

Lexical Entries for Verbs*

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1. A mature speaker of a language controls a great deal of highly specific information about the individual words which he uses in his own speech or which he perceives and interprets in the linguistic productions of others. It is the task of the theory of lexis to characterize such information. In this paper, I shall inquire into the relevance, for the lexical description of English verbs, of certain well-understood concepts from the so-called 'predicate calculus' of symbolic logic; I shall suggest areas where these notions will fail us in our attempts to capture certain logical and semantic properties of verbs; and I shall conclude by proposing ways in which a distinct order of concepts may be appealed to in describing the grammar and semantics of verbs.

The words 'predicate' and 'argument' will be used in roughly the logician's sense. A predicate is a term which identifies some property of an object or some relation between two or more objects. The objects concerning which a predicate asserts something are the arguments of that predicate.²

²I believe that for the purposes of this essay, certain imprecisions may be allowed in the use of logical terms. In particular, I shall not require myself to be careful about distinguishing 'predicate' from 'predicate-name', 'argument' from 'argument-name', or 'argument' from 'variable'. The distinctions which the logicians require are explained in Hans Reichenbach, Elements of Symbolic Logic, The Free Press (paperback) 1966, esp. pp. 80-83.

The abstract study of predicates allows us, first of all, to describe each predicate according to the number of arguments that are associated with it. Such a description may be thought of as

analogous to a classification of predicate-words in natural language according to the number of nouns they require in a syntactically complete expression.

A predicate with one argument, symbolically representable as (1),³ has the simple predicate adjective or intransitive verb

$$(1) P_a$$

³The notation with \underline{P} for predicate and subscripted items for the arguments is used here in place of the more familiar $f(x)$, partly to relieve the reader of the expectations associated with the standard notations of the functional calculus (see fn. 2), partly because parentheses will be introduced later for another purpose.

as natural language correlates. That is, interpreting TALL or SLEEP as one-argument (or 'one-place') predicates, we can express the assertions that John is tall or that John is sleeping by notations (2) or (3) respectively.⁴

$$(2) TALL_{JOHN}$$

$$(3) SLEEP_{JOHN}$$

⁴The reader is asked for the purposes of this essay, to consider the meaning of predicate expressions independently of matters of time.

A two-place predicate, a predicate with two arguments, may be represented in its abstract form as (4).

$$(4) P_{a,b}$$

An expression of this type names a relation that holds between two objects, the two objects identified here as a and b in that order. A two-place predicate is used to assert a relation between two entities, and the left-to-right position of the symbols that identify those entities can be thought of as

indicating the separate roles they have in respect to the given relation. Two-place predicates are analogous to the ordinary transitive verbs of natural languages.

As an example of a two-place predicate taken from natural language, we might consider the relation symbolized as (5)

(5) HIT_{HARRY, MARY}

as representing the claim that in an act of hitting, Harry is the one who did it and Mary is the one who felt it. Viewed as an abstract relation, of course, it is irrelevant which role in a hitting situation is assigned to the left element, which to the right. The order presented here was chosen because it matches that of the subject and object noun-phrases in the corresponding active sentence in English.

Three-place predicates, symbolizable as (6),

(6) P_{a,b,c},

correspond to grammatical constructions of the transitive indirect-object type. An expression like (7)

(7) GIVE_{HARRY, MARY, A FLOWER}

can be interpreted as identifying, in an act of giving, the giver, the receiver, and the gift.

2. Within symbolic logic itself there are essentially three areas in which the properties of predicates can be explored: these we may call the extensional, the intensional, and the definitional. Predicates are described extensionally as the sets of objects, or sets of pairs or triples of objects, etc., for which the relationships or properties in question hold true. They may be described intensionally according to such criteria as whether, for a predicate that holds true of a and b in that order, it necessarily holds true of b and a in that order, too. We shall return to the extensional and intensional properties of predicates later; but first we shall consider the ways in which predicates may be related to each other by definition.

Because of the use of linear order in representations of multiplace predicates, it is possible for two predicates to differ from each other only in the left-to-right sequence of the arguments. That is, it is possible to recognize two two-place predicates as identical to each other, except that the first position of one corresponds to the second position of the other, and conversely. Predicates related in this way are known as 'converses' of each other.

Thus we might wish to define some two-place predicate P as being identical with some other two-place predicate P' , except that the arguments are mentioned in the opposite order. See (8).

$$(8) \quad P_{a,b} = P'_{b,a}$$

In looking for natural language counterparts to converse predicates, we can take the first and second positions as matching the subject and direct object positions of simple sentences. In this way we might note that the English verbs LIKE and PLEASE (in one sense of the latter) can be viewed as converses of each other. Note sentences (9) and (10).

(9) MARY LIKES THE FLOWER.

(10) THE FLOWER PLEASED MARY.

Or, to take a relationship expressed by something other than a verb, we might note that WIFE and HUSBAND are converses of each other. Sentence (11) is true just in case sentence (12) is true.

(11) HARRY IS A HUSBAND OF MARY.

(12) MARY IS A WIFE OF HARRY.

