

### 3. A three-dimensional analysis of verbal semantics

#### 3.1. A brief sketch motivating the causal analysis of argument linking

In earlier work (Croft 1986, 1990, 1993, 1994a, 1994b, 1998a, 1998b), I have argued for a model of verbal semantics in which causal relationships among participants in events play a primary role in argument linking. In particular, the direction of the transmission of force between participants (Talmy 1976, 1988) determines the order of linkings of arguments in terms of grammatical relations. This observation is crucial in providing a general characterization of the semantics of Subject and Object roles.

Subject and Object roles are polysemous, that is, they are each used for a wide variety of participant semantic roles, depending on the event class of the verb (agent, patient, instrument, recipient, and more narrowly defined participant roles). But one can construct the generalization that whatever the participant roles of the arguments are, the Subject referent will antecede the Object referent in the causal chain denoted by the event class. To take a simple and straightforward example, in the prototypical event type with a volitional agent and a physically affected patient, as in 1, the argument linked to Subject acts on the argument linked to Object:

- (1) *Bill broke the egg.*

The directness of the transmission of force can vary to some extent, as in 2, although lexicalization patterns generally imply a relatively direct causal relationship between Subject and Object referents of a simple verb (see e.g. Haiman 1983:783-87):

- (2) *Bill broke the egg with a spoon.*

What matters is that the subject is antecedent in the causal chain relative to the object.

Oblique (prepositional phrase) referents may be either antecedent to the Object referent in the causal chain, as in 2, or subsequent to it, as in 3:

- (3) *Bill broke the egg for Greg.*

Like the Subject and Object roles, most Oblique case markers are massively polysemous, that is, each case marker encodes a wide variety of participant semantic roles depending on the event class of the verb. In virtually all cases, however, each case marker can be uniformly described as specifying only participant roles antecedent to the Object referent in the causal chain (e.g. *with*) or roles subsequent to it (e.g. *for*). (In languages with only one case marker, and languages where the case/adposition system is breaking down, the antecedent-subsequent distinction also breaks down—Croft 1991:188-89.)

There are two other significant properties of the semantic representation used in this model, both of which are characteristic of cognitive linguistic semantic representations. First, a semantic representation specifies not only the concept denoted by the linguistic element, but also the semantic frame in which it occurs. In a sentence like 3, the whole scene includes the causal relations between agent, patient and beneficiary; but the verb profiles only the part of the causal chain extending from Agent to Patient (indicated in boldface in 4):

- (4) **Agent** → **Patient** → Beneficiary

In 4, the verb profiles the first part of the causal chain, while the preposition *for* profiles the latter part. In an example such as 3, where the antecedent Oblique referent is between the Subject and Object referents in the causal chain, it is included in the verb profile:

- (5) **Agent** → **Instrument** → **Patient**

The distinction between the profiled and unprofiled portion of the event semantic representation is also crucial for describing argument linking: Subject and Object referents are the initiator and endpoint respectively of the profiled part of the causal chain.

The principles of argument linking enunciated above can be represents by three highly general linking rules, given in 6 (a fourth rule, also given in 6, applies to incorporated arguments; it will be discussed in future chapters):

(6) *Linking rules:*

1. Verbal Profile delimited by Subject, Object (if any)
2. Subject < Object
3. Antecedent Oblique < Object < Subsequent Oblique
4. Subject < Incorporated Argument < Object

The second salient feature of the semantic representation advocated here is the pervasive presence of **conceptualization** (construal). Not all events are as simple and straightforward to describe in terms of linear causal chains as volitional agent–physically affected patient event types, as all researchers on argument linking know. This is because many events are more complex in their causal structure than a simple linear causal chain model suggests. Also, events include noncausal relations among participants as well as causal ones. Languages (that is, their speakers) conceptualize or construe events in systematic ways, coercing them so to speak in order to fit them into the semantic patterns implied by their grammatical constructions.

A good example of a more complex causal structure is found with verbs denoting mental events, that is, states and processes involving emotion, cognition and perception (Croft 1993). The two participants in this event are usually described as experiencer and stimulus. In a mental event, there are in fact two mutually opposed causal relations between experiencer and stimulus: the experiencer directs her attention to the stimulus, and the stimulus causes a change in mental state in the experiencer. The full conceptual structure of mental events involves both directions of causal relations, attending-to and alter-mental-state, as in the diagram in (7):

(7)



Verbs describing mental processes highlight—that is, profile—either the attending-to relation (as in 8) or the change-mental-state relation (as in 9):

- (8) a. *Jack watched the children.*  
 b. *Melissa thought about the problem.*
- (9) a. *The dog frightened my daughter.*  
 b. *Janet's behavior puzzled him.*

The verbs in 8 profile only the upper causal relation in 7 and the verbs in 9 only the lower relation.

Stative mental verbs do not involve a transmission of force. The linking rules do not specify a single linking pattern when there is no transmission of force. Therefore the linking rules allow for either experiencer or stimulus to be linked to Subject in stative mental verbs, and in fact that is what is found, both in English (as in 10) and across languages (see Croft 1993).

- (10) a. *I can barely hear the orchestra.*

b. *The music is barely audible to me.*

One of the motivations for the model of semantic representation presented here is the hypothesis that there is a single underlying conceptual representation for a particular event class. The different verbs in the event class and the different argument structure constructions associated with them represent alternative construals of the same event (see Langacker 1976, who argues for a distinction between a universal conceptual representation and a language-specific semantic representation whose construal is determined by the grammar of the language).

The construal operations we have posited for argument linking are independently motivated as well. They chiefly involve the process of selection (Langacker 1987:117-20; Cruse & Croft to appear, chapter 4), whereby a speaker shifts the focus of attention with respect to certain aspects of a phenomenon. Examples of selection in a different domain are given in 11a-b:

- (11) a. *a red apple*  
b. *I sat on the chair.*

In 11b, *red* is normally taken to describe the color of the skin of the apple, not the entire apple. That is, the interlocutors construe the denotation of *apple* to select only the skin. (In other contexts, e.g. with solid plastic apples, the entire apple may be red.) In 11b, it is assumed that I sat on the seat of the chair, that is, the denotation of *chair* is construed to select the seat of the chair. In argument linking, shifting the profile of the causal chain represents a different selection of the salient part of the event by the speaker.

The construal operations also can be motivated by speaker intuitions. In particular, if there is a semantic contrast between object and oblique coding of a participant, object coding implies more complete or direct affectedness of the participant; and if there is a semantic contrast between subject and oblique coding of a participant, subject coding implies more direct instigation or responsibility for the outcome of the event (Croft 1994a). Also, encoding as a direct argument (subject or object)—that is, encoding as a salient part of the event profile—results in that participant being more highly focused upon, as various studies of the discourse function of passive and antipassive voice have demonstrated (*ibid.*).

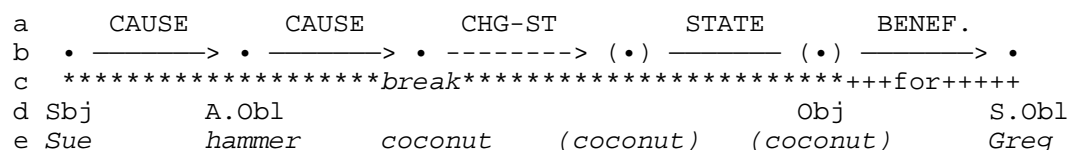
These cross-linguistic generalizations, along with the cross-linguistic generalizations that Subject-Object orientation follows transmission of force and that oblique case markers/adpositions generally subsume either only subsequent roles or only antecedent roles, provide evidence for the reality of the event structures as mental representations of speaker's knowledge of verbs, clauses and events.

### 3.2. Problems with the original causal-aspectual model (Croft 1991)

In Croft 1991 and other work (Croft 1986, 1990, 1993, 1994a, 1994b, 1998a), the causal-structure analysis outlined in §3.1 is represented in a geometric model illustrated in Figure 1 for the sentence in 12:

- (12) *Sue broke the coconut for Greg with a hammer.*

Figure 1. Causal-aspectual representation in Croft 1991, etc.



Key:

a = Event decomposition

b = Force-dynamic structure of the event

c = Verb/predicate profile

d = Linking to grammatical relations

e = Arguments

---

The assignment of English prepositions to antecedent or subsequent status are given in 13:

- (13) Antecedent Oblique: *with, by, of, nonspatial from, out of*  
 Subsequent Oblique: *to, for, spatial Path prepositions*

In this model, an event structure consists of a one-dimensional linear sequence of subevents, each of which is in a causal relation with the following segment. Subevents are individuated at the relevant level of granularity by causal, aspectual and other qualitative properties (see Croft 1991:163-66). For example, a directed process leading to a resulting state causes that state, and is treated as a distinct subevent in the causal sequence even though the participant is the same. This sequence is called the **causal chain**. Causal relations in both subevents are represented by the linear sequence of subevents.

