Journal Title: Discourse and cognition : bridging the gap /

Volume: CSLI Publications, Stanford Un
Issue:
Month/Year: 1998
Pages: 41-54.

Article Author: Goldberg, A. E. (1998).

Article Title: Semantic principles of predication.

Call #: P302.8 .D573 1998

Location: RECAP

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DISCOURSE AND COGNITION

BRIDGING THE GAP

edited by

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CSLI *Publications*

CENTER FOR THE STUDY OF
LANGUAGE AND INFORMATION
STANFORD, CALIFORNIA

Semantic Principles of Predication

ADELE E. GOLDBERG
University of California, San Diego

1 Introduction

This paper addresses the question of what types of events can be construed together to form a single semantic predication.[1] By a "single semantic predication," I intend a unitary grammatical expression of an action, state or combination thereof applied to a single argument. Three different cases are discussed: subevents evoked by a single verb, events evoked by the combination of a verb's lexical semantics and the semantics of a clause-level construction, and finally, the events designated by conjuncts in principled violations of the coordinate structure constraint. It is argued that each of these three types of predications shows a strikingly similar set of possible relations and thus leads us toward a general theory of cognitively plausible predication structures.

2 Individual Lexical Items

One proposal for a constraint on the possible semantics of verbs comes from Croft (to appear:20), who proposes that "a possible verb must have a continuous segment of the causal chain in the event ICM as its profile and as its base." That is, verbs are claimed to only evoke (and designate) two subevents if the two subevents are directly causally related.

In order to explore this claim, we need to address two definitional issues. First is the question of what should count as distinct subevents within a

[1]I would like to thank Michael Israel, Bill Morris, Mark Turner, an anonymous reviewer for this volume, and the audience at CSDL II for helpful comments on this topic.

lexical item's designation, and second is the issue of what should count as a causal relationship.[2]

It is not always obvious what should count as a distinct subevent in a lexical item's designation. For example, do we construe *saute* as designating two events "heat with a small amount of fat" and "stir" or only one? How do we decide? We cannot use the fact that a word can be paraphrased with a single verb as the criterion without begging the question: can a single verb designate two causally unrelated events?

It is likewise not clear when we construe a causal relationship to exist. For example, does being genetically predisposed for some disease cause the disease if not everyone who has the predisposition ends up with the disease?

These issues have been debated for centuries, and the lack of concensous casts some doubt on the idea that there exist necessary and sufficient conditions for deciding either of these two questions. Given present day theories of categorization, it is in fact not clear that we should expect such necessary and sufficient conditions in this domain (Croft 1991; Espenson 1991). In any case, I do not attempt to fully resolve these questions here, but I think some progress can be made on the present topic by considering cases that are rather clearcut.

For present purposes I will assume conservatively, that a verb is construed to involve two subevents if and only if there are two independently describable aspects of what is designated by the verb that do not entirely overlap in their temporal dimension:

> Two events e_1 and e_2 are distinct subevents of an event E designated by a verb V, iff E $\rightarrow$ e_1 & e_2, and e1 is not completely within the temporal extent of e_2.

According to this definition, *saute* is construed as only designating one event since the two aspects of heating and stirring overlap temporally such that the stirring is completely within the temporal duration of the heating. That is, while it is certainly possible to continue stirring after the heating is finished, such continued stirring is not implied by the sauteing event.

On the question of causality, I will consider any event that is sufficient to lead to a new state or event to be a cause. That is, if an event, e_1 is sufficient to lead to a second event or state, e_2, then I will assume that e_1 causes e_2. I will not consider necessary conditions causal unless they are also sufficient. According to this definition, being predisposed for some disease does not strictly speaking cause the disease since, while it may turn out to be a necessary condition, it is by hypothesis, not a sufficient condition.

Verbs which designate both an activity and the endstate of that activity–

[2]Here an below I am referring to what are construed to be two events and what is construed to be a causal relation, not the more philosphical and probably unanswerable question of what an event or a causal relation really is in the world.

Dowty's (1979) *accomplishments*–can be classified as having two subevents that are causally related. The activity and the resulting state are considered two distinct subevents because the resulting state does not completely overlap temporally with the activity. Examples include *strangle*, "to squeeze someone's neck until death" and *fill* "to infuse until full." This analysis of accomplishments and achievements is in accord with longstanding and widespread assumptions about this type of predicate (see e.g. Gruber 1965; McCawley 1968; Dowty 1979; Pustejovsky 1991; Grimshaw & Vikner 1993; Hovav & Levin 1996.) The two subevents are related causally because the activity is sufficient to bring about the change of state.

