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EDITOR'S NOTE

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Where is Chomsky's Bottleneck?

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(2nd printing of paper in no. 5, vol. 1)

The CRL Annual Report for 1986-87 is available for those who are interested.

Transitivity and the Lexicon

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A greater theoretical role than ever before has been assigned to the lexicon by contemporary linguistic frameworks such as LFG, GB, GPSG, and Lexical Phonology. Representing lexical knowledge and its interaction with phonological, syntactic, and general cognitive knowledge is also relevant for processing and computational models of language. In this paper, I provide a single case in which representation of a particular linguistic phenomenon, transitivity, which is thought to be specifiable in the lexical entry of a verb, is in fact attributable to aspects of the whole clause, not to mention the way the clause is construed by a speaker. As such, the idea that transitivity can be represented in a separate component of grammar such as a lexicon becomes highly questionable and sheds doubt on any theory of language that sets up isolated, static modules.

The phenomenon of transitivity has undergone considerable theoretical re-evaluation over the past three decades. In mainstream linguistic theory (that is to say, generative grammar and its derivatives), it received first a purely structural, then a general semantic, and most recently a specifically lexical characterization. It has been attributed to the number of a verb's arguments (its logical form), to the kinds of arguments a verb takes, and now, to the type and meaning of the verb itself. Cross-theoretically, the burden of explicating syntactic behavior such as passivizability, the definitive test of transitivity (at least in English), has moved from the syntax into the lexicon, following the assumption that these are separate components that language users avail themselves of. Consequently, the lexicon has grown quite fat, since it is no longer just the repository of individual lexical items. Now it is a phonological- and content-addressable file for a morpheme's (or a larger idiomatic expression's) form and meaning, its grammatical category, its particular syntactic placement and behavior, all cross-indexed to related or derived forms and morphemes with which it co-occurs. Somewhere amongst all this other information must be the information that verb X is transitive or that it can be used in a transitive clause.

In my study of transitivity (Rice 1987), I have found that many factors go into the bestowal of transitivity on a clause. Moreover, these factors naturally co-occur and give rise to a unified, conceptual gestalt. Only for the most prototypical instances of transitivity like "John hit Bill" or "Lightning struck the golfer" is predicate-argument structure sufficient to account for a clause's transitivity. Nevertheless, for these very same cases, semantic factors such as volitionality of the agent; perfective, punctual action; or an affected patient may also conspire to render the clause transitive. For non-prototypical instances of transitivity, such as "John resembles Bill" or "The performance struck John as weak", I have found that other more subtle factors come to bear on a clause's transitivity, or intransitivity, as the case may be. I characterize transitivity as a construal phenomenon that, like other cognitive and linguistic categories, displays prototype effects (cf. Rosch 1973, 1978, and Lakoff 1982, 1987). Upon comparison to a transitive prototype, a clause's behavior with regard to passive can be better accounted for. However, it is best to speak of at least three transitive prototypes associated with the basic cognitive domains of physical space, perception and ideation, and interpersonal interaction. Through the power of metaphor, all three of these domains can be construed geometrically and force-dynamically relative to a temporal backdrop. That is, physical, mental, and social events can share certain properties relevant to our general conceptual notions of transitivity. All three domains can be viewed abstractly as "spaces" populated by discrete entities foregrounded or situated against some setting. These entities can move and change as well as make contact with or affect other entities. Collectively, entities can be seen as dynamically or configurationally related. Individually, entities may have or lack the internal or external force to move or change. Most importantly, in each of these universes, things exist and events take place. Of all the possible activities therein, certain activities are singled out as special because *something happens* in a particular way between two prominent entities deemed to be co-participants in an interaction. It is these activities that are most likely to receive linguistic instantiation in the form of a transitive clause.

The bare-bones scenario sketched above is certainly derivable from other semantically-based or expressly prototype accounts of transitivity such as those formulated by Lakoff 1977 or Hopper and Thompson 1980. It likewise conforms to our intuitive and pre-theoretic understanding of what happens in a transitive clause--that there is an action that causes some effect. However, many other quite subtle properties of transitivity operate that are not appreciable from the standard small database considered by most other theories of grammar or other approaches to transitivity. In my work, I have examined hundreds of marginally transitive clause structures which, by their very nature, afford a more sensitive index of what makes a clause/event transitive or intransitive.

For instance, I have found that the interacting entities must be *pre-existing* in the speaker's world and not effected out of the interaction. This aspect of transitivity rules out active or passive versions of many cognate object constructions (which nevertheless conform to canonical [NP V NP] transitive phrase structure) like those given in (1):

- (1) a. *A life was lived by Susan.
- b. *Sweat was sweat by the soccer player.
- c. *Many laughs were laughed by Neil.