The term 'converse' has been mainly used in connection with two-place predicates, but one can easily define converse-like relationships between predicates taking more than two arguments. One could, for example, define some seven-place predicate P as identical with some other seven-place predicate P' except that the first argument of one corresponds to the fourth argument of the other. That particular relationship

between predicates, however, has little linguistic interest. There appear to be just two additional converse-type relationships that have counterparts in the system of English verbs. First, there are three-place predicates in which the first and third positions are reversed; second, there are three-place predicates in which the second and third positions are reversed.

For the first of these, note definition (13).

$$(13) \quad P_{a,b,c} = P'_{c,b,a}$$

Two conceptually identical three-place predicates differ only in the order in which the arguments are mentioned, the first position in the one corresponding to the third position in the other, and conversely. If we take the first and second positions as analogous to subject and object, as before, the third as analogous to the object of a preposition, we can see that the two English verbs BUY and SELL fit this pattern. Note the paraphrase --or near paraphrase--relations between (14) and (15):

(14) SCHWARTZ SOLD THE FLOWER TO HARRY.

(15) HARRY BOUGHT THE FLOWER FROM SCHWARTZ.

The second converse-like relationship between three-place predicates shows the second and third positions reversed. Notice definition (16).

$$(16) \quad P_{a,b,c} = P'_{a,c,b}$$

Making the same connections between position and grammatical function as before, we note that the English verbs ROB and STEAL fit this pattern. Note sentences (17) and (18).

(17) CLYDE ROBBS BANKS OF MONEY.

(18) CLYDE STEALS MONEY FROM BANKS.

In the cases of LIKE vs. PLEASE, BUY vs. SELL, ROB vs. STEAL, we had different verbs. Our language also has ways of expressing these same converse-like relationships with identical verbs, where the difference between the predicates is made overt only in the choice of the preposition that marks the last item. A two-place predicate for which this is true is found

in the verb SWARM. This verb refers to an activity of a collection of objects, an activity that has to be conceived of as occupying or occurring in some kind of space. It happens that either the objects or the place can be mentioned first (i.e., as subject), the remaining item being marked by one or another preposition. Notice the sentences (19) and (20):

(19) BEES SWARM IN THE GARDEN.

(20) THE GARDEN SWARMS WITH BEES.

For an example of a pair of predicates analogous to BUY and SELL but differing, not in the verb but in the preposition that goes with the third argument, we may take sentences with the verb RENT. Compare (21) and (22).

(21) HARRY RENTED THE HOUSE FROM SHEILA.

(22) SHEILA RENTED THE HOUSE TO HARRY.

Analogous to the pair ROB and STEAL we may take the verb BLAME. Compare (23) and (24):

(23) HARRY BLAMED HIS FAILURES ON MARY.

(24) HARRY BLAMED MARY FOR HIS FAILURES.

Relations between verbs that are like the converse relations of the theory of predicates involve position-switching for subject and object, as with LIKE and PLEASE; between subject and prepositional object in an intransitive verb expression, as with SWARM; between subject and prepositional object in a transitive verb expression, as with BUY and SELL, or RENT; and between direct object and prepositional object, as with ROB and STEAL, or BLAME.

A second definitional device for expressing connections between predicates makes it possible to show one predicate as being conceptually a part of another. Each of the definitions given as (25) and (26) expresses an identity between a predicate P' and another, complex expression containing the predicate P .

$$(25) \quad P'_{a,b,c} = P''_a, \left[P_{b,c} \right]$$

$$(26) P'_{a,b} = P''_a, \left[P_b \right]$$

In the first case, a two-place predicate is seen as definitionally part of the meaning of a three-place predicate; in the second case, a one-place predicate is definitionally part of a two-place predicate.

The relation between the English verbs KILL and DIE, or that between the verbs PERSUADE and BELIEVE, can be expressed definitionally through an intermediate predicate, CAUSE. Notice the definitions given as (27) and (28).

$$(27) \text{PERSUADE}_{a,b,c} = \text{CAUSE}_a, \left[\text{BELIEVE}_{b,c} \right]$$

$$(28) \text{KILL}_{a,b} = \text{CAUSE}_a, \left[\text{DIE}_b \right]$$

In these cases, a connection between two predicates involves a third mediating predicate: here it is the two-place predicate CAUSE, a relation that holds between an object and a predication.

Another definitional device capable of relating predicates that take different numbers of arguments makes use of the suppression of, or failure to mention, one of the arguments. Thus, some one-place predicates might be definitionally related to a particular two-place predicate, except that the one-place predicate in question ignores (or presupposes) one of the relevant arguments. A notation that might be proposed for such a definition is given as (29)⁵

$$(29) P_a = P'_{a,b} \hat{\wedge}$$

⁵The expression to the right of the equality sign in (29) may be taken as an abbreviation for $(\exists b)P'_{a,b}$, where the argument term b is taken as a variable bound by the existential quantifier \exists .

and may be read as follows: to say P of an object a is to say

that there is some object b for which the predication P holds for a and b in that order.

We may take the English adjective MARRIED as a one-place predicate conceptually based on an inherently two-place predicate. That is, to say that Harry is married is to say that there is somebody who is Harry's spouse, without saying who that person is. Marriage necessarily involves two entities, but the adjective MARRIED allows us to make statements about this relationship while mentioning only one of the parties.