Two types of subevents are distinguished: stative and dynamic. Stative subevents do not involve any change and are represented by a undirected link (a line). Dynamic subevents involve change and are represented by a directed link (an arrow). Qualitative descriptions of the type of subevent are given above each subevent.

Participants are situated at the beginning and endpoint of the subevents where they enter into the causal chain, by a •. Where two participants are involved in a subevent, their relative position is determined by their force-dynamic relationship. The antecedent participant in a segment is called the **initiator** of that segment and the subsequent participant is called the **endpoint** (in Talmy's [1988] terms, the initiator is the Antagonist and the endpoint is the Agonist).

Certain subevents involve the same participant throughout; this is notated by a parenthesized repetition of the argument representation (•). Parenthesized argument representations do not represent distinct argument positions; they are the same as reentrant structure in feature-structure representations.

It must be remembered that the semantic notation represents the structure of the situation as construed by the speaker. The conceptualization of situations for encoding in predicate-argument structures requires certain types of semantic operations to be imposed on a "raw" conceptual structure (Langacker 1976, 1987).

Finally, the **verbal profile** (called the verbal segment in Croft 1991) must be specified for each verb form (simple or derived). The necessity of clearly and accessibly representing both the structure of the situation as a whole (the frame) and its profile is the main reason why I used a geometric notation over an algebraic one for presentational purposes. The profile must

be a (possibly proper) subpart of the causal chain in the situation frame, that is, it must profile all or some of the subevents present in the causal chain. The initiator and endpoint of the profiled subevent are also profiled (compare Cognitive Grammar, in which the ‘trajector’ [= initiator] and ‘landmark’ [= endpoint] of a verbal profile are also profiled).

The profile is what the clause containing the verb form in question asserts; the frame is either presupposed (if temporally anterior or simultaneous) or implicated (if temporally posterior; note also that this is not the sole source of implicatures in this semantic framework). The participants in the profile and the presupposed part of the base are semantically obligatory. (Syntactic obligatoriness is a complex and typologically variable phenomenon only indirectly related to semantic obligatoriness; See Croft 2001, chapter 7.) The profile of the verb is indicated by \*\*\*. Adpositions can add to the profile and certain derivational constructions (e.g. causative, applicative) can alter it. Where adpositions profile an additional part of the event, this is indicated by +++.

The universal linking rules in 6 are directly representable in this semantic notation and need no further notational devices (except of course, specification of the language-particular morphosyntactic structures defining the Subject, Object, Oblique and Incorporation syntactic roles).

The rows on which the various parts of the semantic structure are placed in Figure 1 have been rearranged in order to maximize the comparability between the model proposed here and the layers of semantic and syntactic representation used in other argument-linking models. In Figure 1, the order is: semantics of event segments (if indicated), force-dynamic structure, verb profile, linked arguments, NPs filling argument roles.

The causal-aspectual representation in Figure 1 has a number of serious defects. All of the major defects follow from the fact that it does not properly distinguish causal relations and aspectual structure. Only two types of subevents are distinguished in the representation, dynamic and stative. This distinction is an aspectual one, not a causal one. As a consequence, dynamic subevents conflate true force-dynamic subevents, such as the hammer acting on the coconut, and purely aspectual subevents, such as the coconut changing state from whole to broken.

Another consequence of the conflation of aspectual and causal structure is the need for the parenthesized notation to describe the purely aspectual changes and states of a single participant. The notation is unmotivated, and moreover leads to a serious problem in specifying the verbal profile. For example, in Figure 1, the endpoint of the verbal profile is the coconut. However, the coconut is the endpoint of three subevents: the transmission of force by the hammer, the change of state of the coconut, and the resulting state of the coconut. In principle the verbal profile could end with any one of those subevents. There is no motivated principle that specifies that the verbal profile ends with the last subevent in which the coconut is the endpoint. Yet a crucial aspect of the theory of argument linking represented in Figure 1 is that differences in verbal profile lead to differences in argument linking. A representation that leads to indeterminacy in assigning a verbal profile does not provide a satisfactory representation of the role of the verbal profile in determining argument linking.

A third problem involves the representation of causation. Two models of representation of causal structure have been commonly proposed in the linguistic and philosophical literature. One defines causation as a relation between events, such that one event causes another. The other defines causation as a relation of transmission of force from one participant to another. A third model attempts to combine the two, by allowing participants to initiate events. The three models are coarsely represented in 14, for the example of *George broke the window*:

- (14) a. Events cause events: (GEORGE ACT) CAUSE (WINDOW BREAK)  
 b. Participants act on participants: GEORGE ACT-ON WINDOW  
 c. Participants act on events: GEORGE CAUSE (WINDOW BREAK)

The transmission of force represented in 14b is used in the model illustrated in Figure 1, and is justified by the cross-linguistically valid patterns of argument linking described in my earlier work and also below. The transmission of force model also captures an essential property of causation, that there must be shared arguments between causally defined subevents: causation does not operate telekinetically (Croft 1991:161-63). However, as the representation in 14b shows, the transmission of force model does not directly represent the caused event. In the model of representation in Figure 1, the caused event is represented by conflating causal relations and aspectual relations. But this “solution” causes the other representational problems we have just described. That is, the transmission of force model must also somehow represent the fact that events cause other events, which 14b does not.

Finally, the representation in Figure 1 is inadequate even for aspectual distinctions. It only distinguishes states and processes, which is just one of several major aspectual distinctions (see chapter 1). For example, it does not represent the distinction between achievements and accomplishments, or between directed and undirected activities. It also does not represent which argument is the holistic theme, which is relevant to argument linking (see Dowty 1991 and §4.1). As a result, one cannot use the representation in Figure 1 to capture the aspectual patterns described in chapter 1. Most seriously, the representation in Figure 1 does not adequately allow us to illustrate and support a central hypothesis of the argument linking theory advocated here, which is that argument linking is derivable almost entirely from force-dynamic structure, and not from aspectual structure.

All of these problems demonstrate that the representation in Figure 1 is inadequate for describing either the causal or the aspectual structure of events, or the relationship between the two. In the next section, I present a model of verbal semantic structure that solves all of the problems described above.

### 3.3. A three-dimensional representation for causal and aspectual structure

An adequate representation for the semantic structure of predicates must satisfy the following conditions. It must clearly distinguish between causal and aspectual structure. It must at least preserve the essential force-dynamic patterns that account for argument linking patterns, and yet capture causal relations between events. It must also provide an aspectual representation that can capture the distinctions and generalizations presented in chapters 1-2, including the holistic theme where present. Finally, it must offer a profile-frame semantic contrast that accurately represents both argument linking (see the linking rules in 12) and aspectual behavior (see chapter 2).

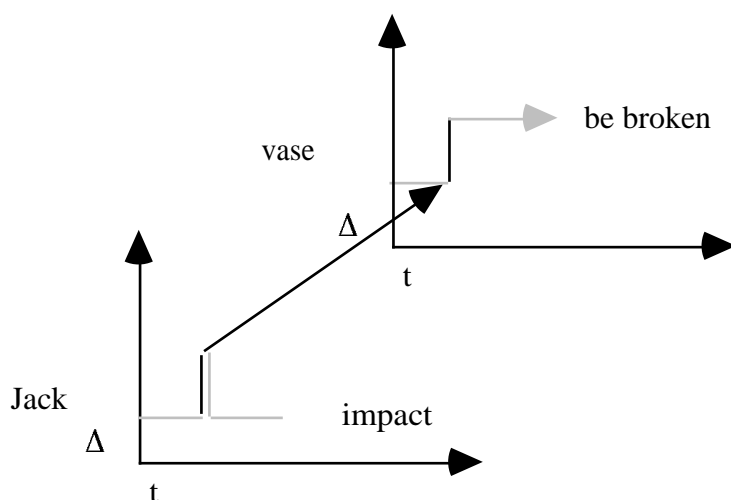
All of these problems can be solved in a single, disarmingly simple stroke. A complex verbal semantic structure is decomposed into subevents such that each subevent involves only one participant and its own aspectual contour; and the subevents are related to each other causally.<sup>19</sup> Thus, each subevent is modeled by the two-dimensional representation introduced in §§1.1-1.2, and the causal structure integrating the subevents is represented in a third dimension. The three-dimensional representation is illustrated for 15 in Figure 2:

- (15) *Jack broke the vase.*

---

<sup>19</sup>This proposal appears to be paralleled by a condition described by Rappaport Hovav & Levin (MS) as the Argument-per-Subevent Condition: ‘there must be at least one argument XP in the syntax per subevent in the event structure’. My proposal is that there is also at most one argument per subevent in the semantic representation of the situation, which is mirrored by the argument structure of the clause.