However, when a cognate object is modified, it may be construable as a clearly recognizable or replicable *type*, and otherwise unacceptable cognate object expressions are licensable, even in their passive versions:

- (2) a. A good life was lived by Susan.
- b. Hard-earned sweat was sweat by the soccer player.
- c. Many ridiculous laughs were laughed by Neil
 for his grandchildren.

This explains in part why the standard examples of cognate object constructions in English like "to sing a song" or "to dance a dance" work as actives or passives: Songs and dances are usually pre-composed entities. The agent is simply making a further recital through the expressed activity. The fact that passive cognate object constructions improve under modification has unsettling consequences for a lexical treatment of transitivity. Should the lexical entry for a verb explicitly state that its cognate object must be modified? Moreover, should most heretofore intransitive verbs in English be reconsidered as *potentially* transitive on the basis of the ubiquity of derived nominals? For instance, although "to walk a walk" is decidedly bad, it is possible to utter any of the following:

- (3) a. A most peculiar walk can be walked by everybody
 who has seen that famous Monty Python sketch.
- b. A hiccup that woke up the entire library
 was just hiccupped by Fred.
- c. The grin that means "I've got more work for
 you" was just grinned by my boss.

From these acceptable passives, we can infer that the corresponding actives do not stray too far from the prototypical transitive event template.

Another important facet of the transitive prototype requires that the interacting entities be *maximally distinct*. The action must not be self-affecting as in a reflexive event nor must it be directed by an entity towards a constituent part. This explains why reflexive objects, even though they meet standard transitive phrase structure requirements, make for less-than-fully transitive clauses as evidenced by their unacceptable passives:

- (4) a. Steve shaved himself.

- b. *Steve was shaved by himself.

This also suggests why passives for active clauses in which the subject NP serves as a setting for the activity of the object NP are ruled out even though the verbs are usually considered indisputably transitive (and by assumption, able to occur in passive form):

- (5) a. This room has heard many boring meetings.
 b. *Many boring meetings have been heard by this room.
- (6) a. Mary lost an eye in the accident.
 b. *An eye was lost by Mary in the accident.

Moreover, the prototypical transitive event should proceed *unidirectionally*, describing an entity's movement *towards a goal*, not just away from a source. This facet of the prototype helps explain why the passives in (7) and (8) contrast; the actives do not equally invoke a transitive construal:

- (7) a. Mary rushed to John.
 b. John was rushed to by Mary.
- (8) a. Mary rushed from John.
 b. ??John was rushed from by Mary.

The two entities in the canonical transitive event must also stand in an *asymmetrical* relationship to each other so that the event is construed as transpiring between relative opposites such as animate/inanimate, mobile/immobile, small/large, part/whole, powerful/powerless, volitional/passive, protagonistic/antagonistic, perceiving/perceivable, conceiving/conceivable, or speaking/hearing pairs of entities. To illustrate, the clause,

- (9) John fought with Bill.

is ambiguous. It can mean John fought *alongside* Bill or John fought *against* Bill. It is only the latter reading that has an acceptable passive:

- (10) Bill was fought with by John.

supporting the idea that the two interacting participants in an event must somehow be in opposition. This sub-property of the prototype is very general and, since it covers many other types of events, it is more desirable as an explanation of the unambiguity of (10) than redundancy rules in the lexicon linking homophonous versions of "to fight with" that merely report their differential participation in passive clauses.

Another aspect of the prototype suggests that the two entities should ultimately be *in contact* and not merely proximate. However, this holds only for events that transpire in physical space. The cognitive domain against which an event is predicated will change the relative import of the various facets of the transitive prototype listed here. As the meaning of a verb changes against different cognitive domains, so too may the syntactic behavior of the verb change. As an example, compare (11) and (12):

- (11) *The wall was adhered to by the sticky paper.
 (12) The script was adhered to by the over-budget director.

Understanding which facets of the transitive prototype are relevant for a particular cognitive domain makes for a much fuller model of transitivity that has greater descriptive and explanatory power than individualized lexical stipulations.

Other relevant aspects of the transitive prototype are those which indicate a *completed* and *unitary* episode of some activity. This aspect of the prototype effectively rules out logically-transitive clauses containing on-going imperfective verbs such as *resemble* or *contain* as representative exemplars of transitivity and suggests why their passives are usually considered to be unacceptable. However, with the addition of extra material such as modals, adverbials, negative markers, or generic NPs, the imperfective clauses like those in (13) become quite acceptable, as evidenced by their counterparts in (14):

- (13) a. *Pat's smoking is minded by Sam.
 b. ?Bill's judgment is trusted by the committee.
 c. *John is known by the couple next door.
 d. *Tommy is resembled by the milkman.
- (14) a. Pat's smoking might be minded by Sam (since he's got such severe asthma).
 b. Bill's judgment is completely trusted by the committee.
 c. John is no longer known by the couple next door.
 d. Everyone is resembled by someone.

