinary verbal lexical item, for example, consists solely of a head and the associated category V. There is always more to a verb. In particular, besides being identified with a concrete morphophonological form and a meaning (or "dictionary" definition), each verb projects a structure defining the syntactic relations (complement, specifier) in which its internal arguments are licensed. And, although this is surely a matter for debate, it is

[1]We are very grateful to Alex Alsina, Joan Bresnan, and others who were involved in convening the Stanford Workshop on Complex Predicates for having the workshop and for inviting us to present this work before an excellent audience of linguists, and we are especially appreciative of our comentator, Paul Kiparsky. This paper owes an incalculable debt to the writings of, among other linguists, Baker (1988), Grimshaw (e.g., 1990), Gruber (1965, 1976), Jackendoff (e.g., 1983, 1990), Kayne (1984), Larson (1988), Levin and Rappaport (e.g., 1992, among other writings), and Walinska de Hackbeil (1986, 1989). While we did not make specific reference to these writers at every point where it would have been appropriate to do so, we nonetheless made use of their ideas throughout. They are, of course, exempt from any blame for mistakes we have made in our own attempts to understand the nature of argument structure. We should point out, however, that one of the aspects of this work which we think is most likely to have merit—i.e., the idea that denominal verb formation, and argument structure itself, are constrained by principles of syntax—was articulated in the work of Walinska de Hackbeil at least a year before that notion began to take form in our own work. Accordingly, that author should be first in line for praise or blame in relation to this aspect of the research program under discussion here.

questionable whether there exist verbs which lack an internal argument. Thus any verbal predicator, to that extent at least, is complex.

The purposes of this paper are (a) to bring together a number of the observations of which we have made use in our attempts to understand the nature of argument structure, with particular attention to constraints on the variety which they can exhibit, (b) to present an informal and tentative theory of the constraints on argument structure, and finally (c) to outline some of the empirical problems with our approach.

2 Some Restrictions on Argument Structure

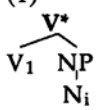
Research on the part of a number of linguists has revealed certain rather striking facts concerning the fundamental nature of the argument structures determined by individual lexical items. For example, work on thematic relations (theme, agent, etc.) reveals that the number of distinct "theta roles" is extremely limited, in the range of half a dozen (cf. Gruber, 1965, 1976; Grimshaw 1990). Moreover, these roles are "assigned" in a determined fashion (cf. Grimshaw 1990; Baker 1988), resulting in the circumstance that the relation between thematic roles and the syntactic structures projected from the lexicon are fixed across structures and across languages. Finally, the syntactic structures projected from lexical items define unambiguous relations between category types (head, intermediate, and maximal projections) and arguments (complements, specifiers), resulting in limits on branching (to binary, cf. Larson 1988; Kayne 1984, 1993), and on depth of projection (to at most two levels). If these observations are correct, or nearly so, then argument structures are greatly limited, and the theory of grammar must reflect this limitation.

We have assumed that the constraints on argument structure derive from the simplicity of the elements involved in syntactic projections from the lexicon. In essence, just two linguistic systems are at work here—namely, (a) the lexical categories N, V, A, P, and (b) syntactic projection of category and relations. The first of these is limited by the elementary nature of the lexical categories themselves, determining the syntactic relations (complement, specifier) which they implicate, and the second is limited by the principle of unambiguous projection, akin to Kayne's principle of unambiguous paths (Kayne, 1984), restricting branching and depth of projection to binary. Finally, each projected argument structure is subject to the principle of full interpretation (cf. Chomsky, 1986). Altogether, we conjecture, this simple conjunction of elements accounts for the basic observations. Thematic relations are few because they reduce to the elementary lexical syntactic relations of complement and specifier, and these are restricted in relation to the lexical categories—e.g., only V and P take complements, and only P and A, projecting predicates, license specifiers. And argument structures are limited in their complexity by inherent restrictions on depth of projection and by the limits on recursion

due, in part, to limits on the use of the specifier relation (cf. Hale and Keyser, 1991, 1993).

The empirical support for the conception of argument structure just outlined comes in large part from the study of denominal and de-adjectival verb formation which, we maintain, involves the use of incorporation, i.e., the head-movement variant of the general transformational process Move-Alpha (cf., Baker, 1988). In particular, we have examined in this connection the following classes of verbs: unergatives (e.g., *laugh, sneeze, dance*, etc.), location verbs (e.g., *shelve, corral, box*), locatum verbs (e.g., *saddle, blindfold, bandage*), and inchoatives (e.g., *clear, narrow, lengthen*). By hypothesis, these all involve incorporation, and their formation is therefore governed by syntactic principles. It is this fact which gives us a probe into the limitations on possible argument structures. Unergative verbs involve the structure in (1) below:

(1)



Incorporation of N_i into V_1 (deriving, for example, the verb dance, where N_i is the noun *dance*) is in accordance with the Head-Movement Constraint (Travis, 1984), or equivalently, the Empty Category Principle (Baker, 1988), requiring X^0 to properly govern any head which incorporates into it. If a noun N is external to V*, as would be the case where N heads the subject, then a derivation incorporating that noun into the head of V* is impossible. The derivations represented by (2a, b) illustrate this, since incorporation of the external (subject) argument into V_1 violates the essential government requirement:

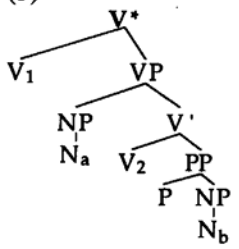
(2) (a) *It cowed a calf.
(cf. A cow had a calf/calved.)
(b) *It dusted the horses blind.
(cf. Dust made the horses blind/blinded the horses.)

In general, this class of verbs is non-existent, for reasons which are clear, given the syntactic constraints on denominal verb formation. We are assuming, of course, that if subject incorporation were in fact possible, there would be some predictable syntactic adjustment. If the clause remained "transitive" a pleonastic or expletive subject (as assumed above) would be required in English. Alternatively, as Alec Marantz and others have pointed out to us, if incorporation of the subject derived an intransitive verb (in conformity with Burzio's Generalization (Burzio, 1981)), the underlying object would presumably undergo the usual Case-motivated

raising to subject position, giving **A calf cowed*, corresponding to (2a), and **The horses dusted blind*, for (2b).

Location and locatum verbs share the structure depicted in (3) below. Thus, for example, *corral* (as in *we corralled our horses*) is putatively derived by incorporating N_b (i.e., *corral*) first into P, then into V_2, and finally into V_1[2], each step conforming to the conditions on head movement. With AP in place of PP, the same system of relations is found in the argument structure representation of de-adjectival verbs like *clear* (as in *he cleared the screen*), derived by moving A, from AP, first into V_2, and then into V_1, again in conformity with the Head Movement Constraint.

(3)



But certain derivations involving this structure are ruled out by the syntactic principles which constrain incorporation:

(4) (a) *We corralled the horses in.
(cf., We put the horses in a corral.)
(b) *She saddled her horse with.
(cf., She provided her horse with a saddle.)

(5) (a) *They wined into the bottles.
(cf., He got wine into the bottles.)
(b) *They housed a coat of paint.
(cf., They gave the house a coat of paint.)
(c) *I speared straight.
(cf., I got the spear straight, i.e., straightened it.)

(6) (a) *We bottled the wine got.
(cf., We got the wine into bottles.)

[2]If incorporation involves adjunction, then, of course, the structure incorporating into V_2 is [pP N], and the structure incorporating into V_1 is [$_V$V[pP N]], though the latter operation may in fact involve substitution rather than adjunction, in which case V_1 is replaced by the complex head. The head-adjunct order of elements shown here is not to be taken seriously—it is simply a notational carry-over from the English head-complement order—and it is in fact more likely that the ordering internal to words derived by incorporation conforms to the general principle according to which adjunction structures are head-final (cf., Williams, 1981, and Kayne, 1993).

(b) *I thinned the soup got.
(cf., I got the soup thin, i.e., thinned it.)

While alternative explanations for the ill-formedness of these sentences exist, it is clear that they are excluded by virtue of simple and well-known syntactic principles. Thus (4a, b) are excluded by the Head Movement Constraint, since V_2 does not govern N_b, by virtue of the intervening PP projected by the intervening head P. By contrast, in well-formed derivations, as in *saddle* of *she saddled her horse*, the constraint is satisfied at each step. Thus, N_b adjoins first to its immediate governing head P; the resulting complex adjoins to its governing head V, and so on.

The government relation which is relevant in defining the ill-formedness of (4a, b) is that which holds between a governing head (e.g., V_1 in (3) above) and the head of its complement, i.e., the head of its immediate sister in the syntactic representation of argument structure (e.g., N_a). Let us refer to this as "strict canonical government". If this is indeed the relation which is operative in the Head Movement Constraint and therefore required for successful incorporation, the derived verbs appearing in (5a-c) are also in violation of this general principle of grammar. In this case, incorporation takes place from the position of N_a in (3). Descriptively, this is incorporation from an "internal subject", and this is evidently impossible in defining legitimate lexical argument structures. We will assume simply that (5a-c) are to be explained in terms of the Head Movement Constraint, inasmuch as N_a is not strict-canonically governed by V_1, its host in the derived structure (cf., Baker and Hale, 1990, for some discussion of relevant issues and cases).

