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On the Problems with Lexical Rule Accounts of Argument Structure

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0. Abstract

It has recently been suggested that the different valence possibilities of a single verb stem can be accounted for by postulating lexical rules that operate on the semantic structure of verbs, producing different verb senses. Syntactic expression is then taken to be predicted by general linking rules that map semantic structure onto syntactic form (Alsina and Mchombo 1990, Bresnan and Moshi 1989, Levin 1985, Pinker 1989, Rappaport, Laughren, and Levin 1987). In this paper, general problems with such approaches are discussed, including the following: a) such theories require a large number of both distinct verb senses and lexical rules, b) *ad hoc* and often implausible verb senses are required, c) an unwarranted asymmetry between different argument structures is posited, and d) many generalizations are obscured.

An alternative is suggested that involves considering the various valences as templates or constructions that are paired with semantics independently of the verbs that may occur with them. For example, abstract semantics such as "X causes Y to receive Z," "X causes Y to become Z" etc. are associated directly with the skeletal syntactic ditransitive and resultative constructions, respectively, allowing the verbal predicates to be associated with richer frame-semantic representations.

1. Introduction

There is a widespread assumption in current linguistic theories that syntax is a projection of lexical requirements. This claim is explicit in The Projection Principle (GB), the Completeness and Coherence Principles (LFG), and in all current "linking theories" which attempt to predict overt syntax from semantic role or theta role arrays. In all of these cases, it is the *verb* which is taken to be of central importance. That is, it is assumed that the verb determines how many and which kind of complements will cooccur with it. In this way, the verb is analogized to the predicate of formal logic which has an inherent number of distinct arguments. The verb is taken to be an *n*-place relation waiting for the exactly correct type and number of arguments.

At the same time, it is also recognized that the same verb stem often occurs with more than one valence. These two factors that 1) syntax is taken to be a projection of lexical, and in particular, verbal requirements, and that 2) the syntactic valence associated with particular verbs is not uniquely determined, have recently led many theorists to postulate lexical rules which are designed to operate on the semantic structures of lexical items. The overt complement structure is then to be predicted by general linking rules that map semantic structure onto syntactic form (cf. Alsina and Mchombo 1990, Bresnan and Moshi 1989, Levin 1985, Pinker 1989, Rappaport, Laughren, and Levin 1987).

By postulating rules that operate on semantic structure as opposed to rules or transformations that are purely syntactic, these theories manage to incorporate important insights. First, different valence expressions are typically accompanied by slightly different semantic interpretations and secondly, alternations are commonly constrained in semantic ways (cf. Pinker 1989 for review and discussion).

In this paper, however, I argue that semantic changing lexical rules are subject to many general criticisms, despite the fact that their semantic basis is well-motivated. An alternative is suggested which attempts to incorporate the semantic insights while avoiding many of the problems associated with postulating rules that change the inherent semantics of the main verb. The alternative involves considering the various valences as templates or constructions that are paired with semantics independently of the verbs that may occur with them. For example, abstract semantic representations such as "X causes Y to receive Z," "X causes Y to become Z" can be associated directly with the skeletal syntactic ditransitive and resultative constructions, respectively, allowing the verbal predicates to be associated with richer frame-semantic representations. This approach is currently being developed as part of the theory of Construction Grammar (Fillmore, Kay and O'Connor 1988, Fillmore 1987, Kay 1990, Lakoff 1987). Aspects of this type of approach have been recently suggested by Jackendoff 1990 and Wierzbicka 1988 as well.

2. Problems with (Semantic) Lexical Rule Approaches

There are many problems with lexical rule accounts. First, although such accounts only appeal to pair-wise alternations, it should be recognized that the number of distinct argument structures that can be used with a verb stem is typically greater than two. For example, an ordinary verb such as *kick* can appear with at least eight distinct argument structures:

1. Joe kicked the wall.
2. The horse kicks.
3. Joe kicked the football into the stadium.
4. Joe kicked at the football.
5. Joe kicked Bob black and blue.
6. Joe kicked his foot against the chair.
7. Joe kicked Bob the football.
8. Joe kicked his way out of the operating room.