How could such effects ever be accommodated within the standard, static view of the lexicon? Because the transitivity/passivizability of the clauses in (13) improves with the addition of extra-propositional content, it is not strictly the case that transitivity is a function of easily "lexicalized" predicate-argument structure. These data seriously undermine frameworks which seek a lexical solution to the indication of transitivity and passivizability facts. They would require the indication of phrasal and clausal information along with propositional information in the lexical entry for any given verb.

Finally, the relative transitivity of an event increases if the meaning of the clause suggests that the activity is *energized*, implying resistance or at least some degree of opposition between the two participants. The *manner* in which the activity is carried out affects that way the activity is construed by the speaker encoding the event into language. And whether an effect is *external* and observable or *internal* and perhaps inferrable is relevant for the conceptualizer as well. This explains the contrast in (15):

- (15) a. John's suggestion was laughed at by Mary.
 b. *John's suggestion was wondered at by Mary.

The transitivity components discussed here often lack either lexical or syntactic realization. Instead, they are bound up in the *interpretation* of both the predicate (the verb) and the predication (the sentence as a whole). The actual event may be objectively quite intransitive, that is, static or configurational, but as long as it or its constituents are construed as forceful, motile, or as achieving some endpoint on a subjective scale for the conceptualizer, the overall event might be considered transitive. The interpretation of a verb (be it simple or complex) as transitive or intransitive is often indeterminable from predicate-argument structure alone or even from a verb's meaning or the meanings of its arguments. For example, in the following pair, only (16a) has a passive form as shown in (17):

- (16) a. John left the three children.
 b. John left the auditorium.
- (17) a. The three children were left by John.
 b. *?The auditorium was left by John.

Yet there are variants of (17b) that are fully grammatical:

- (18) a. The auditorium was left unattended by John.
- b. The auditorium was briefly left by John during the singing of the national anthem.
- c. The auditorium can only be left by John since he has a hall pass.

Based on these data alone, how might we specify the lexical entry for the transitive verb LEAVE? LEAVE is highly polysemous and even (16a) is at least three-ways ambiguous. It can mean John moved in space away from the children, John abandoned the children, or John dropped the children off (for someone else to care for). The passive counterpart in (17a) captures these last two readings, which only partially have physical senses. Here, LEAVE also involves moral or social abandonment. The purely physical sense of "moving away from" is not focused on in the meaning of the passive, which explains why (17b) with only a physical world interpretation whereby John moves with respect to some setting is ungrammatical. When (17b) is given extra interpretation, for example in (18a) where both physical and social interaction come into play since the unattended auditorium is now capable of being affected as the target of vandalism or the site of trespassing, or in (18b) where the auditorium is metonymic for the people and events transpiring within the auditorium and John's movement has both physical and social implications, or in (18c) in which John's departure from the auditorium is a highly restricted event and one whose achievement represents some goal unattainable by others, the setting-like auditorium becomes more central to the event at hand. In any case, in (18a), (18b), and (18c), John and the auditorium are construed as co-participants in an interaction and passive obtains.

It is important to bear in mind that the many sub-properties of transitivity, while certainly important aspects of the prototype, are not necessary and sufficient properties of a transitive clause, at least not in English. Furthermore, they are not always directly encoded by the morphology of a clause. They cannot reliably be read off the meaning of the verb or its arguments. They may be present on one reading of the clause and absent on another. If we are at last starting to appreciate more fully all the intricate parameters involved in transitivity, we might next be concerned with what to do with them. How does the linguist, let alone the speaker of English, ever juggle all these shifting components? How does the speaker store them? How can such a view of transitivity even be represented in the mind? How can a theory of grammar incorporate such a view?