The derivations exemplified by (6a, b) are clear violations of the Head Movement Constraint. In each case, the movement "skips" an intervening governor, i.e., V_2. In this circumstance, of course, the latter would necessarily be overt, as here, where it appears as the common English inchoative verb *get* (as in *the wine got into the bottles*, and in *the soup got thin*). In (6b), of course, the initial movement is out of AP, rather than out of PP.

It is evident from an examination of denominal verbs that argument structures are limited, not only by the principle of unambiguous projection and by the syntactic principles which constrain incorporation, but also by the Principle of Full Interpretation. In particular, no uninterpreted, or "superfluous", projections may appear in a well-formed argument structure. This, we maintain, explains the ill-formedness of (7):

(7) (a) *The clown laughed the child.
(cf. The clown got the child to laugh.)
(b) *The hay sneezed the colt.
(cf. The hay made the colt sneeze.)

This is impossible in English, and, we assume, in all languages which have a system of denominal verb formation of the English type, because unergative verbs, like *laugh* do not permit an argument in the Spec position of the verbal projection. And this is so because the complement, being a nominal, and therefore not a predicate, does not require and cannot have a subject. Thus, *the child* in (7a) and *the colt* in (7b) cannot be interpreted. By contrast, the structures underlying location and locatum verbs, in which the innermost complement is a PP, a predicate by nature, require, and therefore must have, a subject, by the same Principle of Full Interpretation which excludes (7a, b).

3 Argument Structure

Our preoccupation with denominal and de-adjectival verbs, as we have said, comes from our assumption that they have something to tell us about the general representation of verbs in the lexicon. Observed limitations on the possible variety among denominal and de-adjectival verbs make sense, we contend, in a theory which takes the lexical representations of verbs (and other categories as well) to be syntactic. In this conception of the matter, lexical representations, in their grammatical aspect, consist of structural configurations expressing fundamental grammatical relations (head, complement, specifier) in conformity with the basic principles of the projeccaptured in the english. m the lexical categories. Our interest here is not solely in derived verbs, of course. We use these English verbs primarily to give us evidence of the syntactic nature of lexical representations, that is to say, of the nature of argument structures.[3] It is argument structure itself that we wish to understand, and we are taking the perhaps dangerous step of supposing that argument structure is to be identified with the syntactic structures which we believe to be central in the representations of the grammatical properties of lexical items.

If the foregoing can be accepted, at least for the sake of discussion, then we have at hand the actual argument structure representations of certain classes of English verbs.

[3]Evidence of this sort can come from a variety of sources, of course; we restrict ourselves to English denominals and de-adjectivals only for convenience. The basic strategy we employ is that of examining the limits on the derivations of lexical verbs (and other categories), and our belief is that these are understandable in the syntactic hypothesis. A rich source of supportive evidence—not used here but well exploited in other works (e.g., Baker, 1988; Grimshaw, 1990; Hoffman, 1991)—is to be found in morphologically overt derivational processes including compounding and overt incorporation. To be sure, however, overt derivational morphology—overt causative or applied morphology, for example—has properties which must be satisfied in sentential syntax. Non-overt elements, e.g., V_1 of (3) are inherently bereft of properties (apart from mere category), resulting in clear limits on their use, in contrast to overt morphology (cf. Hale and Keyser, 1993).

Unergative verbs, by hypothesis, have the argument structure depicted in (1)—all simple unergatives have this argument structure, not merely those which are in some sense *obviously* derived by incorporation. This structure includes, as an integral part, a "lexical constant"—to wit, the substructure NP-over-N, the complement of V_1 and the source (by incorporation) of the nominal component of the surface denominal verb. But (8) below is fundamentally the same as (1), differing only in the fact that its complement is a "lexical variable", rather than a constant:

(8) $\begin{array}{c} V^* \\ \widehat{V\ NP} \end{array}$

The lexical variable, represented in informal notation (here and elsewhere) as NP without substructure, defines the grammatical relation (in this case, complement of V) born by the phrase which is inserted for that function in sentential syntax, by insertion of the appropriate extended projection (cf. Grimshaw, 1991). We assume in general that argument terms in the lexical representations of verbs are either constants, as in (1), or variables as in (8). The latter is the argument structure of a large number of English verbs of creation, including, among many others, the verbs of (9):

(9) (a) make trouble
(b) create a scene
(c) write a poem
(d) build a house
(e) have pups

It is the verb itself which is the lexical constant here, in the sense that it is that element which is assigned a specific overt morphophonological representation; in denominal verbs like *laugh, sneeze, calve,* and so on, it is the nominal complement which has this distinction, the verb being empty and thus forcing incorporation.

We have explicitly assigned the variable in (8) to the nominal category, to reflect the fact that verbs of the class represented in (9) all take complements belonging to the category DP (an extended projection of the N) in sentential syntax. Thus, we can say that the verbs of this class "select" NP complements (realized as DP in sentential syntax). This may be redundant, in the final analysis (cf. Pesetsky, 1982). However, we will continue to employ a notation which suggests that the category membership of complements (and specifiers) is stipulated in the lexical representations of argument structures.[4]

[4]This is the question of the status of so-called c-selection. Within lexical argument structures, we suppose, there is no significant contrast between s-selection and c-selection. Thus, a V

The configuration set out in (3) above is the argument structure representation shared by members of the two types of denominal verbs called location (e.g., *shelve*) and locatum (e.g., *saddle*)—these differ, we maintain, just in the nature of the preposition which heads the PP complement of V_2. In the argument structure of location verbs, the abstract P is of the category "terminal coincidence" (cf. Hale, 1986). Its complement corresponds to the "goal" in the conventional terminology of thematic roles; this is generally the end-point in a change of location (though "source", or beginning-point, is not excluded, in theory). The specifier, or inner subject, whose appearance is forced by the the predication requirements of PP (and by Full Interpretation) corresponds to the so-called "theme" (cf., Gruber, 1965, 1976), representing the entity which undergoes the change. By contrast, the abstract P of locatum verbs is the preposition of "central coincidence". Generally, the thematic relations involved here are essentially those of "possession", whether concrete or abstract, permanent or temporary; the complement of P corresponds to the entity "possessed", while the specifier, or inner subject, corresponds to the "possessor". The P of central coincidence has a "negative" counterpart, as in forms like *skin the rabbit, peel the orange*. With locatum verbs, no less than with location verbs, change is involved—specifically, change in "possession".[5] Thus, to say *saddle the horse* is to say something roughly like "cause the horse to come to have a saddle (on it)", just as to say *shelve the book* is to say approximately "cause the book to come to be on a shelf".[6]

combines with a NP complement, and that determines the elementary semantics of the projected phrase; and so on for other combinations. In this domain, the two kinds of "selection" are aspects of a single general combinatory process inherent in the projection of the syntactic configurations of lexical argument structure.

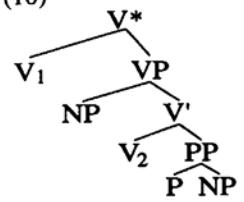
[5]We place "possession" in quotes because it is not precisely the term needed here—rather, the relation is something like "close (temporary or enduring) association or contact". It is the relation sometimes appropriately expressed by the preposition *with* in English. It includes not only the relation which holds between the horse and a saddle in *saddle the horse*, in the reduced relative *the horse with a saddle (on it)*, and *fit the horse with a saddle*, but also that which holds, for example, between the fish and a net in *net the fish*, or between the kangaroo and a spear in *spear the kangaroo*, and between the "theme" and the "goal", or "recipient", in a double object construction, as in *give the child a toy*. A somewhat more "abstract" instantiation of this relation will be discussed in a later section.

[6]We sometimes use the terminology of thematic roles simply in order to refer, informally, to the semantics associated with the syntactic configurations identified with the argument structures of lexical items. In our view, thematic roles are not a part of the basic vocabulary of the theory of argument structure. Were they indeed a part of that vocabulary, we would be hard put to argue one way or the other about the proper association of the "theme" role in the argument structures of locatum verbs—it makes perfect sense to say of either the horse or the saddle in *saddle a horse* that it is the theme. The same is true, we would argue, of the direct and indirect objects of *give* and other double object constructions, which we assume to share the same structure. To be sure, there is a time-honored traditional view in the latter case.

Lexical entries for location and locatum verbs, like those for unergatives, have a nominal lexical constant. This element is the innermost head in the structure, represented by N_b in (3) above. The remaining heads in the entry are empty, as usual in English derived verbs of this type, forcing incorporation. The specifier of V_2 is generally a lexical variable, hence just NP, contrary to what is literally depicted in (3)—a constant is possible there, however, as *the piper*, in the idiomatic *pay the piper (his due)*, but it must remain unincorporated, for reasons already mentioned.