There are, then, these two ways of defining relationships between predicates that take different numbers of arguments. Either a superficially complex or multi-termed predicate may be presented as definitionally built out of simpler predicates, or superficially simple predicates may be presented as definitionally built out of more complex predicates. In reconstructing relations between verbs that differ in the number of nouns they "take", it is not always obvious which of these devices is most appropriate. Consider, for example, the relatedness between sentences (30) and (31):

(30) THE WINDOW BROKE.

(31) THE ROCK BROKE THE WINDOW.

One might assume that BREAK is an inherently simple or one-place predicate and that hence the two-place predicate seen in (31) involves an intermediate notion of causation. Alternatively, we might just as well assume that BREAK is an inherently two-place predicate, and that in the first sentence the speaker merely fails to mention--possibly because he does not know--what was instrumental in doing damage to the window. Without grounding an account of the semantic structure of words in a general empirical theory of semantic structures in natural languages, the linguist can find no principled way for preferring one or another of these alternatives.

A predicate is described extensionally as the set of all of the objects, or ordered sequences of objects, that the predicate can be truthfully asserted of. Thus, for (32)

(32) HIT_{a,b}

we may describe the predicate by identifying those pairs of things which, when put in place of the a and b of the formula, yield true statements. It should be made clear that to the logician, the identification of these objects is in fact the definition of the predicate.

Thus if it is true that Mike hit Billy Smith's nose, then the pair of objects, Mike and Billy Smith's nose (mentioned in that order) constitutes one segment of the extension of the two-place predicate HIT. It will probably be immediately clear that an extensional definition is of little value to the linguist, because he is not concerned with the factuality of (33)

(33) MIKE HIT BILLY SMITH'S NOSE.

but with what the sentence can mean.

One might propose that although extension in the strictest sense fails to capture what speakers of a language know about the predicate words they use, a closer approximation to that knowledge may be constructed by considering the collections of objects that can conceivably enter into the predications in question. The emptiness of this proposal becomes clear when we consider that any understanding of the collections of objects that are conceivably related to the meaning of a given predicate presupposes an understanding of the meaning of that predicate, and not the other way around. If there is anything strange about sentence (34),

(34) THE MOSQUITO SWALLOWED THE VICE PRESIDENT.

we will accredit this strangeness to the fact that the body of the politician in question exceeds certain required dimensions, or to our knowledge that mosquitoes are not equipped to perform deeds of the type we could really call swallowing. Judgments about conceivable occurrence as arguments in the predicate depend, in other words, on our understanding of the predicate notion--not the other way around. It seems to me that no use of the extensional properties of predicates can

serve us in identifying linguistically interesting properties of verbs.

As intensional properties of predicates the theory of predicates has developed such notions as symmetry, reflexivity and transitivity. A two-place predicate is symmetric if, whenever it holds for a and b in that order, it holds for b and a in that order, too. We might think of the verb TOUCH as symmetric: if a touches b, b necessarily touches a. The verb OUTGROW is not like that: if a outgrew b, then b definitely did not outgrow a. OUTGROW is antisymmetric. The verb LOVE is neither. If a loves b, b may or may not love a. LOVE is mesosymmetric.

A two-place predicate is reflexive if whenever the same object is mentioned in both positions, the predicate necessarily holds. The English verb EQUAL is reflexive, because anything equals itself. The verb DIFFER-FROM is antireflexive, a cannot differ from a. LOVE is mesoreflexive: it is possible, but not inescapable, that a person loves himself.

A predicate is transitive (in the logician's sense) if from the fact that the predicate holds for a and b as well as for b and c, it necessarily holds for a and c as well. The English verb EXCEED is transitive: if a exceeds b and b exceeds c, then a necessarily exceeds c. The verb SIRE is antitransitive; if a sired b and b sired c, then a necessarily did not sire c. The verb LOVE, again, is neither. It is mesotransitive. If Harry loves Mary, and Mary loves Schwartz, it is not inescapably true that Harry loves Schwartz.

3. An attempt to see how the notions that have just been reviewed can be used in characterizing expressions containing verbs may begin with a consideration of sentences (35)-(37).

(35) PETER TOUCHED THE WINDOW.

(36) PETER STRUCK THE WINDOW.

(37) PETER BROKE THE WINDOW.

Intensionally, the verbs TOUCH, STRIKE and BREAK are all alike: like most two-noun verbs, they are simply mesosymmetric, mesotransitive and mesoreflexive. Extensionally, they cannot be distinguished from each other appropriately. If we take extension in the narrow sense, no verb has an extension that stays the same from one moment to the next, and the sense in which (35) and (36) are alike (as opposed to (37)) cannot be revealed. If we take extension in the broader sense, there is no possibility of distinguishing (35) and (36) from each other. Presumably anything that can be conceived of as striking something can be conceived of as touching it, and vice versa.

Definitionally, the verb BREAK of (37), is related to a one-term predicate, namely that exemplified in (38).

(38) THE WINDOW BROKE.

but there is no associated one-term predicate corresponding, in the same way, to the verbs TOUCH and STRIKE of (35) and (36).