Lexical accomplishment verbs clearly follow the generalization that individual lexical items evoke causally linked subevents. However, a close look at certain lexical items suggests that the generalization does not always hold.

2.1 Preconditions in a Semantic Frame

Consider the verb *appeal* as in:

(1) The lawyer appealed the case.

This verb presupposes the existence of a previous complex event involving a trial which resulted in a guilty verdict, and asserts a subsequent act of filing legal papers for the purpose of a retrial. The two subevents are not causally related: one does not cause the other, nor vice versa.

The verb *appeal* evokes a complex frame in the sense of Fillmore (1975, 1982, 1985) or idealized cognitive model (ICM) in the sense of Lakoff (1987). A verbal frame is an idealized cognitive model based on the recurrence of one or more events or states in human experience. We have as part of our world knowledge the understanding that trials which result in guilty verdicts may be retried; *appeal* gives a name to this complex frame of experience, foregrounding or asserting the filing of legal papers. Other examples can be found as well. Two general classes of such verbs include verbs that are prefixed with *pre-*, and those that are prefixed with *re-*. For example, *preview* designates an event of viewing while presupposing another subsequent public event of viewing. The first viewing event does not cause and is not caused by the later viewing event. *Reconsider* designates an act of considering, while presupposing a previous act of considering. *Reattach* presupposes both a previous state of attachment, and an intermediate event of detachment. The final change of state involving becoming attached is asserted. Table 1 summarizes the events evoked by these verbs:

	Asserted	Presupposed Event
appeal	to file for retrial	after court case was lost
preview	to view	before a subsequent (public) viewing
reconsider	to consider	after previous act of considering
reattach	to attach	after initial attachment, detachment

Table 1. Verbs that evoke complex frames

These verbs assert one subevent and presuppose another, without a causal relation between the two. Instead, we can view the presupposed subevent as a *precondition* of the asserted event.

2.2 Negation of an aspect of a frame

Other lexical items designate the denial of an implication in an idealized cognitive model. For example the verb *stiff*, as in *to stiff a waiter* means "to fail to tip after eating a meal at a restaurant." The ICM of eating at a restaurant implies that a tip is left at the end of the meal, but this verb serves to contradict that implication. There are two distinct subevents involved: a presupposed event of eating a meal at a restaurant, and an asserted event involving the diners failing to leave a tip. Again the two events are not causally related: the eating of the meal does not cause and is not caused by the failure to tip. Another example is *betray* which evokes the semantic frame of individuals being in a state of sharing a trusting relationship, when at some point an individual acts in an unexpected and hurtful way. In these cases, the verbs designate the denial of an aspect of an idealized cognitive model. In the case of *stiff* the restaurant ICM is evoked; in the case of *betray* an ICM involving how people are expected to act in a trusting relationship is evoked. Other examples like these cases include:

	Asserted	Presupposed Precondition
stiff	to fail to tip	after eating at a restaurant
betray	to fail or desert someone	after having the person's trust
renege	to change one's mind	after promising to do something
miscarry	to spontaneously abort	after becoming pregnant

Table 2. Verbs that specify the failure to satisfy an ICM

2.3 Summary

To summarize, as observed by Croft, many verbs designate causally linked subevents (*strangle, fill*, etc). Tables 1 and 2, however, provide examples that do not involve a causal sequence of subevents. Table 1 consists of cases in which the verb involves a sequence of subevents in an idealized cognitive model (e.g., *appeal, preview, reconsider, reattach*). In these cases, one subevent acts as a precondition for another asserted subevent. Table 2

provides examples in which the scenerio designated by the verb designates the violation of some part of an idealized cognitive model (*stiff, betray, renege, miscarry*).

The question may arise as to what types of subevents are not possible aspects of a single verb's designation. Croft (1991) offers the example of "spinning and getting hot" as an impossible meaning for a verb. Of course such a meaning is only impossible if there is no semantic frame that relates these two events. If we imagine some kind of superstitious ritual in which a ball is spun rapidly on a turn table in an oven until the ball bursts (the time until bursting taken to indicate, for example, the length of a pregnancy), then it is not hard to imagine giving a name to this process, e.g. *The guru* hotspun *the ball.* What are not allowed to become subevents within a single word's designation are two or more subevents that are not related by a semantic frame. The frame can relate the two events by a causal connection, by a simple juxtaposition found with some regularity, or by serving as a counterfactual for what is asserted by the verb.

In the following section, a second case is examined; this case involves a slightly more elaborate instance of predication than that of the individual verb in isolation. In particular, the combination of the event designated by the verb and that designated by the construction is considered.

