4. Spatial situations and causal structure

Spatial situations—location and motion—are fundamental to human experience. They represent one of the most essential modes of being of physical entities, including ourselves. It is not surprising that the language of space is central to grammar, from spatial deixis in pronouns and adverbs, spatial adpositions, and verbs of motion, location, contact, application and removal—the latter being the topic of this chapter. Spatial situations are also very rich in their semantic complexity. Most of the important analytical issues in verbal semantics arise in spatial predicates of various classes. Hence an insightful analysis of the verbal semantics of space will go a considerable way towards an adequate model of verbal semantics.

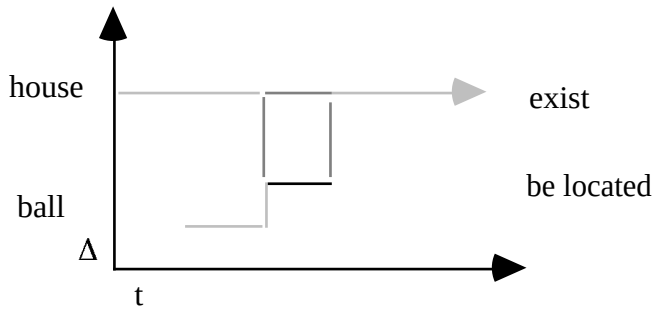
4.1. Location, motion, paths and the verbal scale

The most essential fact of spatial situations is that they always involve two spatial participants. One spatial participant, which I will call the **figure** (following Talmy 1972, 1974; Gruber 1976 uses the term 'theme'), is the participant whose location or motion is being described in the clause. The other spatial participant, the **ground**, is the participant whose location is being used as a reference point for describing the figure's location/motion. The figure's location/motion is expressed as a spatial relation between it and the ground; this relation will be called the **path**, again following Talmy. Although the term 'path' suggests a path of motion, it is used to describe static locative spatial relations as well (see Talmy 1974).

The simplest spatial situation in semantic terms is the description of location. The three-dimensional representation of the location predication in 1 is given in Figure 1:

(1) *The ball is in the house.*

Figure 1. Location



The figure is Subject of the Verb in 1, and hence its aspectual contour is included in the profile of the Verb *be* [located]. The ground is Oblique, and hence its aspectual contour is included in the profile of the Preposition *in*. The ground serves simply as a reference point for the spatial location of the figure. Hence its relevant subevent is merely its continued existence, an inherent state.

The path relation is expressed by the preposition *in*. The path relation is not a causal relation. Hence, an undirected link between the two aspectual profiles is used (compare the representation of mental states in §3.5.2). The figure's path relation to the ground is a transitory state, which is represented by the verbal profile.

The figure is represented as antecedent to the ground in Figure 1. This configuration represents a general human construal of figure antecedent to ground, which is supported by

substantial cross-linguistic evidence (see Croft 1991:192-98, where it is called the figure-first coercion).

I now turn to verbs of motion. As is now well known in verbal semantics research, motion verbs fall into two general categories, which have been called **manner of motion** verbs and **directed motion** verbs. The two categories are illustrated in 2 and 3 respectively:

(2) a. *The bottle floated in the water.*
b. *A couple of boys are swimming in the pool.*

(3) a. *She entered the room.*
b. *Vera descended the stairs.*

Moreover, in English one can use manner of motion verbs to describe directed motion, as in 4:

(4) *The bottle floated into the cave.*

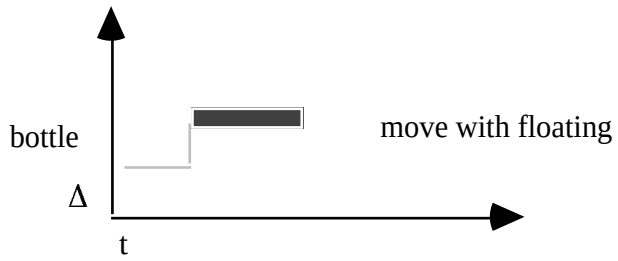
In other languages, however, such as Spanish, it is impossible to express directed motion with manner of motion verbs (5a). Instead, the manner of motion is expressed with a converb form, that is, an adverbial form functioning like a manner adverb (5b).

(5) a. **La botella flotó a la cueva.*
[lit. 'The bottle floated into the cave.']
b. *La botella entró la cueva flotando.*
[lit. 'The bottle entered the cave floating.']

Talmy has described an English type language as a satellite-framing language, because it uses an adposition or directional particle (satellites in Talmy's terms) to express directed motion, or directed processes in general. In contrast, Spanish is a verb-framing language, because it expresses directed motion (and directed processes) by the verb, and expresses manner in adverbial expressions such as converb (gerund) forms (Talmy 2000b, chapter 1[22]).