To relate these valences, seven lexical rules would be required, to allow for eight distinct senses of *kick*. It is clear that this approach leads to a proliferation of both verb senses and lexical rules.

Moreover, despite claims that the linking rules mapping arguments to grammatical functions or to syntactic

positions are general and language independent, the proposed rules are commonly quite construction-specific; i.e. they are often not general across construction types even within a single language. For example, in English the *theme* argument (*the ball(s)* in each of the following) is mapped to subject in intransitive unaccusative expressions, e.g. *The ball dropped*, to direct object in simple transitive expressions, e.g. *Joe dropped the ball*, to the second object position in ditransitives: *Joe threw Mary the ball*, and to an oblique complement in *She loaded the cart with balls*.

2.1. The Problem of Circularity

A fundamental problem that arises from assuming that syntax is a projection of lexical requirements, is that such an assumption often results in circular analyses. For example, the theory is forced into the position of claiming that *kick* is a binary relation, and therefore must have two and only two complements, except in *The horse kicks* in which it is unary, and therefore has one complement, and except in *Joe kicked Bob the football* in which it is ternary and therefore has three complements.

A constructional approach to argument structure allows us to avoid the circularity of arguing that a verb is an *n*-ary predicate and "therefore" has *n* complements when and only when it has *n* complements. Instead, the ternary relation for example, can be directly associated with the skeletal ditransitive construction, and we can understand that relation to be *imposed* on *kick* when *kick* occurs with that particular construction. This idea is discussed more fully below.

2.2. Sentential Effects

Another difficulty with lexical rule approaches is that it is often not possible to determine whether a given argument structure can be used on the basis of the verb alone. For example, holding the verb constant, the following a) sentences are better than the corresponding b) sentences:

- 9a. ?TV is watched.
- 9b. TV is watched an average of six hours per day.
- 10a. *She sent the countryside a package.
- 10b. She sent the Countess a package.

These effects are well known, but there is no natural way to capture these types of constraints in the lexical semantics of the main verb. On a constructional account, however, it is possible to associate constraints on the subject, direct object, or on the overall interpretation of the expression directly to the construction. Intuitively it makes sense to ascribe constraints that occur only with particular argument structures directly to those argument structures, instead of postulating new verb senses for each of the verbs and then needing to stipulate that these particular senses only occur in the particular argument structure. For example, the constraint that the first object must be animate when verbs are used with the ditransitive construction (cf. exs. 11a-b) can be understood as a constraint on the construction; it should not be taken to imply that

there is a special verb sense *send*₂ which constraints its goal to be animate. If a new verb sense were postulated, we would also have to also posit an *ad hoc* stipulation that this sense could only occur in the ditransitive valence. Notice we cannot readily claim that the ditransitive syntax is determined by general linking rules, because verbs which do *lexically* constrain their goals to be animate-- e.g., verbs such as *give* or *hand*-- retain the constraint when they are used with other valences.

2.3. Implausible Verb Senses

Another serious problem with the type of entirely bottom-up analysis of the lexical rule approach is that it encounters problems when faced with examples such as:

- 12. He sneezed the napkin off the table.
- 13. She baked him a cake.
- 14. Dan talked himself blue in the face.

In none of these cases does the verb intuitively require the direct object complement. To account for 12, for example, we would have to say that *sneeze*, a paradigm example of an intransitive verb, actually has a three-argument sense, "to laugh in such a way as to cause motion." To account for 13, we would need to claim that there exists a special sense of *bake* that has three arguments, an agent, a theme, and an intended recipient. This in effect argues that *bake* has a sense which involves something like "intend to cause to have." To account for 14, we would need to postulate a special sense of *talk*, "to talk in such a way as to effect a change in the talker."

On a constructional approach, we can understand aspects of the final interpretation involving caused motion, intended transfer, or caused result to be contributed by the respective constructions. That is, we can understand skeletal valence constructions to be capable of contributing arguments. For example, we can define the ditransitive construction to be associated directly with the semantic roles of agent, patient and recipient, and in addition associate the class of verbs of creation with the ditransitive construction. We do not need to stipulate a specific sense of *bake* unique to this construction. In general we can understand the direct objects found in the above examples to be licensed, not directly as an argument of the verb, but by the particular constructions.