Figure 2. Three-dimensional causal-aspectual representation



In Figure 2, the situation denoted by *Jack broke the vase* is analyzed as follows: Jack engages in a cyclic achievement of contact; and this event causes the vase to undergo an irreversible directed achievement of breaking. In a coarse algebraic representation, causal relations are described as in 16:

(16) (IMPACT [JACK]) CAUSE (BREAK[VASE])

By decomposing the situation into subevents involving just one participant each, the three-dimensional representation simultaneously models causal relations between subevents—IMPACT CAUSE BREAK—and the force-dynamic relations between participants—JACK ACT-ON VASE. The directed arrow linking the two  $t/\Delta$  diagrams for each participant signals both relations at once. Thus, the three-dimensional representation can capture the cross-linguistic generalizations for argument-linking as well as the more usual representation of causation in linguistic and philosophical semantics.

At the same time, the first two dimensions allow us to model the aspectual structure of the situation as a whole and the subevents making it up, with all the detail found in chapter 1. Finally, the profile-frame contrast can be modeled in a way that simultaneously produces the aspectual type of the whole situation and the appropriate profile for the argument linking rules in 12. The overall aspectual contour of *Jack broke the vase* is an achievement (punctual on  $t$ , extended on  $\Delta$ ). The initiator of the profiled overall situation is Jack and the endpoint is the vase, meaning that *Jack* is linked to Subject and *the vase* to Object.

The three-dimensional representation also captures the fact that events in a causal chain involve interactions between participants and cannot occur telekinetically. This is because the three-dimensional model represents two different decompositions of a complex situation into subevents. On the one hand, the  $t/\Delta$  dimensions decompose the subevents in terms of their unfolding over time, as in 17 (using the phase labels defined in §1.2):

(17) a. Jack: t-state - **d-transition** - p-state - r-transition - t-state  
b. Vase: t-state - **d-transition** - i-state

On the other hand, the third, causal dimension decomposes the subevents in terms of the force-dynamic interactions between participants, as in 18:

(18) Jack  $\rightarrow$  Vase

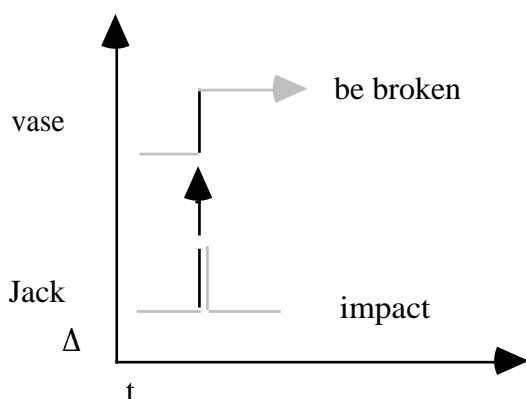
The three-dimensional geometric representation captures the complex structure of situations in a way that a one-dimensional algebraic representation cannot do easily. A situation in the real world simultaneously involves the unfolding of time, qualitative changes in participants, and causal (force-dynamic) interactions among participants. These three dimensions of situations are neatly captured in a geometric three-dimensional representation of causal-aspectual structure as in Figure 2.

An algebraic notation can capture the interrelations between these three dimensions only by a proliferation of indices indicating relations in other dimensions. Moreover, the indices in an algebraic representation would themselves be unconstrained. The necessary constraints on the indices would simply reflect the inadequacy of an algebraic notation to capture the structure of reality which is implicitly captured by the natural structure of the three-dimensional geometric representation. (On the other hand, a matrix algebra representation might render these representational problems tractable.)

In the remainder of this book, I will explore a wide range of predicates, their argument linking and their aspectual behavior in the three-dimensional framework. I will also explore a number of constructions that involve causal-aspectual structure, including various argument linking constructions, the passive and other voice constructions, resultative constructions, and causative and applicative constructions. Before proceeding, however, I will make one notational adjustment to the three-dimensional representation in Figure 2.

A three-dimensional representation is of course difficult to present in a two-dimensional medium like the printed page. The pseudo-perspective used in Figure 2 makes it difficult for the reader to align the subevents in time, i.e. synchronize them. For this reason, I will henceforth align the subevents vertically in the verbal semantic representation, with antecedent events lower than subsequent events. I will also suppress the duplicate timeline coordinates and place all the subevents in a single  $t/\Delta$  diagram. The modified three-dimensional representation for 15 is given in Figure 3:

*Figure 3. Modified three-dimensional causal-aspectual representation*



Following the representation conventions in §1.1, the profiled part of the situation is represented by solid lines, and the rest with dotted lines. The profile of the overall situation can be obtained by examining the whole profiled part of the situation. The horizontal dimension represents the unfolding of whole situation and its subevents over time. The vertical dimension represents the qualitative states/changes, AND the causal/noncausal interactions of participants in an event. The force-dynamic relations can be obtained by

examining the bottom-to-top ordering of participants along  $\Delta$  and the causal (or noncausal) links between them.

It should be remembered that ranging all the participants in a situation along a single  $\Delta$  dimension is a simplification done only for convenience. Each participant in the event has its own  $\Delta$  dimension, with values specific to that participant for that situation. For this reason, each aspectual contour is labeled to the left of the  $\Delta$  scale by the participant to whom the contour applies. The subevent for each participant is named to the right of the relevant aspectual contour.

It should be clear to the reader that one of the most important aspects of the analysis of a clause denoting a multiparticipant situation is the identification of the subevents associated with each participant in the situation. A few words of introduction to this question are thus necessary. I have used the following general rules for labeling subevents. Extended processes are generally named by the process, but directed achievements are generally named by the resulting state. (An exception to this rule is found in chapter 5, where resulting state labels for the various commercial transaction subevents would be extremely confusing.)

Certain subevent types will recur frequently in the representations that follow. Nevertheless, I do not assume that there is a small finite number of subevent types. Subevents are defined by the real-world situation encoded by the clause, and such situations are conceptually quite rich and unique in many ways. Thus, some subevent labels will be derived from the particular overall situation type in which they are found. The overall situation type should be taken as basic, and the subevents which constitute it are derivative from the overall situation type.

This is a nonreductionist approach to the semantics of situations, which I have named Radical Frame Semantics, corresponding to the Radical Construction Grammar approach to syntactic representation (see Croft 2001, chapter 1). In those cases where subevents of different situation types are categorized as the same subevent type, it should be assumed that this represents a schematic generalization over subevents, that is, similar parts of different situation types.

Finally, the three-dimensional representation implicitly encodes a constraint on the causal structure of situations expressed by verbs (Croft 1991:269; see also Rappaport Hovav & Levin MS):

*Nonbranching Causal Chain:* the semantic structure of verbs construes the encoded situation as a nonbranching causal chain

This hypothesis will guide the analyses given in this and the following chapters; problematic phenomena for this hypothesis will also be addressed (see §4.4, §6.8).

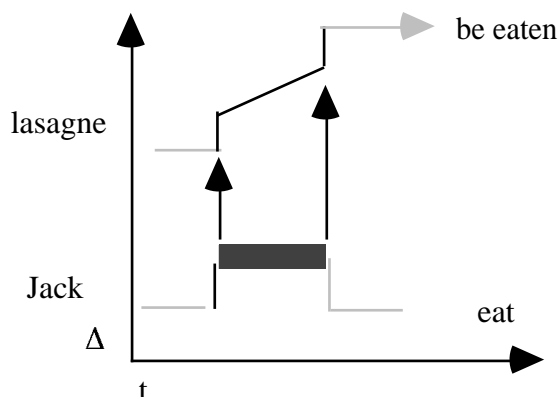
### 3.4. Prototypical causal relations and the verbal scale

The situation represented in Figure 3 is considered to be an example of the most prototypical 'transitive event' type, the one called the 'billiard ball model' by Langacker (1991:13, 283-85). In the billiard ball model, there is an asymmetric transmission of force from the initiator to the endpoint, which undergoes a change of state as a result. In fact, the most prototypical transitive event type can be described more narrowly than that (Croft 1994a): the initiator is an agent exercising his/her volition, and the endpoint undergoes a complete, even irreversible, change of state. The conceptual explanation for the prototypical character of this situation type is that this is the most clearly individuated situation type (Croft 1994a). An agent acting from his/her own volition has no salient antecedent cause, and a patient that ends in a state, especially an irreversible state, has the least likelihood of bringing about subsequent events.

Aspectually, *Jack broke the vase* is punctual, and thus represents an example of **punctual causation**. Punctual causation contrasts with **extended causation** (Talmy 1988), illustrated for 19 in Figure 4.