3 Predications designated by Verb and Construction

There is a growing consensus among many researchers that it is important to distinguish a verb's inherent or "core" lexical semantics from the semantics associated with the grammatical structures in which the verb can occur (Goldberg 1992a, 1992b, 1995, 1997; Pinker 1994; Fauconnier & Turner 1994, 1996; Mandelblit 1995; Fillmore & Kay 1995; Hovav & Levin, 1996). The way I have discussed this idea is that the simple sentence types are directly correlated with semantic structures. For example, in English we find the following correspondences:[3]

Ditransitive:	Subj V Obj1 Obj2	X CAUSES Y to RECEIVE Z
Caused-Motion:	Subj V Obj Obl	X CAUSES to MOVE Z
Resultative:	Subj V Obj Pred	X CAUSES Y to BECOME Z
Transitive:	Subj V Obj	X ACTS ON Y; X EXPERIENCES Y

Table 3.

[3]The form of constructions is defined in terms of grammatical relations in order to abstract over the linear order of constituents. For example, I assume the same ditransitive construction is involved when it is questioned, e.g. *What did Pat give Chris?* or clefted, e.g. *It was a book that Pat gave Chris.* I should also note that the constructional semantics given in Table 3 is somewhat oversimplified, since one formal pattern is typically polysemous and occasionally ambiguous (See Goldberg 1995 for discussion).

See Goldberg (1995) for motivation for this distinction between lexical and constructional meaning. If we assume this distinction for a moment, it makes sense to ask whether the range of possible semantic relationships between the event designated by the verb and the event designated by the construction display similar characteristics to those we saw for subevents within a single lexical item's designation.

It is clear that the most common case is one in which the verb and the construction do not designate two separate events. Rather the verb serves to lexically code or elaborate the event that the construction designates. For example, if we assume that the ditransitive construction has roughly the meaning of transfer, "X CAUSES Y to RECEIVE Z" then it is clear that the verb *give* lexically codes this meaning. The verbs *hand* and *mail* lexically elaborate, or further specify, this meaning. More interestingly for the present purposes are cases wherein the verb does not itself lexically designate the meaning associated with the construction, in which case we have two distinguishable events.[4]

3.1 Causal Relations

Talmy (1985) has noted that a common pattern in English, Chinese, and Dutch is that the verb can code the means of achieving the act designated by the construction. This is the case in each of the following examples:

(2) a. Amy kicked Paul the ball.
b. Elena sneezed the foam off the cappuccino. (Ahrens 1995)
c. Ken wrote his way to fame and fortune.

Kicking is the means of achieving transfer; sneezing is the means of achieving caused-motion; and writing is the means of achieving metaphorical motion.

Pinker (1989) discusses the following example from Talmy (1985):

(3) The bottle floated into the cave.

He notes that this sentence is not felicitous in the situation in which the bottle is carried into the cave in a bowl of water. It is only acceptable in the case that the floating is the means of the bottle moving into the cave.

Croft (1991) similarly observes the difference in the following two examples:

(4) a. The boat sailed into the cave
b. *The boat burned into the cave.

[4] I do not rely in this case on the before mentioned criterion for determining distinct events. In particular, the events may be temporally coextensive in some cases. It is clear we have distinguishable events if we assume one is designated by the verb and another by the construction.

He notes that (5a) is acceptable because sailing is the means by which the the boat moves into the cave; (5b) is not acceptable because the burning is not the means of effecting motion.[5]

There are other ways that verbs' designations may be causally related to the meanings of constructions: the verb may code an instrument or the result as well as the means.

(5) a. Arther wristed the ball over the net.
(the wrist is the instrument of the caused motion)
b. The train screeched into the station.
(the sound is the result of the motion)

Therefore, as we saw was the case with lexical accomplishment verbs, it is possible to combine two subevents into a single predication if a causal relation holds between the two subevents.

In addition, there are certain cases, some of which were previously mentioned in Goldberg (1995), that involve relationships other than causally related ones. The cases discussed in sections 3.2 and 3.3 are strikingly parallel to the types of non-causal relationships we saw for individual verbs in sections 2.1 and 2.2, respectively.

3.2 Precondition in Semantic Frame

If we assume that the ditransitive construction has roughly the meaning of transfer, i.e., "X CAUSES Y to RECEIVE Z" (e.g., Goldberg 1992b), then we find that this construction allows the verb to designate a precondition of transfer, namely, the creation or preparation of the transferred entity. For example:

(6) Dave baked Elena a cake.