Many verbs have fundamentally the same argument structure as that shared by location and locatum verbs, with the simple difference that the lexical constant is a verbal head, rather than the head of a nominal or adjectival complement. These verbs, we assume, employ the argument structure in (10) below, in which NP represents a lexical variable (realized as DP in sentential syntax).

(10)



Through incorporation, the verbal heads, V_1 and V_2, form a chain corresponding to the overt verbal lexical constant (*put, send*, etc.) seen in the location and locatum expressions cited in (11) and (12) respectively:

(11) (a) put the books on the shelf
(b) send the letter to her brother
(c) donate money to the resistance

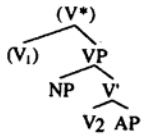
(12) (a) fit the horse with a saddle
(b) send her brother a letter
(c) supply the resistance with money

As (11b) and (12b) suggest, we assume that the the relation between the to-dative and the double object construction consists in the choice of preposition. The central coincidence preposition of the double object construction is generally non-overt in English, though a few verbs of the language do select an overt preposition, typically *with*, for this function (and many languages use an oblique case here; see, e.g., Dixon, 1971, for Dyirbal; and see Bittner, 1993, for Inuit).

English de-adjectival verbs, like *clear, narrow, redden, fatten*, etc., share the verbal portion of the argument structure presented in (3) above,

differing from the latter in that the complement of V_2 is an adjectival lexical constant of the form AP-over-A. The governing verb, being empty (or sometimes suffixal, *-en*), forces incorporation. De-adjectival verbs, unlike denominals, may project either a transitive structure (with V_1 present) or an intransitive structure (with V_1 absent). We will return to this contrast at a later point. As might be expected of this structure, it is possible for the verb (or verbal chain) to function as the lexical constant, with the adjectival complement (AP) a variable:

(13)



By hypothesis, (13) represents the structures projected by the verbs of the following transitive and intransitive sentences:

(14) (a) The dye turned the cloth red.
(b) The cloth turned red.

(15) (a) The work got me tired.
(b) I got tired.

It is also, arguably, the argument structure associated with the verbs of a large number of other resultative constructions, like transitive *wipe the table clean, hammer the metal flat, freeze the pond solid,* and intransitive *freeze solid, come clean, go sour.*

The argument structures depicted in (8), (10), and (13), and their counterparts with nominal or adjectival constants, are employed in an impressive number of verbal items in the English lexicon. However, the variety represented here is not very great, and it is natural to ask how much more variety there is in the lexicon of English. Are there English verbs whose argument structures are not somehow accommodated by the structures already given. We cannot begin to answer this question now, as it is precisely the focus of our ongoing research.[7] However, we suspect that

[7]On the face of it, of course, the question can be answered in the negative, as we have not concerned ourselves here with verbs which appear specifically to select functional categories such as CP, a matter which needs to be examined further (cf. Grimshaw, 1979, and Pesetsky, 1982); nor have we attempted to accommodate constructions in which a noun is said to take a complement, something we suspect is impossible where "noun" is understood as the category symbolized N in the elementary alphabet of categories relevant to the theory we are exploring here. We also avoid any discussion as yet of stative verbs, a category which we suspect

the variety of argument structures available in English (and languages generally) is very limited and, in the final analysis, does not exceed by very much that which has been observed here. The reason for this has to do with the fundamental nature of the elements involved and with the effect of certain general principles.

The elements of argument structure are essentially of two kinds: (i) *grammatical relations*, which determine the configurational properties of argument structure syntax, and (ii) *categories*, which determine the relations projected. These are defined informally in (16) and (17) below:

(16) Grammatical Relations:
(a) Complement—unique XP sister of a Y° head.
(b) Specifier—XP subject of a predicate YP.
(c) Predication—holds under mutual m-command.

(17) Categories:
(a) V—takes a complement XP and forms a (dynamic) event expression.
(b) P—takes a complement XP and forms a predicate.
(c) A—is a predicate.
(d) N—is an entity expression.

Some of the consequences of the interaction of these elements with general principles have been discussed in section 1 above. As suggested there, certain processes and relations are forced. Thus, for example, predication is conditioned by Full Interpretion—a predicate must have a subject, and a subject (specifier) must have a predicate. Consequently, VP may have a specifier only if its complement is a predicate (PP, or AP). This is an interesting situation, if true, since it limits VP-recursion in lexical entries, a desirable effect, since recursion is indeed limited.

But this flies in the face of the traditional view of the VP as the prototypical "predicate", which it surely is in sentential syntax. It does not seem to be a predicate in the syntax of argument structure. It is likely that the predicative function of VP in sentential syntax is due to its combination there with functional categories, I(nfl). Thus, it is not surprising that the category VP cannot appear, without I(nfl), in certain so-called "small clause" constructions, where AP can appear:

(18) (a) *I consider her [VP speak Spanish well].
(cf. I consider her to speak Spanish well.)
(b) I consider her brilliant.

involves verbal "realization" or "spelling" of basic prepositions or adjectives, *have*, for example, being a verbal realization of the preposition of central coincidence.

In this, verbs are like nouns, in that they can appear as predicates only in combination with the appropriate functional category. Constructions like *let him speak, make him speak, hear him speak*, i.e., the classical "causative construction", are apparent, and possibly very real, counterexamples to what is suggested here. However, the fact that there is an interclausal tense-dependency in the causative construction might encourage the view that the complement in these cases, despite appearances, is tensed.

We bank on the idea that VP is not a lexical predicate, as this has interesting consequences which seem to point in the right direction. But this could be wrong, of course, like any of the claims implied in (16) and (17). Thus, for example, while we remain non-committal with respect to the question of whether members of the category A take complements (if they do, it is an option), we suspect that the category N cannot—another claim which may be wrong. If N cannot take complements, then that fact alone accounts for the fact that the verb *anger* cannot take complements:

(19) (a) *The article angered me at Dole.
(b) The article angered me.

This pattern would follow if the verb *anger* had the argument structure embodied in (3), with a nominal lexical constant (appearing as the complement of the abstract P). But this view of the matter must confront the fact that there is in fact a noun *anger* which can actually take complements in sentential syntax, as in *my anger at Dole*.[8] Here we must assume that what appears to be the "basic" noun is instead a derived noun—this is a nominalization, we propose, of the adjectival construction *(I am) angry at Dole*. We assume the same is true for constructions involving *annoy(ance), amuse(ment), bore(dom)*, and the like.

There are many empirical problems with our approach, in addition to the issue just mentioned. Problems, we think, are to be welcomed—as long as they eventually go away, of course. We cannot discuss all of the problems inherent in this impoverished model of argument structure, but we will devote the rest of this paper to some of the problems we are currently thinking about.

Before leaving this section, however, we would like to remark briefly on the "abstractness" of our lexical representations. Consider the verbs of creation in (9) above, in comparison to the standard denominal location and locatum verbs like *shelve* and *saddle*. The former present the surface VO-profile of a traditional transitive verb—and it "makes sense" that they should have the simple transitive argument structure depicted in (8). Location and locatum verbs present the same surface syntactic profile, VO,

[8]Pesetsky (1992) proposes an elegant account of this phenomenon within a different, though conceptually congenial, framework. Our framework imposes on us an analysis which appears, at the moment, to be rather inelegant.

but we assign them a radically different lexical argument structure, to wit (3) above. In this sense, our analysis is abstract. In another important sense, however, it is highly concrete. First, as we have attempted to show (here and elsewhere), the structures we have assigned make it possible to explain why certain form-meaning pairs cannot exist (e.g., a hypothetical transitive verb *bush* appearing in such phrases as *bush a trim* or *bush some fertilizer* in the sense of "give a bush a trim", "give a bush some fertilizer", a gap in the vocabulary of English which we say is principled, not accidental). Second, there is additional empirical evidence indicating that the proposed structural differences are real. In this instance, the distinctive characteristic of location and locatum verbs, namely, their internal predication, correlates with the ability of these verbs to appear in the so-called "middle" construction—e.g., *these volumes shelve easily*, and *this horse saddles easily*, beside the questionable ?**that kind of trouble makes easily*, from a verb of production, or ?**planets see easily*, from a verb of perception. The internal predication, with its subject, supplies the surface object which counts as the "affected argument" believed to be required for a fully well-formed middle in English (cf. Anderson, 1977).

4 Cognate Object Constructions[9]

It is natural to ask what the incorporation theory of denominal verb formation has to say about such sentences as the following:

(20) (a) He danced a lively dance.
(b) He danced a jig.
(c) She shelved her books on the top shelf.
(d) She shelved her books on the windowsill.
(e) I saddled my horse with a western saddle.
(f) I saddled my horse with a McClellan.

The issue, of course, is the appearance of an overt complement to a verb which is, by hypothesis, derived by incorporation from a complement—the position from which incorporation takes place should be occupied by a trace, not by an overt nominal, contrary to what is clearly seen in (20).