Conceptually, BREAK differs from TOUCH and STRIKE in what one must assume about the nature of the second argument. While it may be true that (39) and (40) are both acceptable English sentences, the second noun does not identify the same set of arguments. (40) seems to require an understanding that the dog in question has been frozen, or is perhaps not a dog but an object in the shape of a dog.

(39) PETER TOUCHED THE DOG.

(40) PETER BROKE THE DOG.

The verb, in short, seems to require of its second argument--the entity named by the direct object noun phrase--that it be rigid in some of its dimensions. There is evidently no straightforward way in which such information about expressions containing verbs can be presented if we limit ourselves to concepts of the type we have been discussing.

In all three of the sentences (35)-(37) one can detect an ambiguity in respect to the role played by PETER. The person

Peter might have been the responsible agent for these activities, doing something to the window with, say, a gun butt. Or Peter--that is, Peter's body--might himself be the object that came into contact with the window: somebody may have pushed him into it.

The way in which each of these expressions is ambiguous relates to the different roles that arguments can have with respect to a predicate, roles that the predicate calculus is only capable of identifying, separately for each predicate, in terms of position. One could of course ascribe the ambiguity to the verb itself, or one could say that each of these verbs matches phonetically two distinct predicates. But that is to accept defeat.

I would like to suggest that we can get out of these difficulties by making use of a new order of concepts. These concepts will enable us to say that sentences (35)-(37) are ambiguous with respect to our understanding of the role played by the object identified as PETER, and furthermore, that the roles by which they are said to be ambiguous are the same in all three cases; that is, that in all three sentences we understand Peter as being the active agent, or Peter's body as the 'used' instrument, in the performance of the act. It is true, of course, that within the predicate theory of logic one could state that the first-position arguments for the sentence with STRIKE are the same as those for TOUCH, and one could define the relationships these hold to the predicate as a whole to be the same, but there is simply no direct way of showing, within the calculus of predicates, that there is some kind of identity in the meanings of the sentences with STRIKE and TOUCH, the difference between them having to do with the meanings of these verbs and relating to something like relative intensity of impact.

The added concepts will allow us to say that the semantic relation between BREAK and THE WINDOW is the same in (37) and

(38), the surface difference between the two sentences being relatable to the number of roles that are given overt expression.

The new concepts will allow us to state directly the underlying identity of three-noun expressions with BUY and SELL, as with ROB and STEAL, so that we can say that the differences between them are surface differences in the order in which the arguments are mentioned, and in the grammatical function--as subject, direct object, or prepositional object--that is obligatorily assumed by the nouns that name the objects that fill these roles.⁶

⁶The character of the underlying identity of expressions in BUY and SELL is in the understood system of relationships involving two persons or institutions and the transfer, from one to the other, of some property or service, in one direction, and a sum of money, in the other. The verbs differ in other ways, and so the sentences containing them cannot be exact paraphrases of each other. The differences relate to identity of the voluntary participant in the purchasing act, and the like. For an insightful discussion of the impossibility, on semantic and syntactic grounds, of regarding BUY and SELL as suppletive variants of the same verb, see Jeffrey S. Gruber, Studies in Lexical Relations, M.I.T. Ph. D. Dissertation (1962), esp. Chapt. 3, Sec. 3 and Chapt. 8.

It is clear that the concepts I have been alluding to are sharply distinct from those properties of surface form and linear sequence that we associate with traditional grammatical terms like 'subject' and 'object'. Instead of identifying the 'undergoer' role of the activity symbolized by BREAK as that of the only argument of BREAK when used as a one-place predicate and that of the second argument of BREAK used as a two-place predicate, my proposal is that we label this role directly. In order for such a decision to reflect an empirical claim about human language, it must be assumed that there is some fixed collection of role types to draw from, and that these recur in different expressions. I believe that the recurrence of role types in at least the three sentences we have

seen may be considered demonstrated. A part of the description of a verb, then, is a list of the various distinct roles which entities may assume in expressions containing it. We can leave to the theory of syntax an account of the ways in which the words which name these entities are to be given surface syntactic functions.

I believe that human languages are constrained in such a way that the relations between arguments and predicates fall into a small number of types. In particular, I believe that these role types can be identified with certain quite elementary judgments about the things that go on around us: judgments about who does something, who experiences something, who benefits from something, where something happens, what it is that changes, what it is that moves, where it starts out, and where it ends up. Since judgments like these are very much like the kinds of things grammarians have associated for centuries with the uses of grammatical 'cases', I have been referring to these roles as case relationships, or, simply, cases.⁷

⁷See, in particular, my paper "The case for case," in Universals in Linguistic Theory, eds. E. Bach and R. Harms, Holt, Rinehart and Winston; 1968, pp.

An analogy may help to make clear what I am claiming about constraints on natural language sentences. Suppose that we view the idea expressed by a simple sentence as analogous to a scene in a play, and suppose that we think of speakers of a language as dramatists working within a theatrical tradition that limits itself to a fixed number of role types, with the further constraint that at most one character in a given role type may appear in any given scene. The troupe has hats with tassels of different colors for these different roles, and there is only one hat of each type. Any scene may contain

zero or one character in each of the following roles: a prince, a villain, a hag, a clown, a sought-after beautiful virgin princess, and a messenger boy. Different character types can fill these roles--the villain may be tall or short, white or black, handsome or ugly--but each scene uses at most one of each of these roles.