Here the preparation of the cake is a precondition for Dave's transferring the cake to Elena. Transferring something from an agent to a recipient is associated with a certain frame of semantic knowledge. In particular, we know that what is transferred from one person to another is often prepared for that purpose. The preparation or creation of the transferred entity can thus be viewed as a salient action within our frame semantic knowledge of transferring.

Interestingly, for many speakers, the verb does not designate a precondition as readily in other English constructions. For example, for a theme to move in a direction requires the precondition that the theme be free of physical restraints. In the following construction which designates caused motion, the verb designates the precondition of removing constraints that

[5]These cases were what led Croft to propose that lexical items only designate causally linked events. However these cases are treated here as combinations of verb and constructional meaning.

Example 5b is acceptable on the interpretation that the boat's image became engraved on the cave by burning. This interpretation is predicted to be acceptable since the burning is in that case the cause of the boat's image being on the cave.

will enable motion. However, judgments on the following examples vary, with speakers ranging from finding them fully acceptable to clearly unacceptable:

(7) a. % The warden freed the prisoner into the city.
b. % Pat unleashed the dog into the yard.

The reason that the precondition of preparation in the scene of transfer may be more available than the precondition that restraints be removed in the scene of caused motion may be simply that preparation preceding transfer may be a more frequent occurrence in our experience than removal of restraints enabling motion. In transferring something from one person to another it often happens that the transferred goods have to be prepared or created for the purpose. On the other hand, it is generally not necessary to remove any restraints before causing an entity to move: most entities that might move are relatively unrestrained.

3.3 Negation of an aspect of a frame

In certain cases, the verb may specify that the scene designated by the central sense of the construction does not hold. For example, again assuming the ditransitive construction designates roughly "X CAUSES Y to RECEIVE Z," the verbs in the following serve to deny that entailment:

(8) a. Pat denied Chris a popsicle.
b. Pat refused Chris a kiss.

This is also possible in the caused-motion construction, the basic sense of the construction being "X CAUSES Y to MOVE Z." Example (10) entails that Pat caused Chris not to move into the room, thereby negating the entailment of motion associated with the construction.

(9) Pat locked Chris out of the room.

A parallel possibility exists with the transitive construction. If we take the relevant constructional sense to be "X ACTS ON Y", the following verbs serve to negate the meaning of the construction:

(10) a. Pat ignored Chris.
b. Adam resisted the marshmellows.

3.4 Co-occurring activity

Finally, there exists a case which involves a relation between events that does not parallel the cases we saw for lexical items. The *way* construction for some speakers allows the verb to designate a a co-occurring activity that is not related to the action designated by the construction in any of the above-mentioned ways (see Levin & Rapoport 1988, Jackendoff 1990, Goldberg 1995 for discussion of this construction). For example,

(11) (%) "He seemed to be **whistling** his way along." (Oxford University Press Corpus)

Interestingly, this case is less than fully robust and is not possible for all speakers. Still, it should be noted that a subset of speakers who accept (12) find the same relation possible with the intransitive motion construction:

(12) %He whistled out of the room.

However, notice a co-occurring activity is not generally possible wth all constructions. For example, I have found no speakers who accept the following expressions involving the resultative (14) or ditransitive (15) constructions:

(13) *She whistled the metal flat.
(to mean, she caused the metal to become flat while whistling)

(14) *She whistled him a box.
(to mean, she gave him a box while whistling.

4 Syntactically Complex but Semantically Unitary Predications

It turns out that there is another type of predication that is semantically unitary although syntactically complex: the case of certain syntactic conjunctions that form single predications. That is, as Ross (1967) noted, there exist coordinate structures that do not obey the Coordinate Structure Constraint (see also Goldsmith 1985; Lakoff 1986; Culicover & Jackendoff 1995). For example,

(15) What did you go to the store and buy?

Notice that there is nothing "extracted" from the first conjunct, *go to the store*, although there is something extracted from the second conjunct, *buy [ ]*. As Lakoff, Deane, and Culicover & Jackendoff have noted, there is a sense in which the conjuncts form a semantically unitary predication although they are syntactically complex.

Interestingly, Lakoff describes three distinct cases in which such violations of the coordinate structure constraint are possible. Examples of each of the three are described below.

4.1 Causal Relations

There exist violations of the coordinate structure constraint that involve conjuncts which are causally related. For example:

(16) a. Who did he go berserk and start shooting at? (Deane 1991:24)
b. That's the stuff that the guys in the Caucasus drink and live to be a hundred. (Lakoff 1986)

See also Culicover and Jackendoff (1995). These are cases which Lakoff refers to as Type III. These cases are analogous to the accomplishment verbs such as *strangle, fill,* etc. as well as to the cases in which the verb designates a causal aspect of the frame designated by the construction as discussed in section 3.1.