Our approach to this problem is based on a recognition that the denominal verbs we are considering have what must be seen as "lexical" properties, properties which are additional to those which can be attributed to the purely syntactic derivations responsible for their observed form and

[9]Tanya Reinhart points out that we are using the term "cognate object" rather loosely here, since we include verbs which, like *dance*, merely "classify" the complement (as a dance, in this case) as well as the true cognate object verbs, like *laugh*, whose overt complement, if present, is necessarily headed by a "copy" of the putative incorporated noun (as in *laugh a cruel laugh*).

argument structures. Thus, for example, the verb *shelve* cannot be said to mean simply "to put on a shelf". In the use exemplified in a sentence like *he shelved the book,* in this simple form, the verb normally entails "he put the book on a shelf", but there is more to the verb than this. So, for example, *he shelved the sand* says more than "he put the sand on a shelf". The sand must not be loose; rather, it must be contained in some fashion that permits it to be handled in a way normally thought of properly as "shelving". Thus, in addition to the "literal" meaning implied by the structural relations embodied in the lexical entry we have proposed, there is an additional increment of meaning which we might refer to as "adverbial" or "classificatory". Whatever else it means, *to shelve* means "to put something (on a shelf or shelf-like place) in a 'shelving' manner". And, in fact, the adverbial or classificatory component is at least as stable as the "nominal" component implied by the noun *shelf,* as is evident from such sentences as (20d)—here, use of the verb *shelve* requires at most that the object of the preposition be thought of as a kind of shelf, i.e., that it be "classifiable" as a shelf.

Though we cannot say how it is that a denominal verb acquires its "adverbial" increment, the phenomenon is a regular and well-known aspect of lexicalization. Be this as it may, we will assume that this dual aspect of the meanings of denominal verbs is crucial to the understanding of sentences like those in (20). Our suggestion is this. Each denominal verb has an adverbial component and a "referential" component. The referential component is represented by the chain defined by head movement. As usual, a (non-trivial) chain involves coindexed links. Let us assume that the derivation of the verb *to shelve*, or of any such verb, regularly involves incorporation as we have suggested. And let us assume also, that it is possible to delete the index from the chain defined by incorporation. This, we propose, essentially eliminates, or at least subordinates, the referential increment of the verb, leaving the adverbial increment as predominant. Syntactically, all vestiges of the chain are removed, leaving, in place of the original noun, a syntactic variable representing the argument, to be realised through lexical insertion in the formation of d-structure.[10]

By way of example, consider the comparison of (21a) with (21b):

(21) (a) She shelved the book.
(b) She shelved the book on the top shelf.

[10]Joan Bresnan points out correctly that if index-deletion entails trace-deletion, unwanted derivations, like those in (22), will be permitted—unless the Head Movement Constraint is a constraint on derivations, of course, rather than a special case of the ECP, as assumed. Alternatively, index-deletion may leave some sort of empty category, subject to the ECP, but also a lexical variable in the sense of section 2. We do not know how to decide this issue.

The derivation of (21a) proceeds in the manner already described. The noun *shelf* corresponds to N_b in (3), and it moves in accordance with the Head Movement Constraint to the matrix verb V_1. The chain which results remains intact, appropriately indexed. The empty heads are empty in syntax and at PF, so the derived verb appears as the simple transitive *shelve*, taking any appropriate NP (or more accurately DP) complement by lexical insertion (e.g., *that book, those volumes, the fat report*, and so on). We assume that the nominal *shelf* retains its index and is coindexed with the original trace in the prepositional phrase. Thus, the referential character of the nominal is still present, so that (21a) tends to refer primarily to the putting of a book onto something properly called, or serving as, a shelf.

By contrast, we contend, the nominal component in (21b) has entirely lost its referential character. Here we know that a shelf is involved only because of the noun *shelf* appearing in the PP. The sentence is as fully grammatical with *windowsill, desk, mantle*, or *sawhorse* in place of *shelf.* What is uppermost here is the particular kind of putting, a fact which emerges if the direct object is modified. Essentially, the entity denoted by the direct object must be in a condition which will permit it to adopt a particular stance (typically upright) in its destined location. If one *shelves a box of books*, for example, the box is unpacked and the books are *shelved* (on a shelf, or a windowsill) individually, at least in our speech. It is at best a joke to call it "shelving the books" when an unopened box of books is placed on a shelf, windowsill, or the like. But if one *shelves boxes of books*, the boxes may remain unopened; it is the boxes, not the books, that are being shelved. Likewise, to *shelve the salt* is appropriate in describing the situation in which the salt is in individual boxes, not in its loose state. And so on.

If the verb of (21b) is derived by means of incorporation, as is the verb in (21a), then we must assume that our proposed index-deletion process has applied, effectively removing the referential connection between the incorporated nominal and its original position, corresponding to N_b in (3). Syntactically, this results in the circumstance that the syntactic heads involved in the original Head Movement chain (i.e., positions V_1, V_2, P, and N_b in (3)) no longer represent a chain, since the traces are effectively gone, due to index-deletion. Rather the matrix verb corresponds to the overt denominal verb (*shelve*, in this case, corresponding presumably to the the "verb" of the construction, i.e., to the pair V_1 and V_2), and the other points in the erstwhile chain are represented by the lexical categories alone, free to be overtly realized through lexical insertion, thus accounting for the ability of an incorporated nominal to cooccur with an overt argument appearing in what would seem to be the position of the trace of the incorporated element.

Semantically, the effect of incorporation and index-deletion is to eliminate the referential increment of the incorporated nominal, leaving an adverbial or classificatory increment (e.g., in the case of *shelve*, the idea of

"putting some shelvable entity in a place which is shelf-like"). The acquisition of this increment is, admittedly, totally mysterious to us at this point, but it is nonetheless real and it is a consistent characteristic of denominal verbs.

We began this section with examples which belong to the category of cognate objects, loosely speaking, and while the example we have chosen to illustrate our analysis has been a location verb, not necessarily involving a "cognate argument" at all, we are assuming that we have in fact presented an analysis of the cognate argument constructions. The more familiar construction, represented by such examples as *dance a (fine) dance*, and so on, are examples of the same putative process of index deletion. Thus, deletion of the index from the chain formed by incorporation in the derivation of, say, *dance*, would have an effect precisely analogous to that seen in the derivation of *shelve* in (21b). Syntactically, the argument position would be free to be realized by any NP (i.e., DP), through lexical insertion. And semantically, the verb would continue to refer to the activity of dancing—so, for example, (20b) would mean "she *did a jig* in the dancing manner (rather than on the fiddle, whistle or pipes)".

This view of cognate argument constructions is supported to some extent by the fact that it correctly restricts them to disallow such verbs as those appearing in (22) below:

(22) (a) *She saddled a western saddle on the mare.
(Cf. She saddled the mare with a western saddle.)
(b) *We corralled the colts get in the milk pen.
(Cf. The colts got in the milk pen.
We corralled/got the colts in the milk pen.)

By hypothesis, the starred sentences here are ill-formed for the same reason that (5) and (6) are ill-formed. On the assumption that cognate argument constructions involve incorporation, (22a) violates the principle which prevents incorporation of N_a into V_1 in (3) above (see relevant discussion in the neighboring text). And (22b), assuming incorporation, violates the Head Movement Constraint, since the lower verb is "skipped" in the process of forming the chain.

5 Asymmetries in Dative and Double-object Constructions

Our analysis of dative and double object constructions owes its essential form to the work of Larson (1988), although we have assumed that the two constructions cannot, in Larsonian fashion, be related by means of the passive transformation. We have had to assume this because of a prior assumption of ours to the effect that the passive involves the functional projection Infl (cf. Baker, Johnson, and Roberts, 1989), an element which cannot be "sandwiched" between lexical category heads as a result of

incorporation (cf. Li, 1990). Our prior assumption, that the passive crucially involves the functional category I(nfl), may be incorrect, and current work by Bittner (1993) strongly suggests this. However, we will continue to entertain this possibly mistaken conception of the dative and double object constructions and will persist in our view that the two are not related transformationally. Our position is that both constructions utilize the system of syntactic relations expressed in (10) above, the difference between them being the choice of preposition (cf. section 2):

(23) (a) Mary sent a book to her sister.
(b) Mary sent her sister a book.

In (23a), the dative preposition *to* is used, expressing the relation in which some entity (e.g., *a book*) moves (figuratively or physically) to an end point or recipient (e.g., *her sister*). In English at least, this preposition is regularly overt and cannot act as a conduit for successive cyclic incorporation. Hence, the structure underlying (23a) cannot give rise to a derivation in which the recipient is ultimately incorporated into V_1 of (3)—such a derivation is effectively eliminated for (5b), and its like, for example. Sentence (23b) has the same abstract structure (10), but the preposition which appears there is the possessive (or central coincidence) preposition, expressing the relation in which some entity (e.g., *her sister*) comes to "have" or to "be with" another entity (e.g., *a book*). This preposition is normally non-overt in English sentences of the type represented by (23b), and it must therefore incorporate. The locatum verbs of the preceding section (e.g., *saddle*) are built on this structure, and in the "cognate argument" construction discussed there, the preposition appears overtly as *with*, as in (20e-f).