Certain identities can be recognized in scenes that use different numbers of characters. In one scene the messenger boy, alone on the stage, falls flat on his face. In a second scene, the clown accidentally bumps into the messenger boy, and the messenger boy falls flat on his face. What the messenger boy does in these two scenes is exactly the same. A third scene has the villain pushing the clown into the messenger boy, the messenger boy then falling flat on his face. What the messenger boy does in this scene is the same as what he does in the first two, and what the clown does in this scene is the same thing that he did in the second scene. There is another scene that has only the villain and the messenger boy on the stage. The villain does something and the messenger boy falls down, but the audience does not see what it is that the villain does. (I might point out that one version or school of the theatrical tradition I am telling you about requires that whenever the villain is on stage, he appears to the audience's left. There are other versions of this tradition which fail to impose such a requirement, or which have different but similar ones.)

4. We may now clear the stage in order to examine some of the ways in which case concepts can be called on to describe the syntactic and semantic characteristics of certain English verbs. Let us begin with the verb HIT.

Conceptually the verb HIT requires an understanding of some object and a place where this object achieves contact. (The reader might be more pleased if I were to state that the

meaning of HIT involves merely the coming into contact of two objects. It must be recalled that I am committed to viewing two objects associated with a verb as appearing, somehow, in different roles.) We may refer to the two roles associated with HIT as Instrument and Place respectively.

The basic concept requires an understanding of an object coming into contact with something, but it happens also to be true that simple expressions using this verb may contain mention of an animate being that is responsible for an act of hitting. Another role that is compatible with uses of the verb HIT, in other words, is that of an Agent. We can symbolize these observations with the notation given in (41),

(41) $HIT_{Place, Instrument} (Agent)$

where the subscripted terms are names of roles that arguments can play with respect to the predicate HIT. The expression in parentheses indicates that the Agent role is optional.

To say that the Agent role is not an obligatory component of the meaning of expressions with HIT is to agree that in a sentence like (42)

(42) THE ROCK HIT THE TREE.

one may quite well be referring to what happened when a rock rolled down a hill, completely without any implication of outside agency.

Conceptually, as we have seen, the Agent is an unnecessary part of expressions containing HIT. Syntactically, certain conceptually present roles may be 'suppressed' under certain conditions. For example, when an Agent is identified, it is not obligatory to mention the Instrument. Thus, we may understand sentence (43)

(43) JOHN HIT THE WINDOW.

as meaning that John, as Agent, was responsible for an occurrence of the kind of contact indicated by the verb HIT. The implement is not mentioned, but its absence is of a different order from that of the Agent in (42); conceptually, the

instrumental relation is present in (43), because a sentence like (44)

(44) JOHN HIT THE WINDOW, BUT HE DIDN'T HIT IT
WITH ANYTHING.

is semantically anomalous.

It is a fact of English syntax that if both Instrument and Agent are identified in sentences containing the verb HIT, the Instrument shows up as the third thing mentioned, marked off with the preposition WITH. Notice sentence (45).

(45) JOHN HIT THE WINDOW WITH A SHOESTRING.

However, if only the Instrument and the Place are mentioned, as in (43), the Instrument shows up, not as the object of the preposition WITH, but as the subject of the sentence. The facts, then, that one may identify the Agent without indicating the Instrument, and that the Instrument may be mentioned without implying an Agent, account for the ambiguity of the earlier sentences about Peter doing things to the window.

If the place is "understood", from the context, the verb HIT may be used with the Instrument alone. Thus a sentence like (46)

(46) THE BULLET HIT.

is usable whenever it is not necessary to indicate the Place. Notice that mention of the Place can be omitted when the subject is the Instrument, but not when the subject is the Agent. That is, there is no sentence of the type (47)

(47) PETER HIT.

where the sense is that Peter hit the target with an arrow, say, and the Instrument and Place are perfectly well understood from the context of utterance.

English syntax allows the noun indicating the place to appear in first or subject position if the verbal expression is converted to its passive form. If only the Place is mentioned, the passive form is required. Sentence (48)

(48) THE TARGET WAS HIT.

is a way of expressing that an act of hitting took place, while only mentioning the Place. When either the Agent or Instrument is mentioned, it is marked by an appropriate preposition. If the Agent is mentioned, it is marked by the preposition BY. Notice sentence (49).

(49) THE TARGET WAS HIT BY HARRY.

When the Instrument is mentioned, the choice of preposition depends on whether the notion of Agent is conceptually present or not. If the event involves only an Instrument and a Place, the Instrument noun is marked with the preposition BY; if the event involves an Agent, however, even when the noun that would identify the Agent is not syntactically present, the Instrument noun is marked with the preposition WITH. Notice the difference between (50) and (51):

(50) THE WINDOW WAS HIT BY A BRANCH.

(51) THE WINDOW WAS HIT WITH A BRANCH.

(There is a certain amount of indeterminacy in these generalizations. The careful reader may have noticed that I said of the Agent that it was marked by the preposition BY, of the Instrument that it was marked with the preposition WITH.)