2.4. Lack of Explanation

In addition to these problems, there is reason to doubt the explanatory nature of lexical rule accounts. It is well-known that there are cases which meet the structural description of a particular alternation, but which do not alternate. For example, in the case of the ditransitive, we find *donate*, *explain*, and *choose* which do not appear ditransitively; in the case of the locative alternation, we find *pour*, *drip*, and *coil* which do not occur in the *She loaded the wagon with hay* frame. Because of these cases, many theorists have sought to add constraints to the relevant structural descriptions. Attempts in this direction can be found throughout the literature. However, to date, no general constraints have been discovered which distinguish the verbs which allow certain alternations from those that do not. (see Pinker 1989 for a full discussion of

the failure to find adequate ways to constrain, in a general way, the application of particular alternations). Most theories solve this problem by positing some type of designation on either the verbs which allow the alternation or on the verbs which do not.

Complementary classes of cases are also recognized to exist. These are cases which have the "output" structure, but not the "input" structure. For example for the ditransitive, *envy*, *forgive*, *cost* appear ditransitively, but not with prepositional paraphrases. In the case of the locative, *fill*, *cover*, *inundate*, *adorn*, etc., cannot occur with directional phrases, but do occur in the *with* variant.

These two classes of cases, that the rules do not apply to all verbs with the correct structural description, and that not all expressions with the "output" structure have the same "input" structure, cast doubt on the explanatory value of the alternation account. The alternation cannot be stated as an implication in either direction. Instead, the statement of the alternation can only say: some verbs with argument structure X also have argument structure Y. This is true, but it tells us nothing about either of the argument structures or about the particular verbs; it simply describes the fact that there is some overlap between the set of verbs associated with two distinct valences.

2.5. Generalizations are Obscured

Further undermining the explanatory value of alternation accounts is the fact that they, by their nature, obscure certain generalizations. Because the rules are written with reference to one particular basic argument structure, other rules with the same output, but a different input structure are postulated as independent rules. E.g. In the case of the ditransitive, alternation accounts of the construction typically assume the existence of two distinct constructions: the "*to*-dative" and the "*for*-dative", because of the fact that two different "input" argument structures are involved. In this way the alternation accounts typically ignore the fact that *to*-datives and *for*-datives are intimately related both syntactically and semantically (for discussion, see e.g., Goldberg 1989). A related problem is that the class of expressions that share the same output argument structure, but that do not have any other relevant argument structure are often not accounted for in any systematic way. Instead, cases such as

15. He gave her an idea.

16. The music lent the party a festive air.

are said to be idiomatic, and are often ignored.

In the case of the locative alternation, similar generalizations have been overlooked. Accounts of "locative" verbs have been systematically delimited to those cases which alternate, or in some cases (e.g. Rappaport and Levin ms., Pinker 1989) to those cases which are of the same general kind as those which alternate. However, motion verbs such as: *push*, *move*, *run*, *throw*, and metaphorical cases are all excluded from analysis. (Talmy 1980 and Jackendoff 1985 are notable exceptions to this generalization in examining all types of verbs of motion as a class. However, perhaps tellingly, their discussions are not made in the framework of describing alternations).

A broader perspective of the construction as an entity in its own right leads to interesting generalizations. For example, the expressions:

17. The wind blew the ship off course.

18. She forced him into the room.

can be assimilated into an account of a construction involving caused-motion, although they are not at all relevant to the "locative" *with* variant. Similarly, we can account for the metaphorical extensions:

19. He drove her into a state of madness.

20. He forced the idea out of his mind.

which are even more removed from the *with* variant, as metaphorical extensions of the construction.

2.6. Assumptions of Asymmetry

Alternation accounts generally assume an asymmetry between the two argument structures (Pinker 1989 is an exception in allowing lexical rules to operate in both directions). In a few cases this is desired, as it may be meant to capture a difference in markedness between the two argument structures. For example, having a lexical rule which transforms an active argument structure into a passive argument structure captures the idea that the active argument structure is in some sense more basic or less marked. However, active/passive pairs represent perhaps the clearest case of an asymmetrical relation. In many other cases, the asymmetry is not warranted and often is not defended.