Our analysis of this construction fails, on the face of it, to account for the following asymmetries (cf., Oehrle 1976):

(24) (a) Mary sent off a book to her sister.
(b) *Mary sent off her sister a book.
(c) Mary resent a book to her sister.
(d) *Mary resent her sister a book.

The key to this might conceivably be found in the idea, explored and developed in Keyser and Roeper (1992), according to which verbs project a (unique) clitic position in sentential syntax, above and beyond the lexical argument structure which determines their basic projection of syntactic structure along the lines sketched in the foregoing sections. Verbal particles, like *off* in (24a, b), and certain prefixes, like *re-* of (24c, d) are thought to occupy the clitic position, which is unique and can be filled once and once only—thus, the ill-formedness of *resend off the book*.

Within the framework of the present discussion, it is expected that the explanation of the asymmetries in (24) will be related somehow to the nature of the preposition in (10), since that is the sole difference between the two constructions. The double object construction is the only circumstance in which we posit a non-overt head (to wit, the P of central coincidence), which does not come to host an adjunct through incorporation. It seems reasonable, if it indeed exists, that this empty category will have special, perhaps extraordinary, properties. It might itself assume the clitic position, blocking the cliticization of *off* and *re-*, accounting straightforwardly for (24b) and (24d).

Though we will not go into the matter in any detail, the clitic theory of Keyser and Roeper is probably not implicated in the extraction asymmetry which has been noticed often in the literature on double object constructions (cf. Oehrle 1976; Hudson, 1992; Larson, 1988), namely the contrast between wh-extraction and NP-movement:

(25) (a) What did she send her sister *t* ?
(b) ?*Who did she send *t* a book?
(c) Her sister was sent *t* a book.
(d) ?*A book was sent her sister *t*.

Judgments vary greatly in regard to the forms marked as degraded. The data are included for future reference, as a diagnostic for the double object construction itself. The pair (25c, d) is probably a simple matter of sentential syntax—(25c) involves Case-motivated movement, and (25d) a violation of the Case Filter. The contrast represented by (25a, b), has been explained in a variety of ways (see the references cited above).

6 An Entailment Problem

Ultimately, a restrictive theory of argument structure, such as that outlined above (and in Hale and Keyser, 1991, 1992, 1993), must deal with the argument structures of *all* verbs, not just the "easy cases" so far considered. As we move beyond the relatively "safe" ground of unergative verbs, location and locatum verbs, and standard double object verbs, problems are in fact impressively legion. Problems are useful, as they tell us that our framework is restrictive and does not simply "account for anything that comes along". We assume that the theory is essentially correct and that it is safe to set problems aside temporarily, in the belief that they will eventually be solved. On the other hand, we can easily come to grief with an overly restrictive theory by failing to account for legitimate and true counterexamples. Ultimately, all problems have to be confronted.

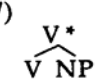
In this section we will present one example of what we take to be a real problem for our approach, a problem in the sense that it could force us to

increase the range of relations which the structural projections defined by lexical items can express. We would consider this to be a serious loss.

We will begin with a verb class whose members still belong to the "easy" category, namely, verbs of production of the sort appearing in (26):

(26) (a) He is baking bread.
(b) She is carving a toy.
(c) They are digging a hole.
(d) She is writing a novel.

These verbs, we assume, represent the simple projection depicted in (27), in which a verb (e.g., *bake*) takes a nominal argument (e.g., *bread*) directly:

(27)


The fundamental semantic relation associated with this configuration is that according to which an event (the elemental semantic notion associated with the category V) implicates an entity (corresponding to the category N). At d-structure, V* is predicated of a subject, interpreted as "agent", constructionally, and the whole is interpreted as an event of "production" or "creation", according to which the entity denoted by the subject "makes" or "produces" the entity denoted by the object, as in:

(28) (a) He is making bread.
(b) She is making a toy.
(c) They are making a hole.
(d) She is producing a novel.

The verbs of (28), while they are overt, correspond rather closely to the elemental abstract verb of unergatives. That is to say, their semantic content is close to the primitive relation in which an event implicates an entity—they are similar in nature to the verb of so-called "light verb" constructions (cf. Grimshaw and Mester, 1988; Kearns, 1988), and, in fact, *make* is one of the light verbs of English. But the verbs of (26) are, in an obvious sense, richer. They are verbs of creation or production, to be sure, but an additional element of meaning is present—thus (26a) means "he is making bread by the method called 'baking'," or some such thing; similar observations hold for the other verbs of (26).

We believe that this extra adverbial increment in these verbs is not itself problematic. For our purposes here, it is sufficient to treat them as integral parts of the lexical entries, having no effect on the syntactic projections of category and argument structure. Our problem is independent of the

difference between the verbs of (26) and (28); it involves a construction in which the root-related homonyms (cf. Higginbotham, 1989) of both these types occur, namely, the benefactive construction exemplified in (29):

(29) (a) He is making a pie for his brother.
(b) He is baking a cake for his daughter.
(c) He is making his brother a pie.
(d) He is baking his daughter a cake.

The question is this. What structure is assigned to the benefactive constructions represented here? One obvious candidate, of course, is (10), with the verb overt (e.g., *make, bake*), and with P realized either as *for*, in the "*for*-dative" construction of (29a-b), or as the non-overt preposition of central coincidence, in the double object construction of (29c-d). This would, at least, be consistent with the extraction judgments of (30), paralleling those of (25):

(30) (a) What did you make/bake me *t*?
(b) ?*Who did you make/bake *t* a cake?
(c) I was made/baked *t* a cake.
(d) ?*A cake was made/baked me *t*?

Similarly, with the introduction of clitics, the benefactives of (31) yield judgments paralleling those for (24), in our speech, at least:

(31) (a) We cooked up a stew for everyone.
(b) *We cooked up everyone a stew.
(c) We recooked a stew for everyone.
(d) *We recooked everyone a stew.

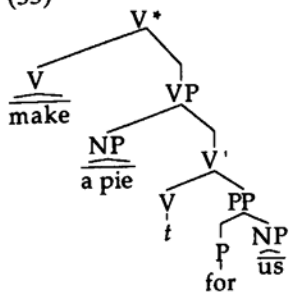
If the judgments recorded in (24, 25) and in (30, 31) reflect true syntactic parallels, then we have some reason to believe that benefactives share the same basic syntactic structure as *send* and other verbs of that type—i.e., (10), assuming that the syntactic structures projected by verbs of the *send*-type are themselves instances of (10).

The structural parallel is also suggested by the fact that the two types behave the same in relation to so-called "heavy NP shift" (as noted, for example, in Hudson, 1992; and see Larson, 1988, for an analysis of this):

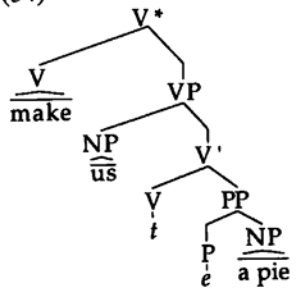
(32) (a) She sent to her sister [an interesting book about A. C. Creole].
(b) *She sent a book [her sister who lives in Bluefields].
(c) He made for his daughter [an enormous tamale pie].
(d) *He made a tamale pie [his favorite aunt from Hermosillo].

However, if we assume that the benefactives have the syntactic structure represented in (10), a semantic problem arises. Suppose that the structures of *he made a pie for us* and *he made us a pie* are as depicted in (33) and (34), respectively:

(33)

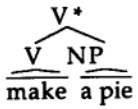


(34)



In neither of these does there appear the structure corresponding to *make a pie*:

(35)

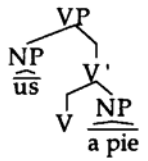


Thus, the structures we are supposing for the benefactive fail to express the semantic relation of entailment which is said to hold between the proposition embodied in *he made us a pie* and the simple proposition *he made a pie*, or between the latter and *he made a pie for us*.[11]

At present, we do not know how to solve this problem within our framework, except to put the entailment issue outside the domain of syntax, strictly speaking, and to appeal to the interpretive component in the hopes that relevant entailments will, in some principled manner, be "read off" the syntactic structures. But, of course, if this apportionment leads to unwanted enrichment of the interpretive component, there is no gain.