Linguists have all too often fallen into the trap of the container metaphor in language (cf. Reddy 1979). This is especially so in the standard formulation of the lexicon as a module that things are put *into*. Even data such as those in (16)-(18) would require a radical revision and extension of the lexicon, greater even than what it has undergone over the course of the last few years. Needless to say, a verb's designation as transitive or intransitive does not always depend on lexico-syntactic properties of the verb. Transitivity cannot be represented symbolically by simple subcategorization schemes (except perhaps for central members of the category such as HIT or KILL). Sometimes the types of NPs or their specification as definite or indefinite affect a verb's transitivity index. At times other verbal complements or modifiers, sentential adverbs, modals, or aspectual properties of the verb can enhance or subvert a transitive construal. A verb's meaning may change relative to the cognitive domain or semantic frame against which it is predicated. Also relevant is the way in which the event is conceived, as potential or complete, or as static or dynamic. These notions may not form part of the objective content of the clause, but may be imparted to the clause's meaning via subjective construal. The inclusion of phrasal, clausal, and now construal information in the lexical entry for a verb makes for an improbably large lexicon that looks more and more like a list of all possible sentences of the language linked to all possible speaker intensions. My reversal on Pandora's box--that an adequate lexicon would have to *absorb* all the unpleasant irregularities and extensions of word meaning as well as the unwieldy aspects of clause meaning and speaker intension--is only to demonstrate that the lexicon has been viewed incorrectly. It is more of an open encyclopedia of knowledge (cf. Haiman 1980) and, as such, is not different in kind from other types of linguistic and cognitive knowledge.

Unfortunately, the notion of the lexicon as a dictionary-type list of line-item entries is still a pervasive one in linguistics. The idealized model of the lexicon harbored (implicitly) by most linguists reduces to a sort of storage bin where phonological, semantic, and category information about a lexical item are represented. This information is to be cross-referenced to other lexical items and accessed when a lexical item is selected for participation in larger constructions like a phrase or a clause. However, linguists harbor only vague notions about what a particular lexical entry would really consist of. This vagueness is due primarily to the fact that information usually attributed to the lexicon has a multitude of sources. These sources--the "semantics" or "pragmatics" of a language--have been unduly slighted in theoretical work until recently. But if a thoroughly adequate account of, say, a verb's argument structure is to be specified, the lexicon must extend its scope to include pragmatic and subjective factors such as those discussed here. Taking seriously the kinds of information that would need to be *in* the lexicon would lead to a gross elaboration and proliferation of lexical entries. Clearly, a more distributed view of lexical knowledge is needed. Lexical and syntactic knowledge are continuous. A verb's meaning (and subsequent syntactic behavior) is not atomistic. Its meaning is embedded in the context in which it appears. A verb's phrase, clause, pragmatic environment, and the speaker's intent all influence the way in which it is used and the arguments it will bear. There is simply no economical or realistic way of spelling out a priori, that is, in a lexicon, how a verb will be used and what it will mean. In short, transitivity cannot possibly reside in the lexicon as a property of certain verbs because no lexicon with static lexical entries really exists. The lexicon is truly a convenient fiction in linguistics and one that does not stand up to very much scrutiny. This is not to imply that there is no such thing as lexical knowledge. Rather, the encoding of lexical information involves the simultaneous satisfaction of multiple constraints. Lexical knowledge is part of a dynamic, interconnected network that can access sound, meaning, and speaker intent in parallel.

Transitivity is best characterized as a cognitive category organized around a prototype or cluster of prototypes. As such, it does not reside *somewhere* in the mind or in the mind's lexicon. It is built up anew each time the speaker surveys a scene and wishes to encode the event in linguistic form. If an event is interpreted as consisting of certain properties or if the speaker wants to bias his listener's interpretation of an event in a certain way, he may choose particular lexical items and arrange them in such a fashion as to create a clause that a linguist considers to be transitive based on its passivizability. At the very least, facets of the prototype are *distributed* over the elements of the clause. Probably, however, it is more accurate to say that transitivity is distributed over the entire speech act, by which I mean that the speaker has control over how an event is to be interpreted by the way in which he formulates the corresponding clause. Like so much in grammar, transitivity pertains to form-meaning correspondences between an infinite range of meanings and a very finite set of forms. The hook-up is all a matter of speaker choice. There is no grammar and there is no lexicon that specifically confers transitivity on a clause. There is only an agreed-upon convention that speakers of a language individually come to understand through their experience of the world, a convention that makes sound and meaning align in a coherent and comprehensible manner (cf. Langacker 1987).

Our assumptions about language and cognition are slowly being re-evaluated. Recent polysemy studies in cognitive semantics and cognitive grammar (Lindner 1981, Brugman 1981, Sweetser 1984, Van Oosten 1986, and Smith 1987) have expanded conventional notions of word meaning and have advocated prototype approaches to the study of language at the level of word, preposition, and grammatical relation. Because the transitive clause is a rather fundamental linguistic template at the syntactic level, I hope the present study can contribute to this line of research and to a view of language as an expressly cognitive and integrative enterprise organized like so much else in our conceptual system--around prototypes in non-categorical categories.

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