All of these observations are facts that speakers of English know about the verb HIT. It is not true, of course, that they are all idiosyncratic facts about that single verb. They happen also to apply to the verbs STRIKE and TOUCH, and a few others, as well.

We turn now to a verb of a slightly different type, the verb BREAK. The ambiguity we saw first in the sentences about people hitting, touching and striking windows was matched, as we saw, by that of sentence (37).

(37) PETER BROKE THE WINDOW.

That is, either Peter's body was instrumentally involved in damaging the window, or Peter used something (possibly a part of his body) to damage the window. This suggests that the surface subject of active transitive simple sentences

with BREAK can represent either an Agent or an Instrument. The fact that (52)

(52) PETER BROKE THE WINDOW WITH A GUN-BUTT.

is not ambiguous suggests that, as with HIT, BREAK allows both Agent and Instrument to be expressed in the same sentence, but requires, in that case, that the Agent appear as the subject and that the Instrument appear as the object of the preposition WITH. A property that distinguishes BREAK from the other verbs is that there are syntactically and semantically complete sentences which mention neither Instrument nor Agent. Recall sentence (38),

(38) THE WINDOW BROKE.

where the same relationship between the window and the predicate holds as in the sentences where THE WINDOW is the direct object. The analogous sentence (53)

(53) THE WINDOW HIT.

is not acceptable. This difference is apparently relatable to the fact that BREAK is an inherently one-place predicate, while HIT is an inherently two-place predicate. Another difference between them is that while HIT can occur with the Instrument only, the Place being understood from the context (recall sentence (46)), the analogous possibility does not exist with BREAK. To express the information that the hammer broke the window is the context where everybody knows what it is that got damaged, the speaker of English is not free to omit the direct object and say merely (54):

(54) THE HAMMER BROKE.

We can summarize these facts by saying that the verb BREAK is inherently a one-place predicate, that the role which is obligatorily expressed with it is one that can be given the label Object (for want of a better word), and that expressions containing this verb assert of the noun identified as Object a certain kind of change of state from a whole to a damaged condition. The verb can be used with an Instrument or an

Agent, under the restriction that an Agent is tolerated only if there is conceptually an Instrument present. The formula given in (55) summarizes these observations:

(55) BREAK_{Object (Instrument (Agent))}

As with expressions containing HIT, the same conditions hold for choice of subject, choice of prepositions, and use of the passive form.

In addition to the differences already mentioned, there is another one which relates to the roles I have identified as Object and Place. The decision to assign these labels finds some support in the fact that there are languages which use a Locative case ending for nouns that go with verbs of hitting, Accusative case endings with nouns that go with verbs that refer to breaking. A syntactic distinction shows up in English when the noun in question is the name of a body part. Body part nouns can be used to identify places or objects. Where they identify places, but not otherwise, there are in English paraphrase relations between genitive constructions and constructions containing locative phrases. For example, (56) is a paraphrase of (57),

(56) SCHWARTZ HIT HARRY'S NOSE.

(57) SCHWARTZ HIT HARRY IN THE NOSE.

but there is no such paraphrase relation between (58) and (59).

(58) SCHWARTZ BROKE HARRY'S NOSE.

(59) *SCHWARTZ BROKE HARRY IN THE NOSE.

The facts that came to light about the roles that could be associated with HIT are not idiosyncratic facts about HIT; they apply also, with some variation, to some other verbs of surface contact like SLAP, STRIKE, BUMP, SMITE, and TOUCH. The facts that were brought up in connection with BREAK apply equally well to other change-of-state verbs like BEND, FOLD, SHATTER, and CRACK. Many of them, in short, appear to be general facts about English, rather than facts that need to be registered separately in the lexical entries for each verb.

Examples of a different sort are expressions containing the verbs ROB and STEAL. Both of these words are used in connection with the same type of activities, and both of them

conceptually relate to three things: the being who does it, the being or institution that suffers a loss, and the object or objects that change ownership. Basic to the sense of each verb are the notion of transfer of ownership without permission of the original owner, and the notion of illegality. The three roles may be identified as the familiar Agent and Object for the performer and the object that is transferred from one owner to another, and Dative for the person or institution that experiences the loss. In general the case concept Dative refers to the being or institution that experiences something or has something happen to it.

Both of the verbs ROB and STEAL conceptually require an understanding of all three roles. They differ from each other in that ROB allows the speaker to mention only the Agent and the Dative (leaving the Object unspecified) and STEAL allows him to mention only the Agent and the Object (leaving the Dative unspecified). The syntactically basic elements show up as subject and object in each case, the optional element appearing, if at all, as object of a preposition. Because of these options, the verbs ROB and STEAL allow one to see very clearly that there is an essential difference between syntactic roles and the meanings of the nouns that fill these roles. Compare sentences (60) and (61).

(60) HARRY ROBBED A CASINO.

(61) HARRY STOLE A CASINO.

In each case the non-required role can be mentioned, in the form of a preposition phrase. Notice sentences (62) and (63).

(62) HARRY ROBBED A CASINO OF ITS SILVER.

(63) HARRY STOLE A CASINO FROM HOWARD HUGHES.