A possibility which we must entertain, clearly, is that our approach is entirely wrong and that our conception of argument structure must be abandoned, in part at least. A promising venture in this direction is the recent dissertation of Branchadell (1992), in which the beneficiary, in Romance constructions most nearly parallel to (29c-d), is assigned to the Specifier position within the simple structure exemplified in (35). In this view of the construction, the nominal arguments of *make us a pie* are related as follows:

(36)



The Specifier NP *us* receives its interpretation, as "beneficiary," constructionally as a function of its structural relation to V'. This is not a structure which our framework allows, since for us, a Specifier can only appear if the complement is a predicate—(36), therefore, violates our principle of Full Interpretation. Thus, we would have to add to our system Branchadell's constructional rule of interpretation (or Theta-Role assignment) in order to satisfy that principle. While this is an option we might seriously entertain, in order to account for the entailed *make a pie*, it is not given to us freely—the constructional interpretation would amount to a stipulation for otherwise illicit structures of the type represented by (36).

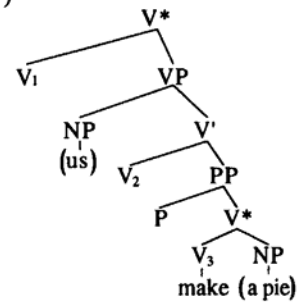
For the present, we have refrained from adopting an analysis of the sort just mentioned, as we cannot as yet see how it is constrained. For example, we cannot see how to avoid projecting structures of the type which underlie

[11]In his recent and very interesting study of the Romance benefactive, and other dative constructions, Branchadell (1992) continues the tradition according to which syntactic expression of this entailment relation is a fundamental requirement of a theory of their grammatical structures.

ill-formed causatives like (5) above. And, in general, we are not sure that the framework which admits structures of the type represented by (36) can meet the criterion of "natural projection", i.e., the principle according to which the lexical projection of categories and relations proceeds naturally, and without ambiguity, from the essential properties of the elements involved.

Another approach to the entailment problem proceeds from the recognition that VPs like *make us a pie* are, in a rather clear sense, combinations of the lexical relational structures corresponding to (34) and (35)—i.e., combinations of a verb of production and a verb of giving. Hoffman (1991) has developed an analysis of the Bantu applicative which builds this idea directly into syntactic structures having the essential character of the restricted syntax of lexical argument structures. Modifying certain details, we adapt her proposal to the English benefactive, assigning to the verb of *make us a pie* the following argument structure:

(37)



We assume that P in (37) is the preposition of central coincidence and, further, in the absence of evidence to the contrary, that this preposition can take a verbal complement. The latter expresses the entailment missing from (34) above and it does not seem unreasonable to suppose that the "benefactive" relation holds, semantically speaking, between the PP predicate and its subject, NP in Spec of VP, giving a meaning to the whole V* clumsily paraphrasable as something like *benefit us with the production of a pie* or perhaps *bring it about that we benefit from the production of a pie*. The empty heads in the structure are of course licensed by raising of V_3, first to P, then successively to V_2 and V_1.

There are elements of danger here. We are opening the door a bit for verb phrase recursion, unwanted in a restrictive theory of argument structure. Correctly, the embedded verb phrase here lacks a specifier, hence the notation V* rather than VP. It is evident that such verb phrases must be "further interpreted"—the action, or process, embodied in the event denoted by the verb must be attributed to some entity, to a "subject" as it were. In this case, the understood subject is the same external argument as that of

which the larger V* is attributed. Thus, in *Frank made us a pie* both *make us a pie* and *make a pie* are "predicated" of *Frank*, the first by the conventional sentential syntactic predication relation, the second by some other, presumably natural, grammatical principle.[12] The danger, of course, is that the hoped-for principle does not in fact exist and that no limits of the use of verb phrase recursion can be determined. We do not think that the danger is great however, and we strongly suspect that principles from another sphere, semantics, will force an appropriately narrow range of interpretations on structures of the type represented by (37). These putative semantic principles are probably also implicated in the interpretation of sentences like *Ruth supports Mary* and *Ruth gave Mary support*, in which *support* is understood as *support by Ruth, Ruth's support*, or the like.

7 A Lexical Asymmetry in Transitivity Alternations

In earlier studies on the syntactic nature of argument structure (Hale and Keyser, 1991, 1993), we considered it to be problematic for our conception of lexical entries that transitivity is differentially arrayed among derived verbs of the type represented in the sentences of (38) and (39):

(38) (a) The screen cleared.
(b) We cleared the screen.

(39) (a) *The books shelved.
(b) We shelved the books.

In general, de-adjectival verbs (like *clear*) participate in the so-called "ergative" transitivity alternation (cf. Burzio, 1981; Keyser and Roeper, 1984). For our purposes, it is sufficient to note that verbs of this type have both transitive and intransitive forms. By contrast, denominal "location" and "locatum" verbs (like *shelve* and *saddle*) do not participate in this alternation, having only the transitive form.

In the works mentioned, we considered two distinct approaches to this problem, each problematic. In the present essay, the problem will be reconsidered with a view to determining the proper explanation for the asymmetry noted. In the course of the discussion, a third approach will also be considered.

We begin with a brief review of an account (cf., Hale and Keyser, 1993) which assimilates the difference between (38) and (39) to that observed in (40) and (41):

[12]Collins (1993) develops a Binding Theory account of this second "predication" relation. The assumes that VP always has the specifier position,where the specifier is non-overt it is *pro*, bound by an appropriate antecedent.

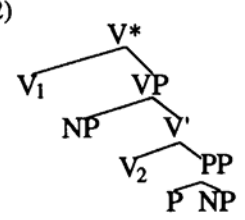
(40) (a) We splashed mud on the wall.
(b) Mud splashed on the wall.

(41) (a) We smeared mud on the wall.
(b) *Mud smeared on the wall.

Like the de-adjectival verbs of (38), verbs of the class represented by *splash* (e.g., *drip, pour,* etc.) participate in the ergative alternation, with the object of the transitive variant corresponding to the subject of the intransitive. By contrast, verbs of the class represented by *smear* (e.g., *daub, paint*, etc.) have only the transitive form, like the denominal verb in (39), and others of its type (e.g., *box, corral, saddle, clothe*).

Our explanation of the *splash/smear* asymmetry rests on the assumption that the verbs which head the corresponding projections differ in a particular way, having to do not with the syntactic relations into which they enter but rather with some aspect of their semantic *content*. We assume that the transitive variants of these two classes have the same structure:

(42)



The points in this structure which are relevant to the problem at hand are V_1 and V_2, since they demarcate two distinct domains in the configuration. These distinct structural domains, it seems to us, correspond to the distinct behaviors of the two classes, in a manner which can be described informally as follows. In *splash mud on the wall, drip honey on the sidewalk, spill crayons on the floor,* etc., the verb, in addition to its basic relational function (expressed in the V-complement configuration dominated by V'), carries an additional component of a "classificatory" nature (cf., section 3 above). To say that that mud splashed on the wall, for example, is to say not only that mud got on the wall but also that it got on the wall in a particular manner—specifically, in a "splashing" configuration appropriate to liquid, or liquid-like, substances. This classificatory component is related to the *inner* subject, i.e., the Spec of V_2—*mud*, in the case at hand. Thus, it seems to us, the relevant component here, let us call it the SPLASH classifier, is a *part* of the lower verb, V_2. Fully parallel comments are appropriate to the verbs *drip, spill,* and others of the *splash*-type. Thus, the DRIP and SPILL

classifiers are associated with V_2 in *drip honey* and *spill crayons*, respectively.[13]

Now consider the second class of verbs, i.e., the class represented by *smear, daub,* etc. Here again, it is clear that the verb has "content" above and beyond its lexical category V. This content includes at least a classificatory component, we think (e.g., some things can be smeared on a surface, others cannot, and so on). But there is evidently something else involved as well. As in the case of the class represented by *splash*, the classificatory component is associated with the *inner* projection, i.e., that defined by V_2, and accordingly, it is an internal argument (Spec of that projection, ultimately the s-syntactic direct object) which is associated with this classifier (thus, for example, *mud* is an appropriate object for *smear*, just as it is for *splash).*[14] In both classes, we suppose, the classificatory component is a property of the lower verb. This verb is consistently "contentful" in these classes. But what of the upper verb? It is there that the crucial difference is to be found, we contend. In the *smear* class, but not necessarily in the *splash* class, there is an additional component having to do with the *manner* or *means* in which the action or process is accomplished.

This second component is in the nature of an adverb—a manner adverb, specifically—modifying the action attributed to the external argument. Thus *to smear mud on the wall* is not merely *to get mud, a "smearable" substance, on the wall*; it is, rather, to do so with a certain kind of action, motion, or gesture, and that aspect of the event as a whole is attributed to the entity which carries out the action—i.e., to the entity represented by the *external* argument, the subject. We maintain, therefore, that this adverbial function it is a property of V_1, the upper V. And it is because of this that the *smear*-class verbs are necessarily transitive.[15] The underlying principle here, of course, is that a verb which is not entirely abstract—i.e., is not simply a head of category V, with no other content—cannot delete, or, perhaps more accurately, cannot be omitted from the lexical item.