(19) *Jack ate the lasagne.*

Figure 4. Extended causation



In extended causation, the initiator continues to transmit force to the endpoint, which undergoes a continuous change as a result of the initiator's action. Thus, in Figure 4 there is continuous causation from the inception of Jack's eating to the consumption of the last bite of lasagne. I will notate extended causation by arrows at the beginning and the end of the interval in which extended causation takes place; this notation should be understood as indicating continuous causation through the interval.

The lasagne acts as the holistic theme for this bounded situation. It is the disappearance of the lasagne which measures out the verbal scale. Thus, the aspectual contour for the lasagne is an accomplishment. The aspectual contour for Jack, on the other hand, is an activity. Jack engages in an eating activity which in itself does not have a natural endpoint in its normal construal. It can be argued that the eating activity is directly represented as a one-participant, undirected activity in the intransitive sentence 20, as in Figure 5:

(20) *Jack ate.*

Figure 5. Intransitive activity reading of eat



In fact, a general hypothesis that is implied by the three-dimensional analysis of verbal semantics is that many (though not all)  $n$ -ary predicates can be analyzed as  $(n-1)$ -ary predicates with an added subevent.<sup>20</sup> In this case, the 2-ary predicate *eat(x,y)* is analyzed as the 1-ary activity *eat(x)* with a subsequent accomplishment subevent which renders the overall situation an accomplishment.

The aspectual type of the situation in Figure 4 is an accomplishment. I hypothesize that this fact is due to the following principle:

*Verbal Scale Construal*: if there is a verbal scale in one of the subevents of a complex situation, then the overall aspectual type of the situation is determined by the verbal scale.

One piece of evidence supporting this principle is that the holistic theme in a construction like *Jack ate the lasagne* profiles more of the time interval of the situation than the agent argument: it also profiles the inception and completion of the situation.

I also propose the following two principles governing the relationship between the verbal scale, the situation being construed, and the verbal profile in the situation:

*Verbal Scale Uniqueness*: there is only one verbal scale/holistic theme per situation encoded by a clause.

*Verbal Scale Profiling*: the verbal scale/holistic theme contour is always part of the verbal profile.

These principles appear to hold for English in the analysis presented in these chapters. I suspect that they hold for languages in general, although such a hypothesis must of course be verified with cross-linguistic evidence. The Verbal Scale Profiling principle, if valid, appears to be a constraint on possible verbal profiles, and hence influences argument linking possibilities. However, as will be seen in chapter 4, it is less a case of constraining possible verbal profiles as a case of altering the construal of a participant as a holistic theme or not.

The question remains, what is the profile on the aspectual contour for the agent argument? The inception of the agent's activity must be profiled, because it triggers the inception of the accomplishment undergone by the patient. The termination of the agent's activity is not profiled because the termination does not cause the completion of the accomplishment: it is rather the agent's last bite of the lasagne that leads to the successful accomplishment. The r-transition and rest state are found in the frame because once the incremental theme is exhausted, the agent's activity with respect to the holistic theme must come to an end.

Prototypical causal relations include the expression of salient instruments. The representation of situations with instruments is given for 21 in Figure 6:

(21) *Greg broke the coconut with a hammer.*

---

<sup>20</sup>This hypothesis is comparable to Rappaport Hovav & Levin's event template augmentation (Rappaport Hovav & Levin 1998:111).

Figure 6. Punctual causation with instrument

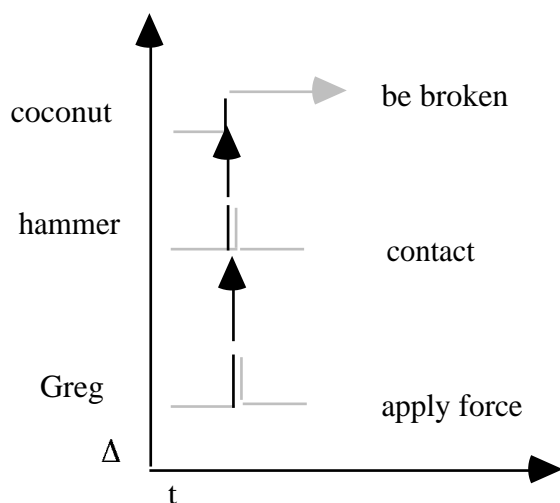
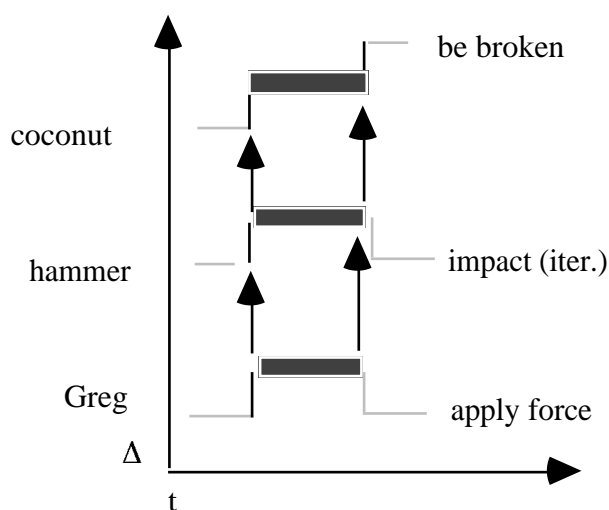


Figure 6 gives the achievement construal of 21. Example 21, with the support of a container adverbial such as *In a couple of minutes...* can also be construed as a runup achievement in which the runup activity is Greg repeatedly striking the coconut with a hammer until the coconut breaks. The runup achievement construal is represented in Figure 7 (see also §4.3):

Figure 7. Runup achievement construal of punctual causation with instrument

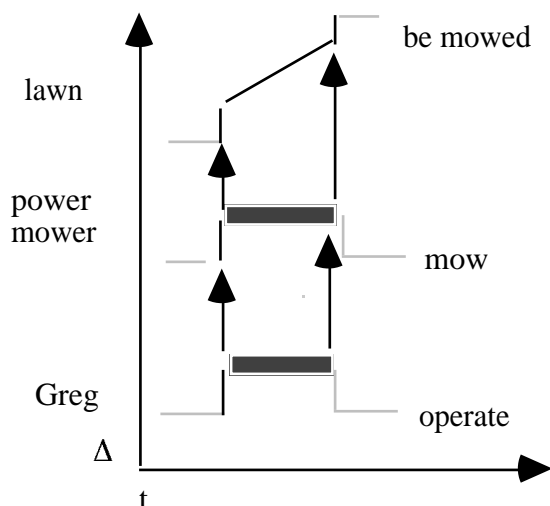


As in Figure 4, the inception phases of the undirected activity contours of the agent and instrument participants are profiled, but only the completion phase of the directed change profile of the patient participant is profiled, not the termination phases of agent and instrument.

The representation of extended causation with an instrument is straightforward, and is given for example 22 in Figure 8:

(22) *Greg mowed the lawn with a power mower.*

Figure 8. *Extended causation with instrument*



The participant role categorized as instrument in thematic-role models is a straightforward antecedent oblique construal in the causal model advocated in this book. The most straightforward subsequent oblique thematic role is the benefactive, as in 23:

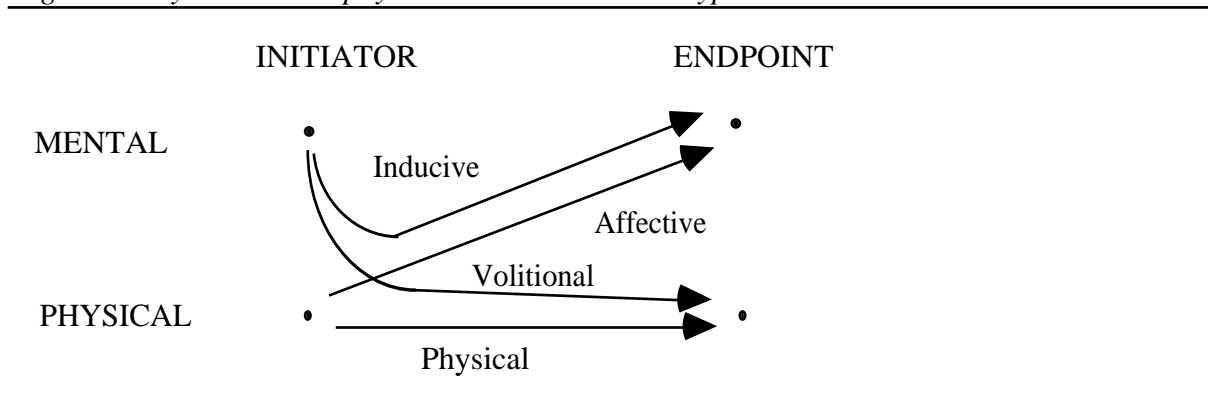
(23) *Jack washed the dishes for Mary.*

The accomplishment of the dishes being washed benefits Mary in some relevant way. The causal relation involved in the benefactive thematic role is what Talmy (1972, 1976) calls **affective causation**: a situation associated with a physical being causes a change in mental state of a mental being (see also Croft 1991:166-68). Affective causation is one of four types of causation described by Talmy, which I analyzed in terms of whether a physical state or mental state is involved in the causal relation (Croft 1991:166-68). All four types, with Talmy's names for the types, are listed in 24:

- (24)
- |                          |                     |
|--------------------------|---------------------|
| a. Physical causation:   | physical → physical |
| b. Volitional causation: | mental → physical   |
| c. Affective causation:  | physical → mental   |
| d. Inducive causation:   | mental → mental     |

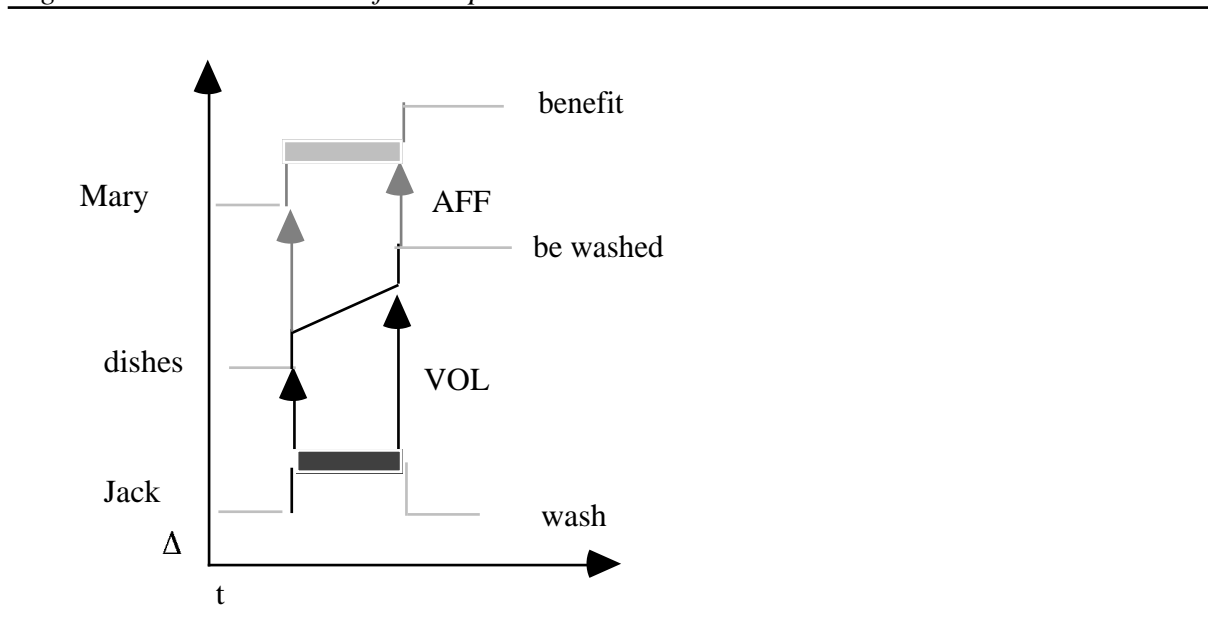
Of course, mental states can only be affected, and mental action can only be implemented, via physical processes. That is, events cannot be brought about telepathically (Croft 1991:167). Figure 9 (from Croft 1991:167, Figure 1) represents the four types of causation:

Figure 9. Asymmetries in physical-mental causation types



Example 23 has the three-dimensional representation in Figure 10:

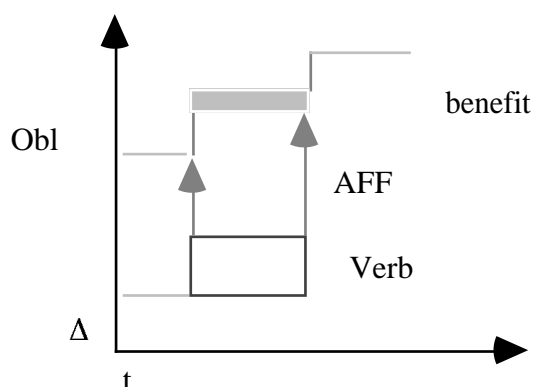
Figure 10. Clause with benefactive phrase



In Figure 10, the causal relations are labeled with their type ('VOLitional', 'AFFective'). In general, I will include the type of causal relation only when it is relevant to focus attention on the different causal types. In general, the causal types may be inferred by the type of subevent for the initiator and endpoint, i.e. physical or mental (change of) state.

The beneficiary profile is runup achievement: the washing of the dishes involves some activity with respect to Mary's benefit, but Mary does not benefit until the process is completed. The profile of the adpositional phrase *for Mary* is represented in dark gray in order to distinguish its contribution from that of the verb, whose profile is given in black, and from the frame, which is light gray (due to limitations of the PDF translation of the Word 5.0 graphics). Technically, the profile of the benefactive phrase, an example of beneficiary *for* (see §5.3), overlaps with that of the verb, that is, the verb is an "argument" of the beneficiary *for*. The independent representation of the benefactive phrase is given in Figure 11:

Figure 11. Semantic structure of English beneficiary for



The box notation represents a completely schematic situation, abstracting away from extent on both  $t$  and  $\Delta$  (see §2.3), and *Obl* represents the Oblique referent.

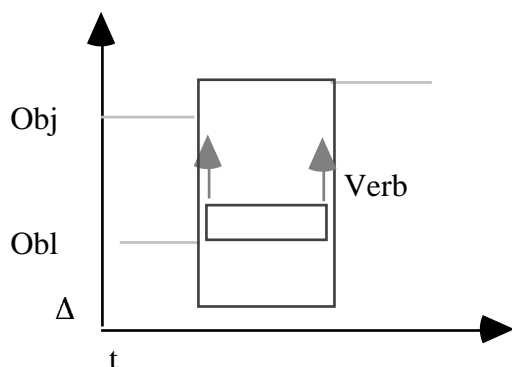
In order to create the overall semantic structure in Figure 9, the semantic structure of the adposition in Figure 11 is “superimposed” on the semantic structure of the verb in Figure 10. The superimposition is such that the profiled verbal semantic structure in Figure 10 **elaborates** the schematic verbal semantic structure of the adposition’s semantic structure in Figure 11. Elaboration is a generalization of the concept of argument filling used in the theory of valence in Cognitive Grammar (Langacker 1987:66-68, 298-306). The substructure that is elaborated is called the **elaboration site** or **e-site** by Langacker.

The theory of valence in Cognitive Grammar is in turn a generalization of the concept of semantic composition (Langacker 1987, chapter 8). Valence is the means by which one combines any pair of semantic structures with any sort of semantic relation between the two. Composition is achieved by the establishment of correspondence relations between substructures of the two semantic structures such that the substructure of one elaborates the corresponding substructure of the other. There may be multiple correspondences between two semantic structures. Also, there may be correspondences between the substructures of more than two semantic structures being combined.

Valence is thus more like unification (Shieber 1986). Unlike unification however, the semantic structures need not “match” perfectly in valence correspondences. Instead, the substructure of one semantic structure may impose an alternative construal on the corresponding semantic substructure in the other linguistic expression. For example, the English Past tense plus a container adverbial imposes a runup achievement construal on an achievement predicate, as is seen in Figure 7 (see §2.5.4), and is illustrated in chapter 2. Construal will be seen to play a major role in the analysis of the causal structure of events, beginning with the description of spatial situations in the next chapter.

I now turn to the representation of the meaning of antecedent obliques such as the instrumental *with* in Figures 6-8. Figure 12 gives the semantic structure for *with*:

Figure 12. Semantic structure of English with



The smaller box is a schematic representation of the aspectual contour of the Oblique object of the adposition. This box is thus the e-site for the Oblique. The larger box is a schematic representation of the verb which the *with* phrase modifies, and is labeled Verb. It is thus the e-site for the verb. (In Cognitive Grammar, these would be labeled trajector and landmark respectively.) The definition of an antecedent oblique is a participant antecedent to the endpoint of the verbal profile, encoded as Object and labeled as such in Figure 11. Thus, Figure 11 specifies that the referent of the Oblique of *with* is antecedent to the referent of the Object of the Verb.

The box notation also suggests that the Oblique referent does not antecede the Subject referent in the causal chain. This is the case for most if not all uses of English *with*. In other languages, however, a schema covering uses of an adposition or case marking may have to abstract away from any relative position of the Oblique referent and the Subject referent.