These two verbs allow other options as well. If one wishes to mention only the Dative element, one uses the passive of ROB, as in (64).

(64) THE CASINO WAS ROBBED.

If one wishes to mention only the Object element, one uses

the passive of STEAL as in (65).

(65) THE SILVER WAS STOLEN.

If one wishes to mention only the Agent, indicating the activity of taking things from people as a typical or professional activity, one may use the verb STEAL, as in (66).

(66) HARRY STEALS.

The verb ROB does not allow us that luxury.

The analogy with the drama is suggestive for simple verbal expressions, but there is one other 'role' that we find associated with verbs, and that is the role provided by an embedded sentence (a play within a play). One might wish to say of the verb BELIEVE that it takes a Proposition as one of its arguments, and a Dative as the other. In a sentence like (67), for example,

(67) MARY BELIEVES THAT HARRY IS A GENIUS.

the predicate BELIEVE takes two arguments, one the experiencer of the belief, the other the content of the belief. The verb PERSUADE has the same central sense as BELIEVE, but PERSUADE requires syntactically an Instrument or an Agent. Thus a sentence like (68)

(68) HIS SMILE PERSUADED MARY THAT HARRY WAS A GENIUS.

identifies the Instrument or stimulus responsible for this change of state, while (70) identifies Schwartz as the Agent.

(70) SCHWARTZ PERSUADED MARY THAT HARRY WAS A GENIUS.

5. It would be possible to go on at some length exploring the semantic and grammatical properties of individual verbs, and if we did we would continue to find semantic and grammatical properties which different verbs share. I should like now, however, to itemize a few of the various facts about verbs that a complete theory of lexical informations will have to account for. I conceive of a lexicon as a list of minimally redundant descriptions of the syntactic, semantic

and phonological properties of lexical items, accompanied by a system of redundancy rules, the latter conceivable as a set of instructions on how to interpret the lexical entries. In what follows I shall make no attempt to sort out from each other those types of facts which must be recorded as idiosyncratic information about specific verbs and those which are best seen as instances of general facts about whole classes of verbs. It may be a long while before such distinctions can be sorted out with any subtlety.

First, there is what we might wish to call the basic or central sense of a verb. For HIT and TOUCH, there is the matter of surface contact, the difference in meaning between the two verbs having to do with intensity of impact. For ROB and STEAL there are the notions of transfer of ownership and illegality.⁸ The verb BURGLARIZE adds to that the notion of

⁸To some speakers, expressions with STEAL contain implications of stealth or secrecy.

forcible entry.

Second, it is necessary to specify the number and the nature of the roles--the 'cases'--that are conceptually inherent to the basic sense of the verb. These roles, I have suggested, can be identified by terms like Agent, Instrument, Object, Place, etc., and are thus freed from matters of left-to-right position. BREAK requires one case, the Object that undergoes the change of state. HIT requires two cases, ROB or STEAL require three. BUY and SELL require four cases, assuming that some reference to money is inherently a part of the meaning of these verbs.

Third, certain verbs impose certain specific understandings onto one or another of their inherently associated arguments. BEND, for example, imposes an understanding of "offering resistance" onto the Object. That is, when we hear a sentence like (71),

(71) HE BENT HIS HANDKERCHIEF.

we have to modify our usual understanding of the properties of handkerchiefs in order to make sense of it. The handkerchief might be starched. Or consider the verb ASSASSINATE. The Dative element associated with this verb is understood as a person in some important political or religious position.

Fourth, for certain verbs the nature of our understanding of one of the arguments is so clear that the argument itself need not be mentioned at all unless quite specific additional information is to be communicated. The typical Instrument associated with SLAP or KICK or KISS is a hand, a foot or a pair of lips respectively, but if the speaker of English has nothing special to say about these, he doesn't need to mention them. That is, we do not say (72), but we might say (73).

(72) HE SLAPPED ME IN THE FACE WITH HIS HAND.

(73) HE SLAPPED ME IN THE FACE WITH HIS MUDDY LEFT
HAND.

We seldom find it necessary to say (74), but we might have reason to say (75).

(74) SHE KISSED ME WITH HER LIPS.

(75) SHE KISSED ME WITH EAGER LIPS.

Notice that these facts are not simply consequences of the specificity of the associated arguments. You can't STUB anything but a toe, but you have to use a word that refers to one or more toes anyway.⁹

⁹What is at issue here is not whether SLAP obligatorily refers to hands--one can after all slap someone with a fish--but whether there is some typically understood Instrument which need not be made explicit.

Fifth, we need to indicate which non-inherent cases are compatible with the verb in a simple sentence. The notion Agent is not inherent to the basic sense of HIT, but an Agent may be expressed in simple expressions containing this verb anyway.

The same is not true of a verb like SLEEP. If one person is responsible for another person's sleeping, English requires an expression with two verbs as in (76).

(76) THEY MADE ME SLEEP.

Sixth, we need in general to indicate which of the cases need to be expressed and which can be suppressed. As I suggested earlier, although Instrument and Place are notions inherent to HIT, one doesn't need to mention the Instrument in a sentence that identifies the Agent, and one doesn't need to mention the Place if there is no Agent and the identity of the Place is known from the context. This is characteristic of some surface-contact verbs, but not all.