4.2 Preconditions in a semantic frame

Consider the following violations of the coordinate structure constraint:

(17) a. Who did he grab his pen and write to?
b. Who did he pick up the phone and call?
c. Who did he open his arms wide and hug? (Deane 1991:23)

Lakoff describes this type of exception as involving a natural sequence of events. For example, picking up a pen and writing a letter constitutes a sequence of events in the certain semantic frame of knowledge. What is intriguing is that this case is analogous to the lexical examples in Table 1 (e.g. *appeal, preview, reattach*) and the constructional cases involving verbs of creation in the ditransitive construction (*Pat baked him a cake*). Recall that the previous examples also involved a series of events linked by an Idealized Cognitive Model. In these cases as in the lexical and constructional cases, one subevent is a precondition for a distinct asserted event. As Deane (1991) points out, the first conjunct in each of the examples in (20) designates a "preparatory action" or a precondition. For example in (20a), going to the store is a precondition for buying something in the ICM of shopping; in (20b), taking a pen is a precondition for writing a letter; in (20c), opening one's arms wide is a precondition for hugging.[6]

4.3 The denial of an implication of a frame

Another type of violation of the coordinate structure constraint involves examples such as the following:

(18) a. How much can you drink and still stay sober?
b. How small a meal can you eat and feel satisfied?

These are Lakoff's Type II cases, and they involve the negation of a final aspect of an idealized cognitive model. That is, we have frame semantic knowledge that tells us that drinking causes us to get drunk; drinking and staying sober violates this implication. Similarly, we know we may not feel satisfied if we don't eat enough food; the suggestion that a small meal be eaten and be satsifying negates the implication of our frame semantic knowledge.

These cases are analagous to the lexical examples in Table 2 (*stiff, betray, dissemble, renege, miscarry*), and the constructional examples 9-11 (e.g., *She denied him a popsicle*). In all of these cases, certain events are presupposed while the denial of an aspect of the ICM is asserted.

[6]These cases are not uniformly necessary preconditions, of course, since it is possible to buy things by telephone or mail, and it is possible to write letters on the computer or by dictation. However, these are preconditions in an Idealized Cognitive Model of how shopping or letter-writing are often done.

4.4 Discussion

We have seen that the semantic generalizations about semantically complex lexical items, the generalizations about the range of relations between verb and construction, and the generalizations about which kinds of coordinate structures can violate the coordinate structure constraint show striking parallels. All three cases all the following three possibilities: 1) a causally related sequence of events, 2) a sequence of events which constitute an ICM in which one or more events are backgrounded or presupposed, or 3) a sequence of events in which one aspect of an ICM is negated.

The parallel between the lexical facts, the facts relating verb and construction, and the facts about the types of violations of the coordinate structure constraint is not accidental. Lakoff states the explanation of what types of phrases can be involved in coordinate structure violations in terms of a Predication Condition: the coordinated structure must be construable as predicating something of the isolated element (the filler) (see also Deane 1991, Kluender 1992). Thus the three generalizations are mutually reinforcing and serve to help form an empirical foundation for what types of scenarios can count as legitimate predications.

5 Other places to look

Other domains in which to look for a similar pattern include serial verbs and other complex predicates. An initial look indicates that a similar pattern can be found. Focusing on related issues in Alamblak, Bruce (1988) observes:

> "Serialization of roots in a verb stem is restricted to sequences of events which are commonly associated culturally or for which there is a cultural basis or pragmatic reason for their close association."

This quote indicates the necessity of a semantic frame in the sense discussed above. Bruce also specifically mentions a causal relation as a prototypical subtype of serial verb, a relation that is common in serial verbs cross linguistically.

Finally, while serial verbs are often largly inseparable, negative morphemes typically can intervene between individual verbs. This fact indicates that the negation of an aspect of a frame is a possibility for single predications designated by serial verbs as we saw was the case for the other unitary predications already discussed.

6 Conclusion

This paper has explored the question of what constitutes the range of legitimate semantic predications. In particular, we have considered three types of predications:

a. Subevents evoked by a single verb,
b. Events evoked by combination of verb and constructional semantics,
c. Events designated by conjuncts which violate the coordinate structure constraint

All three cases have been found to involve strikingly similar possibilities:

1. a causally related sequence of events,
2. a sequence of events constituting an ICM (one or more events may be presupposed),
3. a sequence of events in which one aspect of an ICM is negated

One interpretation of the findings presented here goes beyond the linguistic generalization to provide a more general foundation for what kinds of subevents can be united semantically to be construed as a single complex event.

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