### 3.5. Nonprototypical causal relations

§3.4 describes prototypical causal relations, prototypical at least to linguists studying verbal semantics. Such situations are only a subset of the full range of situations that are expressed in language. This section will briefly examine nonprototypical causal relations of several kinds: other types of force-dynamic relations, degrees of affectedness in causal relations, and situations with non-discrete participants, that is, so-called reflexive or middle situation types.

#### 3.5.1. Nonprototypical force-dynamic relations

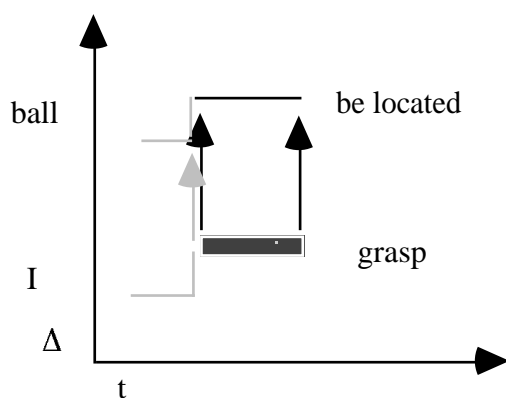
Talmy (1988) proposes force-dynamics as a generalization beyond the prototypical causal relations described in §3.4. Talmy also uses a geometric representation model to describe the range of causal relations that he describes. In this section, I will survey Talmy's force-dynamic types and represent them in the three-dimensional model advocated here.

As noted in §3.4, Talmy's force-dynamic model distinguishes causation types in terms of their aspectual nature. Extended causation involves continuous application of force over time; punctual causation involves application of force for only a point in time. (Actually, Talmy contrasts extended causation with onset causation; in §4.5 I argue that onset causation should be analyzed as punctual causation.)

Prototypical causation also involves the causation of motion or change of state (Talmy treats change of state as metaphorical motion). There also exists causation of rest, that is, successful resistance of the tendency of an object to move or change. Example 25, represented in Figure 13, is a typical example of extended causation of rest:

(25) *I held the ball.*

Figure 13. *Extended causation of rest*

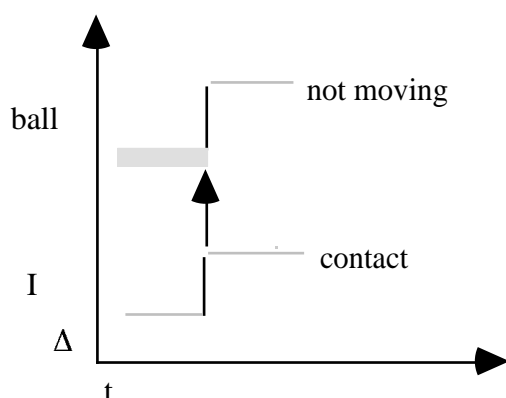


In 25, my grasping the ball and not dropping it causes the ball to remain in position, instead of falling to the ground. The grasping activity is not force-dynamically neutral, hence its expressed as an activity acting on the ball. The force-dynamic character of the relation between me and the ball is represented by the directed causal link between the aspectual contours for me and the ball in Figure 13. The inception of the activity is unprofiled for the same reason that the inceptive phase is unprofiled in one-participant activities: sentence 22 expresses the activity, not its inception. Holding is a typical example of an inactive action (see §2.5.3).

Example 26 is arguably a case of punctual causation of rest; its representation as such is given in Figure 14:

(26) *I stopped the ball (when it rolled to me).*

Figure 14. *Punctual causation of rest*



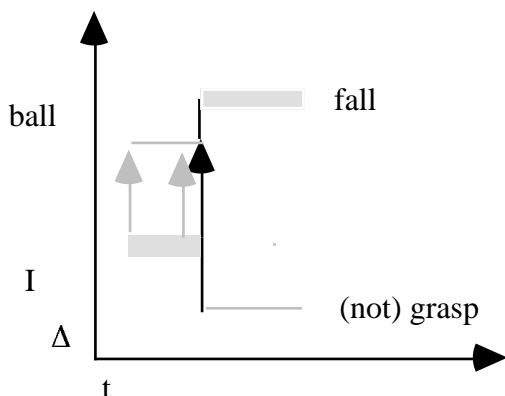
The context I have offered for 26 raises the issue of what the aspectual type of the rest phase is. In 26, the “rest phase” is in fact motion, that is, the ball moving towards me. In 25, however, the ball may not have been moving before. It is only that the ball would move (i.e., fall to the ground), if I were not holding it. The tendency towards motion is only implicit. For

this reason, I represent the rest phase of causation of rest as a t-state and not an activity in Figure 13.

Prototypical causation also contrasts with another nonprototypical force-dynamic relation: letting causation. Letting causation is when the initiator lets a situation happen by not interfering to stop it. Letting causation is illustrated by example 27, and represented in Figure 15:

(27) *I dropped the ball.*

Figure 15. Letting causation of motion

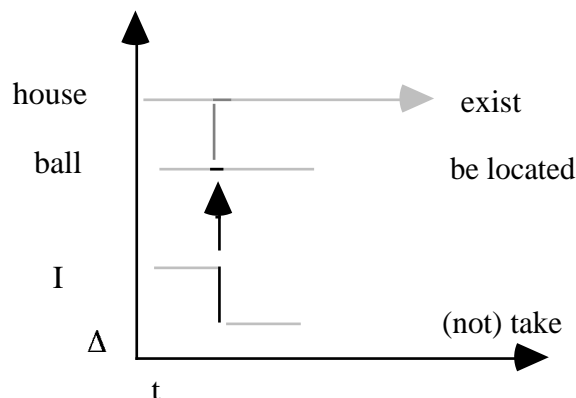


Letting causation is represented by very few simple transitive verbs; *drop* is one of them. The prior state of causation of rest (holding the ball) as the “rest” phase is presupposed by *drop*. The prior state of causation of in a complex expression of letting, as in *She let me go to the party*, is also presupposed: I am constrained in my action until I am allowed to execute it.

Letting causation of rest is illustrated in example 28 and represented in Figure 16 (see §4.1 for discussion of the locative relation between ball and house):

(28) *I left the ball (in the house).*

Figure 16. Letting causation of rest



Letting causation of rest, like letting causation of motion, is rarely expressed in a simple verb form.

### 3.5.2. Degrees of affectedness and mental verbs

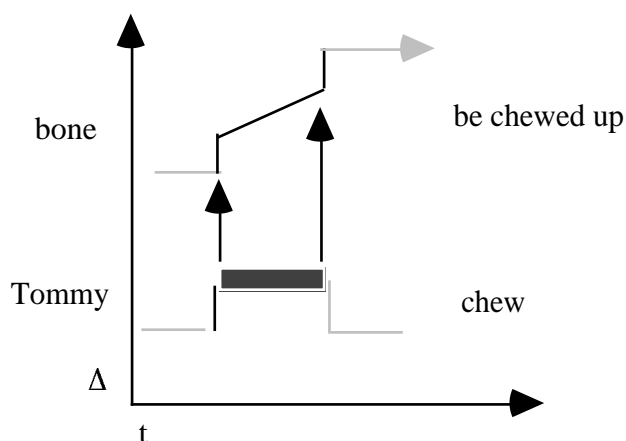
In a great many situations, the effect of transmission of force is not as clearcut as in events such as breaking a vase. In this section, I will explore some of the less clearcut outcomes of transmission of force and how they are represented in the three-dimensional model.