In the case of the ditransitive, *He gave the book to her* is usually supposed to be more basic than *He gave her the book*. (however, decisions as to which is more basic are not unanimous, see Dryer 1986 for the opposite analysis). A typical reason that is given is that the verbs which allow ditransitives are a proper subset of those that allow prepositional paraphrases. However, this is not actually so since *refuse*, and *deny* do not have paraphrases with *to* or *for*, and neither do many metaphorical expressions, for example:

21a. She gave me a headache/a kiss/an idea.

21b. *She gave a headache/a kiss/an idea to me.

Oehrle (1976), moreover, has argued that there is no principled way to distinguish those cases which have prepositional paraphrases from those that do not.

Developmental data (Gropen et al. 1989) shows that the ditransitive and prepositional paraphrases occur at roughly the same time in children's speech, neither construction reliably preceding the other, so that evidence for an asymmetry cannot be grounded in evidence from children's acquisition of the forms.

The asymmetry implicit in alternation accounts is even more difficult to defend in the case of the locative alternation. In general, the valence associated with *He loaded hay onto the wagon* is supposed to be more basic than *He loaded the wagon with hay*. However, when different verbs are examined, this asymmetry is clearly unwarranted. So, although *stack* and *plaster* all allow both argument structures, there is no intuition that the *into* variant is more basic than the *with* variant. That is, the

following appear to have equal status in terms of being basic or unmarked:

- 22a. He stacked the shelves with boxes.
- 22b. He stacked boxes onto the shelves.
- 23a. He plastered the wall with posters.
- 23b. He plastered posters onto the wall.

Moreover, *adorn, blanket, block, cover, dam, enrich, fill, dirty, litter, smother, soil, trim, endow, garnish, imbue, pave, riddle, saturate* to name a few, only occur with the *with* variant. In fact in a detailed study of locative verbs, Rappaport and Levin(ms) found that out of 142 verbs studied, only 34 alternate.

On a constructional account, we need not assume an asymmetrical relationship between two constructions that are found to be related. Instead, we can describe instances of partial-overlap of syntax, semantics, or pragmatics as such, without necessarily assuming that one or the other is basic, the other derived. So, for example we can state that the semantics associated with the ditransitive construction is related to the semantics of the paraphrase with *to*; we do not need to assume the primacy of one over the other. Likewise, we can describe the relationship between paraphrases with *to* and the caused motion construction.

3. The Interaction of Verb and Constructional Semantics

A constructional approach to argument structure allows us to avoid many of the problems discussed above. At the same time, we should not assume that all of the analysis is top-down, that constructions simply *impose* their meaning on unsuspecting verbs. In point of fact, there are reasons to think that the analysis must be *both* top-down and bottom-up. That is, the meanings of constructions and verbs can be seen to interact in non-trivial ways, and some cross reference between verbs and argument structures will be necessary.

Minimal entries for verbs will need to make reference to:

- 1) idiosyncratic facts (although typically motivated by 2) about its syntax, semantics, and use, and
- 2) frame semantic knowledge of the concept associated with the verb.

Kick's syntactic properties are not idiosyncratic, so no syntactic properties will have to be listed in this case; any idiosyncratic semantic or pragmatic properties that *kick* may have are not immediately relevant, so I will for now avoid discussion of them. The frame semantic knowledge of *kick* must include something to the effect:

kicking involves an abrupt forceful motion of the leg such that the leg is brought away from the body and then returned.

Argument structure constructions will need to refer to particular verb classes. Thus, for example, the ditransitive construction will need to make reference to verbs of ballistic motion, verbs of creation, verbs of future having, verbs of refusal, etc. (see Green 1974, Oehrle 1976, Wierzbicka 1988, Pinker 1989, and Goldberg to appear,

for discussions of such classes). The caused-motion construction will make reference to verbs of motion, verbs of directed force, verbs of manner, verbs of instrument, etc. (see Talmy 1976, Jackendoff 1985, Shibatani 1976, Pinker 1989 for discussion of such classes).

Consider again *kick*, to take a particular case. The ditransitive construction will make reference to the fact that it can occur with verbs which can cause ballistic motion. The fact that *kick* is such a verb will be inferred from its frame semantics, i.e. from the fact that it kicking can be used to cause an object to move by an abrupt motion of the leg. We do not need to claim that the semantics of *kick* undergoes any change when used ditransitively.