Seventh, it is necessary to know, for each verb, which cases can show up as the subject of a sentence, which as direct object. Recall that the verb RENT, used actively, allows different things to appear as subject, BLAME allows different things to appear as object.

Eighth, it is necessary to indicate, for those elements that do not show up as surface subjects or objects, what prepositions go with which noun phrases. For some other languages we would here be referring to the government of specific case categories by specific verbs. Statements on the choice of specific prepositions for particular roles in construction with given verbs are analogous, in other words, to such statements as that Latin UTOR takes the Ablative case, or German HELFEN takes the Dative case.

Ninth, it is necessary, for some verbs, to know whether there are semantic facts that determine such matters as the choice of subject or choice of object. I suggested earlier--incorrectly--that (19) and (20) are paraphrases of each other.

(19) BEES SWARM IN THE GARDEN.

(20) THE GARDEN SWARMS WITH BEES.

While (20) suggests that the whole garden is full of bees, (19), being a generic statement about bees, does not. The

choice of surface subject, in other words, may, for some verbs, be linked with semantic facts about the sentences containing them. The same is true for some of the verbs that allow alternative choices of direct objects. Sentence (77)

(77) HARRY SPRAYED PAINT ON THE WALL.

is a near-paraphrase of (78)

(78) HARRY SPRAYED THE WALL WITH PAINT.

though the latter suggests that the whole wall got covered with paint, while the former does not.

Tenth, it is necessary to know what modifications in the verb are called for in connection with each subject choice. Either tenant or landlord may appear as the subject of RENT in its active form, but the rented property, expressed as subject, calls for a passive form of the verb. With GIVE, only the giver may be mentioned as subject with the verb in its active form; the passive is called for when either gift or recipient is expressed in the subject position.

6. Obviously, a child facing the task of learning to speak English does not have to learn this whole range of information item-by-item for each verb. Many of these facts appear to be instances of quite general properties of English as a whole, many are most probably explainable in terms of properties of human language in general. My purpose in this essay has been merely that of displaying the kinds of information that have to be accounted for one way or another and suggesting a framework for describing these facts.

My discussion has been limited to verbs, but the ideas are relevant to the descriptions of adjectives and nouns as well. Examples that one might start with in a case-grammar study of adjectives are the following:

(79) APPLES ARE HEALTHY.

(80) HARRY IS HEALTHY.

(81) THE MOVIE WAS SAD.

- (82) HARRY IS SAD.
(83) HARRY IS CERTAIN TO FAIL.
(84) SCHWARTZ IS CERTAIN THAT HARRY WILL FAIL.¹⁰

¹⁰Both HEALTHY and SAD are predicates that take Dative arguments, but they may take Instruments--entities capable of bringing about the state or experience referred to--as well. It happens that when these predicates take Instruments and the Dative element is generic or non-specific, the Dative element need not be mentioned. The adjective CERTAIN takes a Dative element and a Proposition. When the Dative element is syntactically realized, we get a sentence like (84) with the Dative noun appearing as subject, the Proposition as a that-clause complement of the adjective. When the Dative element is not present syntactically, an 'empty' subject may be chosen (matching (84) but with IT replacing SCHWARTZ), or the noun that would have been the subject of the embedded sentence becomes the subject of the whole sentence (as in (83)). In this latter case, the embedded Proposition appears as an infinitival complement to the predicate.

Emmon Bach has recently suggested reasons for treating nouns as predicates,¹¹ and I find that many things that one can

¹¹Emmon Bach, "Nouns and noun phrases," in E. Bach and R. Harms, eds., Universals in Linguistic Theory, Holt, Rinehart, and Winston, 1968

say about the other more obvious predicate words apply to nouns as well. Recall that there is a difference between the basic meaning of the verb and the various kinds of understandings that verbs impose on the arguments that they take. This distinction, it seems to me, can be found in nouns as well. In this regard we may consider the only English noun that has so far been given a semantic analysis: BACHELOR. We have learned that the noun BACHELOR identifies something which is Male, Human, Adult and Unmarried. It seems to me that only Unmarried (or, more accurately, 'never before married') is the concept that

one would wish to associate directly with the meaning of BACHELOR, and that the other three properties make up part of our understanding of the nature of arguments that BACHELOR as a predicate can accept.

Chomsky has recently discussed what he refers to as the "lexicalist" position on derived nouns.¹² I believe that

¹²Noam Chomsky, "Some remarks on nominalizations," to appear in R. Jacobs and P. S. Rosenbaum, eds., Studies in English Transformational Grammar, 1968.

many of his proposals can be re-interpreted in case terms in a fairly straightforward way.

I continue to think that the world must wait another two or three decades before it will see anything resembling a respectable grammar of English. I, at least, remain almost totally baffled by tenses, modals, determiners, quantifiers and adverbs. But I have the feeling that real progress can be made in understanding the elementary structure of the "propositional" core of simple sentences, and in understanding the semantic and syntactic properties of the major parts of speech, by abandoning a conception of syntax that restricts itself to categories and sequences in favor of a conception of syntax-semantics that is based on a theory of the essential ways in which aspects of linguistically codable experiences are relatable to each other and to the experience as a whole.