A more complex phenomenon that will require extending the geometrical representation language is degree of affectedness. Different degrees of affectedness of objects can be illustrated with the following English examples:

- (29) a. *Tommy chewed up the bone.*  
 b. *Tommy chewed the bone.*  
 c. *Tommy chewed on the bone.*

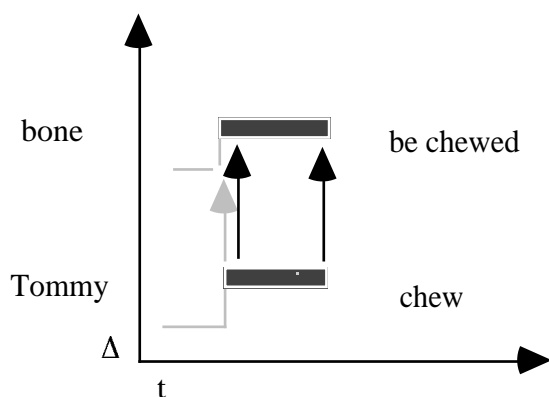
Example 29a, with the particle *up*, is an accomplishment and involves complete destruction of the bone; it is represented in Figure 17:

*Figure 17. Completely affected patient*



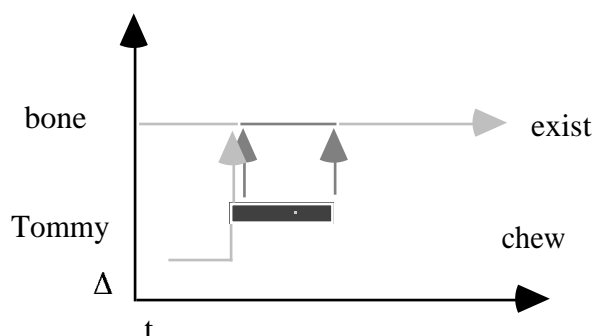
Example 29b involves a directly affected patient but the affect is not complete. Hence 29b is an activity, not an accomplishment; it is represented in Figure 18:

Figure 18. Directly affected patient



Example 29c involves a much less direct effect on the bone than 29b does. The less direct affectedness of the bone in 29c is expressed grammatically by the use of an Oblique prepositional phrase instead of the Object role. The semantic distinction reflecting this grammatical difference is represented as in Figure 19:

Figure 19. Less affected patient



The difference in directness of affect is reflected in both the causal structure and the subevent involved. In the causal structure, the patient is not part of the verbal profile; that is, the activity does not directly involve the patient. Instead, the patient is part of the Oblique profile.

The preposition *on* in 29c is not spatial. The Oblique preposition indicates that the bone is being acted upon, albeit not as directly or fully as an Object. The causal interpretation of this preposition (called by Levin [1993] the Conative construction) is represented by the causal (arrow) link between the aspectual contours for Tommy and the bone.

The patient subevent is construed as mere existence. If the chewing were more intense, the bone's aspectual contour would shift from being something lasting (its existence) to something that is undergoing a change (as a result of the action directed towards it).

It is possible that the bone should be represented as undergoing some sort of change in Figure 19; after all, there are cases of much less affected objects for which the representation

in Figure 19 may seem more appropriate (see below). If so, then example 29c should be represented as in Figure 20:

Figure 20. *Less affected patient: alternative representation*

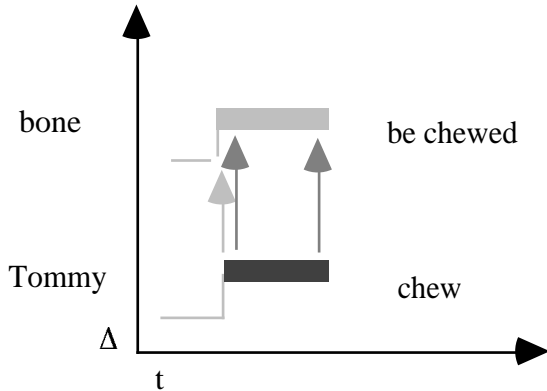


Figure 19 may be more appropriate for objects that are not physically affected, but are “only” psychologically affected as in example 30:

(30) *Marge picked on her little sister.*

However, in neither 29c nor 30 can the hearer infer that the bone or Marge’s little sister are affected. That implicature can be defeated in either case:

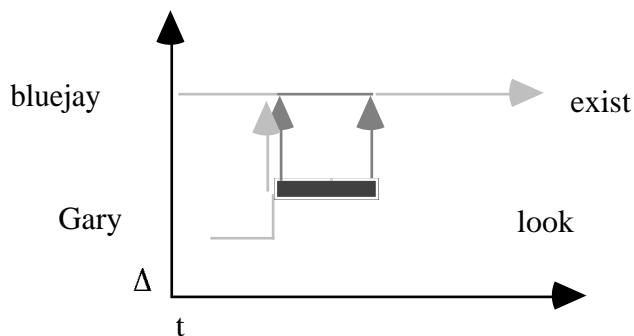
- (31) a. *Tommy chewed on the bone, but it was a fossil bone and so it wasn’t even scratched.*  
 b. *Marge picked on her little sister Frances, but Frances wasn’t even bothered by it.*

This fact is an argument for representing less affected patients as in Figure 19.

Another example of less affected objects are the objects of mental verbs of directed attention, as in examples 32, represented in Figure 21, and 33, represented in Figure 22:

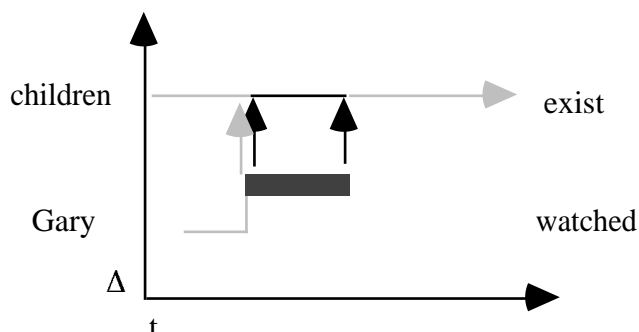
(32) *Gary looked at the bluejay.*

Figure 21. *Less affected participant as Oblique*



(33) Gary watched the children.

Figure 22. Less affected participant as Object



It appears, however, that the only evidence in favor of a distinction in the semantic representation between 34 and 35 is the grammatical distinction between the encoding of the stimulus as Oblique vs. Object. In 34-35, it can be argued that watching is a more intensive directing of attention towards the stimulus than merely looking at something, and hence the grammatical distinction is motivated by the semantic difference in this case.

On the other hand, cross-linguistically there is considerable variation as to the encoding of less-affected participants as Objects or Obliques. Cross-linguistic variation is usually an indicator of semantic nonprototypicality. In this case, the nonprototypical state of affairs is the causal link whose endpoint has the aspectual contour of an inherent state like 'exist'. The prototypical case is a causal link whose endpoint has the aspectual contour of a process (directed or undirected). An endpoint that has the aspectual contour of an inherent state like 'exist' is characteristic of noncausal links, as will be seen in chapter 4. Table 1 describes the two prototypes and the nonprototypical, intermediate type:

Table 1. Prototypical and nonprototypical relations between participants

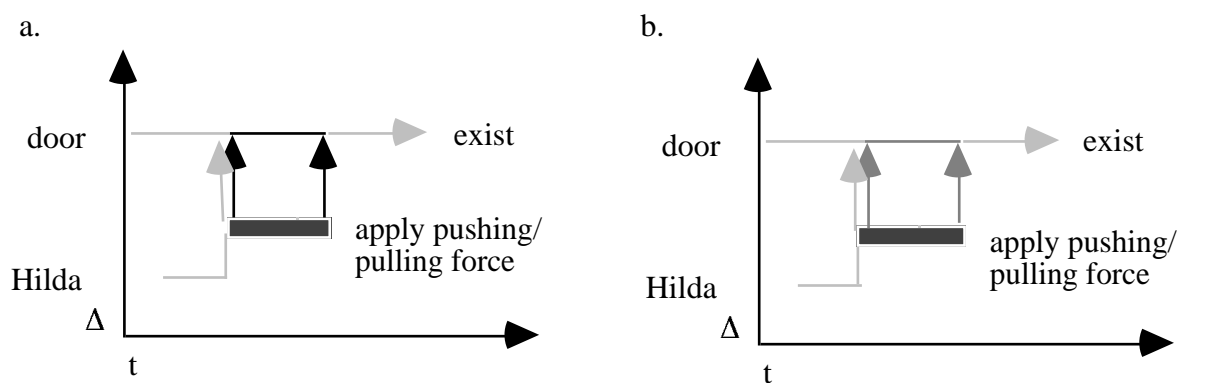
	<i>Prototypical causal relation</i>	<i>Nonprototypical relation</i>	<i>Prototypical noncausal relation</i>
<i>Type of link</i>	causal	causal	noncausal
<i>Aspectual contour of endpoint</i>	process	i-state	i-state

The nonprototypicality of the intermediate type is reflected not only in cross-linguistic variation, but also intralinguistic variation. For example, in English the application of force to an unyielding object may be expressed as either Object or Oblique for *push* and *pull* (see §4.4 for an analysis):

(34) a. *Hilda pushed the door, but it wouldn't budge.*  
b. *Hilda pushed on the door, but it wouldn't budge.*

(35) a. *Hilda pulled the door, but it wouldn't budge.*  
b. *Hilda pulled on the door, but it wouldn't budge.*

Figure 23. Pushing and pulling: alternative construals



Following the lead of typological explanations of prototypical conceptual structures in conceptual space (Croft 1990, chapter 6; Croft 2001, chapter 3), I would suggest that the prototypical relations are those that are more frequently experienced by human beings and/or are more salient to human beings in their daily experiences.