The fact that *kick* can be used with the caused-motion construction as in:

- 24. She kicked the ball into the end zone.

can be accounted for by the fact that the caused-motion construction will make reference to verbs of forceful directed action, and it will be inferred from the frame semantics of *kick* that it is such a verb.

The fact that *kick* can appear in the transitive construction will follow from the fact that the transitive construction will make reference to verbs of contact, and again, the fact that *kick* can be interpreted as a verb of contact will be inferred from its frame semantics.

In this way, we do not need to postulate different senses of *kick* because of its different valence possibilities. Instead we can understand the sentential interpretation to arise from a combination of verb and constructional semantics. Valence constructions will be associated with one or more abstract semantic representations, and will make reference to classes of verbs. Whether *kick* falls into the appropriate classes will be determined by general inferences made on the basis of the frame-semantic representation of *kick*. That is, the semantic representation of the verb may underdetermine argument structure expression.

A benefit to assigning the skeletal semantics sometimes described as the "syntactically relevant" aspect of verb meaning directly to argument structure constructions, is that Pinker's (1989) observation that the syntactically relevant aspects of verb meaning are like that of closed class elements is predicted since argument structure constructions *are* closed class elements.

4. Issues

The suggestion being made here brings several tricky questions to the fore. If argument structure expressions are viewed as constructions, and we wish to claim that essentially the same verb is involved in more than one argument structure expression, we need to deal with several issues. Exactly how is the verb represented if not by some direct representation of an argument structure? Another question that arises is, when and why does the same verb occur with more than one argument structure construction? And finally, if the verb does not explicitly specify the correct number and type of arguments, how then do we prevent the generation of:

25. *Joe touched Bob a cupcake.
 26. *Joe murdered.

I.e. how does this approach accomplish what was supposed to be accomplished by principles such as Projection Principle of GB or the Completeness and Coherence Principles of LFG?

However it should be made clear that these problems are not created by a constructional approach. In fact, although these issues are somewhat obscured by the mechanisms of traditional theories, they are by no means solved by those theories. For example, the question of how to capture the meaning of a verb independently of the particular argument structures in which it appears has its direct analog in more traditional accounts: the question that requires explanation is, in what way are the lexical items created by lexical rule related to each other? One non-answer to this question would be to stipulate that the meanings are not related semantically, that each is an independent lexical entry. Another uninteresting answer would be that the meaning of the verb stem is a disjunction of all of its argument structures; this would not answer the question of how the disjuncts are related to each other.

It may be suggested that the lexical rule itself explains the relationship between two argument structures. For example, in the case of the causative lexical rule, one might argue that that the relationship is captured because the semantic decomposition of an inchoative predicate is contained in the semantic decomposition of a causative predicate. That is, the predicates may be said to be related by a containment relation. However, it is clear that simply stating that one representation properly contains another, does not explain the relationship between the two. Moreover, not all containment relationships form the basis of potential lexical rules, and conversely, the relationship that is intended to be captured by lexical rule is often not one of containment. Typically, the lexical rule merely stipulates that there is a relationship, it does not shed light on what that relationship is.

The second question as to when and why a particular verb stem can occur in more than one argument structure, is also not explained by alternation accounts. As was discussed above, alternation rules simply say: some verbs with argument structure X also have argument structure Y. This does not at all account for why a verb stem occurs in both, it simply stipulates that it does.

Finally, concerning the question of disallowing the following in a principled way:

27. *Joe touched Bob the cupcake.
 28. *Bob murdered.

As has been noted, appealing to the fact that a verb has *n* number of arguments and therefore must have exactly *n* complements begs the question, since the way *n* is determined is by considering how many complements the verb actually does occur with.

I take it to be a valuable outcome of the constructional approach that these issues are made clear. Further research will be necessary to fully address these issues,

however. For example, we will need inter and intra linguistic studies to determine which verb classes tend to be associated with which constructions, how constructions are related to each other, and the exact way in which verbal, and more generally, lexical meaning is to be represented. What we stand to gain from such studies is a deeper understanding of the nature of argument structure than has heretofore been proposed.

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