[13]We liken the classificatory components of these English verbs to the corresponding features of the renowned classificatory verb stems of, among other languages, Navajo and Cherokee (cf. Hale, 1989, for an attempt to assimilate this to the framework which we are exploring in this and related papers on the syntax of argument structure). And see Young and Morgan, 1987, for a full account of Navajo classificatory verb stems.

[14]In general, we suspect, the classificatory element is associated with the verb which projects the structure in which the "innermost" direct argument appears, typically the inner Specifier (i.e., the traditional "theme"), but also the complement of verbs of creation (e.g., *mold a pot, carve a whistle, build a house, make a saddle, project a syntactic structure,* and so on). The fact that Navajo, and other languages, have classificatory verb stems for instrumentals is interesting in this connection, and certainly relevant to the basic syntactic representation of instrumentals (cf. the discussions on Baker, 1988).

[15]This is not to say that *smear*, and others, do not have intransitive variants (cf., *the lipstick smeared*). We are referring just to verbs corresponding to the projection depicted in (3)—i.e., to "location" and "locatum" verbs.

In (42) above, where this represents a verb of the *splash*-class, V_1 is entirely abstract, serving merely as a syntactic position, to which some lower head can in principle raise. It may therefore be omitted, accounting straightforwardly for the intransitive (or unaccusative) variant of its class. This upper verb may not be omitted, of course, if it acquires content through head movement, as in raising of V_2 in forming the transitive variant, which requires an external argument, as usual for "causative" predicates. In the *smear*-class, on the other hand, V_1 is not abstract and, accordingly, may not be omitted—members of this class are therefore consistently transitive.

We will assume for present purposes that this account is the correct one for the two classes of verbs just considered.[16] The question is, can this be extended to the contrast between (38) and (39)? We repeat these here as (43) and (44):

(43) (a) The screen cleared.
(b) We cleared the screen.

(44) (a) *The books shelved.
(b) We shelved the books.

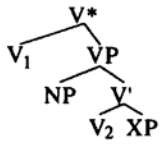
A natural extension of our *splash* vs. *smear* analysis to the *clear* vs. *shelve* paradigm virtually suggests itself. De-adjectival verbs like *clear* are like *splash* in that their upper verb, V_1, is entirely abstract and, therefore, omissible. And denominal verbs like *shelve* and *saddle* are like *smear* in that thie upper verb has "adverbial" content, above and beyond its category, or part of speech—it cannot delete, therefore, and the verb is necessarily transitive.

[16]We must mention that this leaves a number of observations unaccounted for—as pointed out to us by Tova Rapoport. For example, we cannot account for the fact that the "theme" argument in verbs of the *splash*-class are systematically "liquids", while those of the *smear*-class are typically substances of "thicker" constituency. This corresponds, of course, to the classificatory distinction proposed, but why should it be the case that verbs having to do with such "thicker" substances getting onto some surface consistently be transitive? To be sure, *paint* can *splash* onto a wall, or be *smeared* onto a wall, but why can't it simply *smear* onto a wall? The answer, presumably, is that *smear* has the suggested adverbial component associated with its upper verb, V_1, but why is this generally associated with "thicker" substances? To what aspect of the general study of language does this question properly belong?

There is also a problem which cross-cuts the classification suggested here. Some, but not all of the transitive variants enter into the *with*-construction, as in *smear the wall with mud, splash the wall with mud,* but not *drip the cornbread with honey*. The problem here almost certainly has to do with our failure properly to classify the verbs.

While it is successful in some sense, this analysis is a failure in an important respect. Specifically, it fails to express the evident correlation between transitivity and the categorial provenance of the verb—if the verb is denominal, it is necessarily transitive; if it is de-adjectival, it participates in the transitivity alternation. If (45) below is the argument structure shared by both types, the correlation may be formulated in terms of the nature of XP—the complement of V_2 . Where that is a PP, the verb which results from incorporation is denominal and necessarily transitive. Where the complement of V_2 is AP, the derived verb is de-adjectival, participating freely in the transitivity alternation.

(45)



The question is, why should this be so? How does V_1 acquire "content" by long-distance association, so to speak, with XP? Or, to put the question another way, why should V_1 necessarily "have content" in one of the structures but not in the other. In short, an analysis along these lines fails to explain why the content of XP in (45) matters in determining the transitivity of the derived verb.

We would like now to attack the problem directly, by exploring the possibility that the solution to the problem has to do not with the nature of V_1 but rather with the nature of XP.

Let us begin with the de-adjectival case, as illustrated in (43). These are, in a sense, the easiest to deal with. We are assuming that the category A is inherently a predicate. If this is so, then it is by definition a head dominated by the maximal projection of its category; in particular, there is no "process" by which an adjective "forms" a predicate by combining with a complement. An adjective simply *is* a predicate, lexically. Thus, if XP is AP, it must find a subject in an appropriate position. This is provided by the V-projection within which AP is a complement. In accordance with the principle of Full Interpretation, that V-projection may, and in fact must, present a specifier to function as "internal" subject. Since the relational and predication requirements of that V-projection are met at the maximal projection of the head V, the intransitive (43a) is automatically available. The transitive (43b) involves use of a matrix abstract verb in the canonical "causative" configuration represented by (45); the abstract verb acquires "content" in the usual way, by means of Head Movement—this, in general, is the source of the transitive variants of verbs participating in the transitivity alternation exemplified by (43).

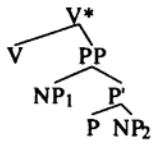
The account just given of de-adjectival verbs is fully consistent with the view that their basic argument structure representations are as depicted in (45), with XP equivalent to AP, the singular projection of the inherently predicational category A. If (45) also underlies location and location verbs of the general class represented by (44)—with XP equivalent to PP, and other things being equal—the behavior of this class of verbs is completely mysterious. The structure should allow the intransitive alternant. It is natural to suspect, then, that there is, in fact, a structural difference between the two classes. According to the line of reasoning we have been following in this work, if there is a structural difference, it is the necessary consequence of some aspect of the essential nature of the elements involved.

Let us suppose that the observed syntactic classification exemplified by (43) and (44) stems from the categorial difference in the complement of V_2, for this is an obvious point of contrast between the two classes. We have just given a characterization of the category A and we have proposed that the behavior of de-adjectivals derives from the inherent nature of the category. Now we have argued several times that the prepositional category P is likewise predicational—so what is the essential difference? The difference, we believe, lies in the fact that adjectives are predicates *inherently*, that is their fundamental character as lexical items. By definition, they are complete projections and must appear in syntactic structures which will permit them, through predication, to meet the general requirement of Full Interpretation.

Prepositions, on the other hand, have the category-inherent syntactic property that they *form* predicates. They are not themselves predicates. Thus, P takes a complement, NP, and forms a phrase—P', let us say. This phrase is a predicate and must satisfy Full Interpretation, as usual. Now we have tacitly assumed, following Williams, 1980, that predicates are maximal projections. Let us depart from that now and assume that any *phrase* which is a predicate semantically can and must take a subject. We can interpret this suggestion to mean that it is possible, and in fact necessary, for predication to be completed by Spec and X' of a category X, where X° forms a predicate phrase X' by combining with its complement YP. This is a circumstance met in argument structure representations by prepositions alone; it is the distinctive property of the category P.

On the view just considered, the structure of location and locatum verbs is as follows:

(46)



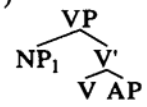
Informally, we can imagine that the PP-dominated structure "grows" in the following way. The preposition P combines with NP_2 to form a predicate phrase P' which must "get" a subject immediately, so to speak. This forces the appearance in Spec position of NP_1. Predication is now complete, assuming, as we now do, that P' is a predicate. By contrast, adjectives are "fully grown" predicates inherently, and they must therefore "get" their subjects externally to their own projections. In the structures we are considering the adjective appears as the complement of a V, and its predicational requirements, accordingly, force the V to present a Spec position.

This gives us a structural difference between de-adjectival and preposition-based verbs, but we have yet to determine how this might explain the contrast between (43) and (44). We understand how it comes about that de-adjectival verbs have both transitive and intransitive alternants (see above). But how come the preposition-based denominal verbs have only the transitive variant?

This is the question we started with. Its answer, we think, is this: since the predication requirements of P are necessarily met within its own projection, the matrix verbal projection V* is itself "complete", in the way any well-formed transitive argument structure is. Its subject is therefore external, and consequently assigned in sentential syntax, receiving its interpretation (viz "agent", or the like) as a function of the predication relation holding between it and V*. This is the canonical transitive configuration, with the agentive subject external (e.g., in Spec of the appropriate functional projection) and NP_1 as surface s-syntactic object, exactly as in the case of the internal subject of the transitive variants of de-adjectival verbs (as in (43b)).