The analysis of less directly affected patients in Figures 19-23 is a more natural analysis of what Rappaport Hovav & Levin (1998) call the 'nonstructural constant argument', underlined in example 36a and represented by them as in 36b (Rappaport Hovav & Levin 1998:115):

- (36) a. *Phil swept the floor.*  
 b. [ x ACT<SWEEP> Y ]

Rappaport Hovav & Levin argue that the Object referent in 36a is not part of the 'structural' relation between participants in an event (Rappaport Hovav & Levin 1998:114). Instead, its presence is determined by the 'constant' part of the meaning (<SWEEP> in 36b), namely that sweeping involves a floor. Their structural relations defined with respect to basic event types, which represent the causal-aspectual structure of situations (Rappaport Hovav & Levin 1998:108-9). One fact of English that Rappaport Hovav & Levin intend to capture with the structural-nonstructural argument is the fact that the nonstructural argument can be dropped from 36a, while structural arguments of verbs such as *break* cannot be dropped:

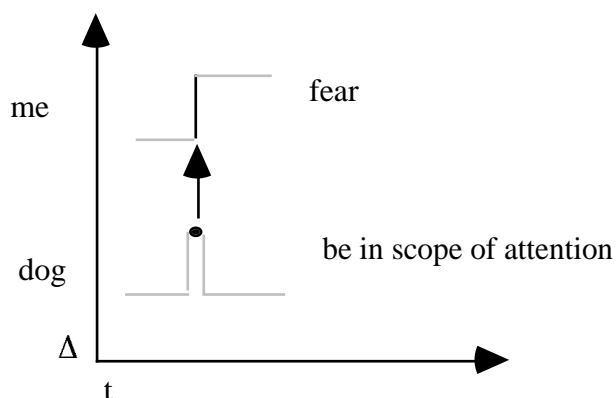
- (37) *Phil swept.*  
 (38) a. *Tracy broke the dishes.*  
 b. \**Tracy broke.* [Tracy engaged in a breaking activity]

However, Rappaport Hovav & Levin's analysis would have to capture the fact that *the floor* in 36a is encoded as an Object, and also the fact that there is some sort of force-dynamic relationship between Phil and the floor, even if the floor remains unaffected, or at least not totally affected. The representation in Figure 22 can be applied to 36a, and accommodates these facts. It represents the force-dynamic relationship between Phil and the floor, and hence the argument phrases are linked to Subject and Object following the linking rules in 6. It also represents the less-affected or unaffected state of the floor by virtue of the endpoint's subevent being 'exist'. This latter distinction allows verbs such as *sweep* to be distinguished from verbs such as *break* (see §4.3), in which the endpoint subevent is a directed change of state.

I conclude by noting that mental verbs of caused change of mental state are causally much more straightforward, as can be seen by the representation of example 39 in Figure 24:

(39) *The dog scared me.*

Figure 24. *Caused change of mental state*

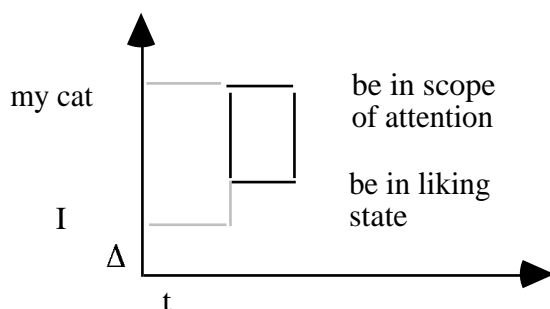


The stimulus enters the scope of attention of the experiencer<sup>21</sup> and that event (my seeing the dog and its behavior) causes the change in mental state.

Mental state verbs are themselves stative, non-force-dynamic relations joining experiencer and stimulus. For this reason, an undirected link between the two aspectual profiles is used.

(40) *I like my cat.*

Figure 25. *Mental state*



Again, since the noncausal mental state relation is extended over time, I use the convention of notating the relation at only the beginning and end of the relevant time interval.

### 3.5.3. Reflexive/middle situations

For some predicates, English makes a three-way grammatical distinction between a prototypical transitive situation, a reflexive situation, and a middle situation:

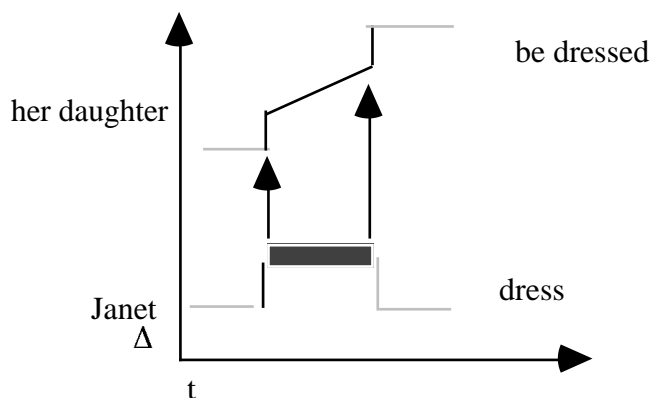
(41) a. *Janet dressed her daughter.*

<sup>21</sup>I thank Ronald Jacobsen for his proposal for the identity of the subevent for the stimulus in this situation type.

- b. Janet dressed herself.  
c. Janet dressed.

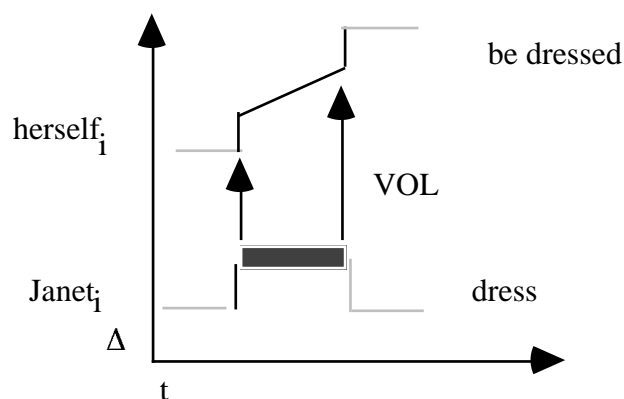
The prototypical transitive situation in 40a is straightforwardly represented as in Figure 26, with the agent acting on the patient:

Figure 26. Transitive dressing



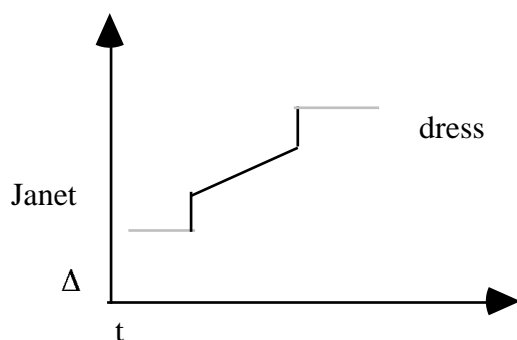
In example 41b, the overt reflexive encodes the agent acting on herself. This situation can be described in terms of the causal splitting of the agent into a volitional being acting on her own physical body, as in Figure 27:

Figure 27. Overt reflexive dressing



In example 41c, there is no overt encoding of the dual role of Janet in the dressing event. The event is construed as involving a single participant, as in Figure 28:

Figure 28. Intransitive dressing



As with the contrast between less affected Objects and Obliques in §3.5.2, it is not obvious that there is a semantic as opposed to grammatical motivation for the representations in Figures 26 and 27. Again, there is considerable cross-linguistic variation—and intralinguistic variation—as to whether reflexive situation types are expressed as Transitives with Reflexive Objects, or as (possibly overtly derived) Intransitives with only a Subject argument. (For an example of intralinguistic variation, compare English *dress* with *behave oneself*; see also Kemmer 1993.) And again, as Haiman (1983) has shown, in languages with a distinction between a Transitive-like encoding (as in 40b) and an Intransitive-like encoding (as in 40c), the distinction reflects a semantic difference of greater vs. lesser distinctness of the participant roles in the event.

And as with the semantic representation of less-affected participants, there is a reason for this variation within and across languages for reflexive situation types. The reflexive situation type is intermediate between the prototypical 2-ary situation and the prototypical 1-ary situation, as shown in Table 2.

Table 2. Prototypical and nonprototypical situation types by valency (arity)

	<i>Prototypical 1-ary situation</i>	<i>Reflexive/middle situation</i>	<i>Prototypical 2-ary situation</i>
<i>Number of participant roles</i>	1	2	2
<i>Number of participants</i>	1	1	2

In the prototypical situation types, the number of participant roles matches the number of participants. In the nonprototypical situation type, there is a mismatch between the number of participant roles and the number of participants. This mismatch is resolved sometimes in favor of the number of participants (Intransitive-like constructions), and sometimes in favor of the number of participant roles (Transitive-like constructions).