This is our second "story" for the transitivity asymmetry in (43-44). We suspect that this one is closer to the correct explanation than the earlier one is, but we cannot claim yet that the issue is satisfactorily closed. There is an additional problem which must be addressed, and here we do not have a convincing story. Consider the structure associated with the *intransitive* variant of de-adjectival verbs:

(47)



In sentential-syntax, NP_1 "raises" to the specifier position of the appropriate functional projection (ultimately I(nfl)). This is the paradigmatic case of subject-raising out of VP (cf., Kuroda, 1988; Fukui and Speas, 1986; Koopman and Sportiche, 1988). For us, of course, it is limited to verbs which have internal subjects forced by predication (i.e., de-adjectival, location, and locatum verbs); all other subjects so far considered are external—the contrast between internal and external subjects correlates roughly with the difference between the traditional roles "theme" and "agent", respectively, as we have noted in earlier sections.

Now consider again structure (46), which we have associated with location and locatum verbs. Why is it that NP_1 there cannot raise to the specifier of an appropriate functional category and, from that position, satisfy the predication requirements of V*? This would give an intransitive variant, parallel in basic conception to the raising variant of *get* in such sentences as *the books got on the shelf*. This possibility must be blocked for denominal verbs of the type represented by *shelve, saddle*, and the like. In descriptive terms, the process of head movement enforces a kind of "lexical integrity"—when a verb is formed by incorporation (of N into P, and P into V), its basic transitivity is thereupon fixed. It is presented to sentential syntax as a transitive if it canonically governs an NP there, as is the case for (45) or (46); and it is an intransitive otherwise, as in the case of (47). The "lexical" transitivity of the former can be altered in s-syntax, of course, but only through the agency of special mechanisms such as passivization or middle-formation (or other detransitivizing processes).

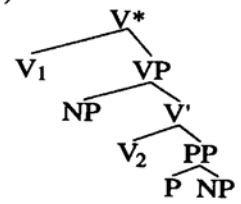
Although this account requires a departure from uniformity of predication, according to which all predicates are X-bar projections to the same level, presumably the maximal projection, it is, in a certain sense, more natural by virtue of the fact that it is driven by a principle of *immediacy*, akin, perhaps, to the principles of economy which determine the manner in which movement rules apply in complex syntactic structures (cf., Chomsky, 1992). The immediacy principle at issue here determines the point at which predication applies. In general, predication applies as soon as there exists a configuration in which it *can* apply. Thus, in the case of a P-projection, it applies as soon as there is a projection which contains both a predicate and a subject, a condition which is met within the PP itself. In the case of an A-projection, since A is inherently a complete predicate, its subject will not appear *within* AP but rather in the immediately

superordinate VP—the latter, of course, will be forced to present a specifier by the same general principle of immediacy.[17]

A third approach makes reference to the phenomenon of *case*. In general, we have assumed, case is not a feature of argument structure representations. Insofar as it is associated with agreement, case is a matter having to do with the system of functional projections, rather than with lexical projections alone. But it may be incorrect to relegate case entirely to the functional categories. Suppose, for example, that the so-called *inherent* case associated with prepositions (P) is a true elementary property of this lexical category. The property might well play a role in determining the syntactic behavior of lexical items whose derivation involves the category P—items like *shelve* and *saddle*, which are at issue in this discussion. Here again, we would have a tangible syntactic difference between preposition-based and adjective-based derived verbs. And we also have an opportunity to restore the predication symmetry inherent in our initial analysis of de-adjectival verbs and location/locatum verbs—that is to say, we can assume that the two classes share the LRS representation depicted in (45) above, with XP = AP for the first, XP = PP for the second.

The analysis would be as follows. Let the structure of a verb like *shelve* or *saddle* be as in (42), repeated here as (48):

(48)



While the preposition is non-overt, it nonetheless possesses inherent case, by hypothesis. The case requirements of the NP complement of P are satisfied, or in some way mitigated, through N-incorporation, let us assume. On the other hand, P must assign its inherent case, a requirement which cannot be satisfied by its own complement. Therefore, P (with incorporated N, of course) must raise to a position where it can assign case to an NP

[17]Note that this will not force all VP (or, equivalently, projections notated V*) to have a specifier. A verb will project a specifier *only* if its complement qualifies as a predicate. This obtrudes the issue of whether a VP can itself be a predicate in argument structure representation—it cannot, in our view (see Hale and Keyser, 1991), but this is by no means settled, and the classical contrast between "non-agentive" *water ran into the field* and "agentive" *the farmer ran into the field*, if this is in fact a grammatical matter, suggests a treatment according to which the agentive variant has an inner VP predicate predicated of the external agent through a form of "control", parallel in conception to the binding relation found in *the farmer (running) got himself into the field* (cf., section 5 above; and see also Collins, 1993, for a relevant control analysis of serial constructions).

argument. Thus the structure in which it appears must present this opportunity—(48) does this, under two assumptions, (i) that incorporation into V_2 and V_1 does not block the case assigning potential of P, and (ii) that, V_1 is a position which appropriately governs, for purposes of case assignment, the NP in Spec of VP. On this view of the matter, P-based denominal verbs, i.e., location and locatum verbs, will necessarily be transitive, to satisfy the case-requirements of P. De-adjectival verbs, on the other hand, will not necessarily be transitive, since adjectives do not assign case.

This account has the desirable feature that it attributes the transitivity asymmetry to a fundamental property of an established lexical category, while retaining a uniform structure for the predication relation. But it has one very dubious feature as well—namely, the idea that P retains its particular case-marking capacity when N is incorporated into it and, further, that it would be able to assign its inherent case to the "internal subject", i.e., in an essentially ECM configuration. So far as we know, neither a verb nor an adposition continues to assign the case it would otherwise assign to its complement when it hosts the incorporated the head of the latter, and inherent case is normally not assigned in the ECM configuration.[18]

Let us explore the possibility that P can no longer assign its inherent case after N is incorporated into it. This will eliminate the explanation just given for the necessary transitivity of P-based denominal verbs. It is, however, consistent with the fact that the few P-based derived verbs hosting "visibly" incorporated prepositions always, so far as we know, involve prepositions which can stand alone as predicates (their assumed function when used as so-called "particles"):

(49) (a) They downed the plane.
(cf., They brought the plane down.)
(b) They upped the price of butter.
(cf., They put the price of butter up.)

If these are basically "intransitive" in nature, it is surely not their inherent case that is being assigned to the internal subject (i.e., to *the plane* and *the price of butter* in (49)), rather, structural case is being assigned by the verb itself. This suggests that structural case is being assigned by the derived verb in (44b) as well, in which case the foundation of this third explanation collapses.

[18]While a verb may "remain (morphologically) transitive" after incorporation in some languages (e.g., members of the Tanoan family), it cannot then assign its case to a new argument, under ECM or any other condition.

However, case may well be involved in the eventual explanation of another general problem in the grammar of English derived verbs, namely the impossibility of verbs of the type illustrated in (50):

(50) (a) *The books onned the shelf. (= got on)
(b) *They onned the books the shelf.
(c) *The calves inned the milk-pen. (= got in)
(d) *They inned the calves the milk-pen.

Structural case, in our framework, is a matter of s(ential)-syntax—i.e., the representation at which lexical items are in construction with the functional projections. Forms like (50b) and (50d) probably involve a violation of the Case Filter. But forms like (50a) and (50c) cannot be explained so easily, since the derived verbs there should be able to assign structural case to their s-syntactic objects.[19] And verbs whose lexical representations are fundamentally the same in structure as those of (50a,c) exist in English and are perfectly able to assign case to their superficial objects:

(51) (a) The calves entered the milk-pen.
(b) The crowd exited/left the theater.

We will terminate this discussion with a suggestion. Suppose assignment of inherent case is required at d-structure and, further, that it is assigned only in the basic head-complement configuration, where the head in question is *overt*. And suppose also that English overt prepositions (*in, on, at,* etc.) assign inherent case. Under these assumptions, incorporation of an overt preposition would be impossible, accounting for (50). Verbs of the type represented in (49) are allowed, of course, since these do not assign inherent case.

8 A Closing Comment

This paper is part of a project whose purpose is to determine the extent to which the possible predicate argument structures are a function of the elementary properties of the linguistic elements which are *necessarily* involved in defining them—i.e., the lexical categories and the fundamental relations of complementation and predication. The categories project syntactic structures in accordance with their nature, e.g., some take complements, and some don't, and some project predicates, others don't,

[19]In languages with productive P-incorporation (see Baker, 1988 for discussion) the problem represented by (69) does not arise—in accordance with Baker's transparency principle, verbs with incorporated adpositions assign case to DP in the domain of the trace of the incorporated element (see also Craig and Hale, 1989).

and so on. Complementation and predication are unique; a subject has just one predicate, and vice versa; a head takes just one complement, and a complement is locally governed by just one head. This constrains argument structure in a manner which resembles, to a large extent, at least, what is actually found in the lexical resources of actual languages.

But there are problems, as we have noticed. The system is, it would seem, too restrictive to account fully for certain complex argument structures—the benefactive, might be a case of a structure not accommodated by the system. We hesitate, nonetheless, to relax anything at this point, in the hopes that solutions will be found within the restrictive system which grows out of the nature of the elements.

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