I will begin with manner of motion verbs, and then turn to directed motion with manner of motion verbs in English, and finally to directed motion verbs, in English as well as Spanish. Manner of motion is represented in Figure 2 for example 2a:

Figure 2. Manner of motion



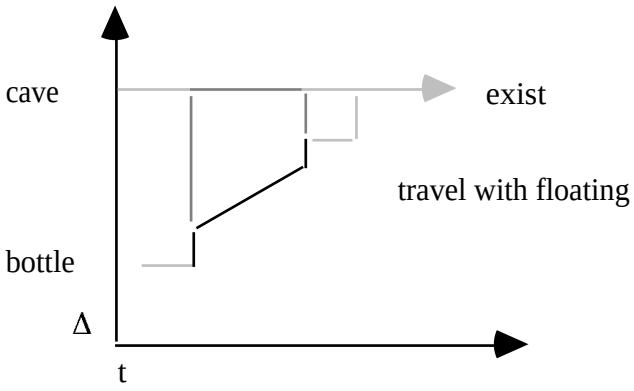
Manner of motion verbs are typical undirected activities (see §2.6). Manner of motion verbs are, nevertheless, motion verbs, even if the motion is not in any direction. Thus the semantic type of the aspectual contour is 'move', with a descriptive manner component of

[22]All of the references to Talmy's seminal work on motion and causation are to the revised versions in Talmy 2000a,b (see Talmy 2000a,b for references to the original sources).

floating which is glossed as 'with …ing' in Figure 2. The motivation for this semantic representation will become clear shortly.

The representation of directed manner of motion in English, as in example 4, is given in Figure 3:

Figure 3. English directed manner of motion



The structure in Figure 3 represents the bottle as the holistic theme, for the reasons given in §1.2.5. That is to say, its motion determines the extent to which the verbal scale has been traversed.

A possible counterargument to the analysis in Figure 3 is that sentences such as 6 requires measurement of both the figure and ground (Dowty 1991:571):

(6) *Hurricane Archibald crossed the Florida penninsula.*

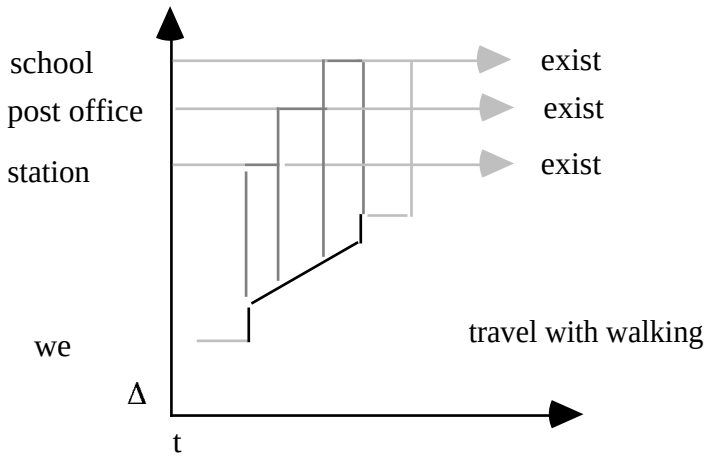
Example 6 uses the boundary-crossing directed motion verb *cross*. Measurement of the accomplishment involves both the figure and the ground: the directed motion is not completed until the rear part of Hurricane Archibald has passed the front part of the Florida penninsula. However, as argued in §1.2.5, the "incremental theme" is actually a measurable scale specified by the verb meaning, in this case, the boundary-crossing verb. It is the Hurricane that is traveling along the path, and the hurricane's movement, not any "activity" on the part of the Florida penninsula, that defines at what point on the verbal scale the situation is at any given moment.

As Dowty (1991:569) among others has noted, motion is described with respect to a single path even when there is more than one ground object, as in 7:

(7) *We walked from the station past the post office to the school.*

In fact, examples such as 7 indicate that the ground objects serve merely as reference points for establishing the path, represented as in Figure 4:

Figure 4. Multiple ground expressions in directed motion

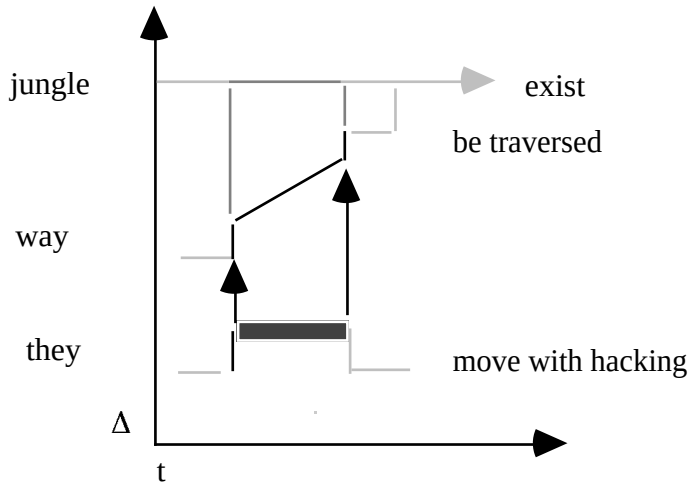


There are, however, several motion constructions in which the path is overtly expressed:

(8) a. *She swam the Channel.*
b. *He ran a mile in under four minutes.*
c. *They hacked their way through the jungle.*

In all of these constructions, the path is expressed as an argument—*way* of course also means 'path'—and is the holistic theme. The *Way* construction (see e.g. Jackendoff 1990; Goldberg 1997), illustrated in 8c, is represented in Figure 5:

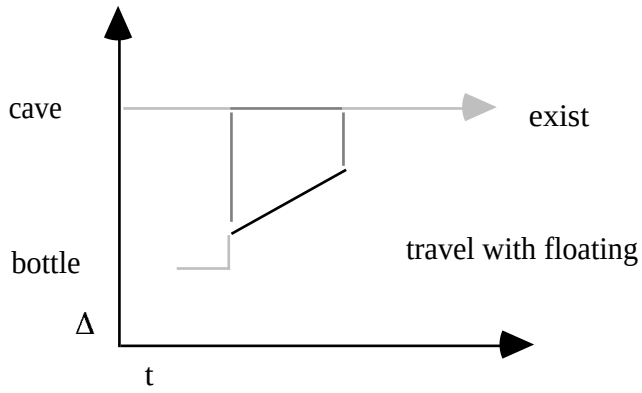
Figure 5. The Way *construction*



In the examples given so far, the path contour has been an accomplishment, that is, bounded directed motion. However, the path need not be bounded; it may simply indicate unbounded directed motion, as in 9, illustrated in Figure 6:

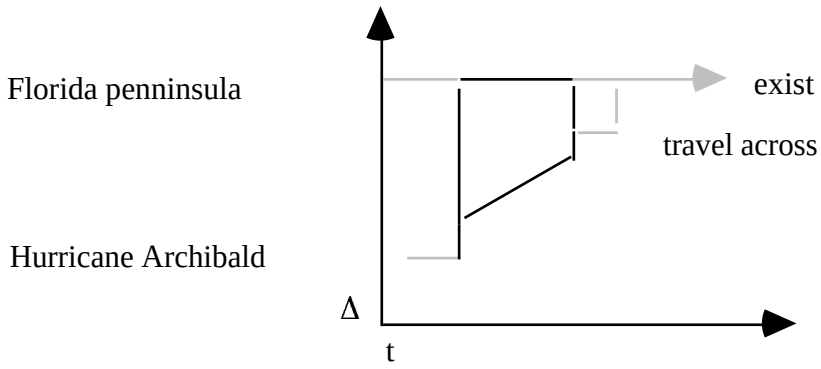
(9) *The bottle floated towards the cave.*

Figure 6. Unbounded directed motion



The representation of path-incorporating verbs such as *enter, ascend* and *cross* is distinct from that for directed motion verbs, because the ground is expressed as the Object of the path-incorporating verb, not as the Oblique. Figure 7 is a representation of example 6 above:

Figure 7. Path-incorporating verb



The examples represented in Figures 3-5 also illustrate the appropriateness of the analysis of the initial subevent of manner of motion verbs as 'move with VERBing' (compare Talmy 2000b:31). It is the motion of the figure that causes the figure to travel. In the examples represented in Figures 3-5, it is plausible to assume that the manner of motion caused the directed motion, as I suggested in earlier work (Croft 1991:160-61). However, there are other examples that demonstrate that this constraint on the description of the subevents is too strong, as I also noted in that work (Croft 1991:201, fn. 15; see also Goldberg 1995:61-65):

(10) *The car screeched around the corner.*

The semantic type of example 10 is one of several related types observed by Talmy, who calls them **co-events** (Talmy 2000b:42-47):

(11) a. *The top spun past the lamp.*

b. *She wore a green dress to the party.*
c. *I scooped jellybeans up into her sack.*
d. *Glass splintered onto the carpet.*
e. *The rocket splashed into the water.*
f. *They locked the prisoner into his cell.*

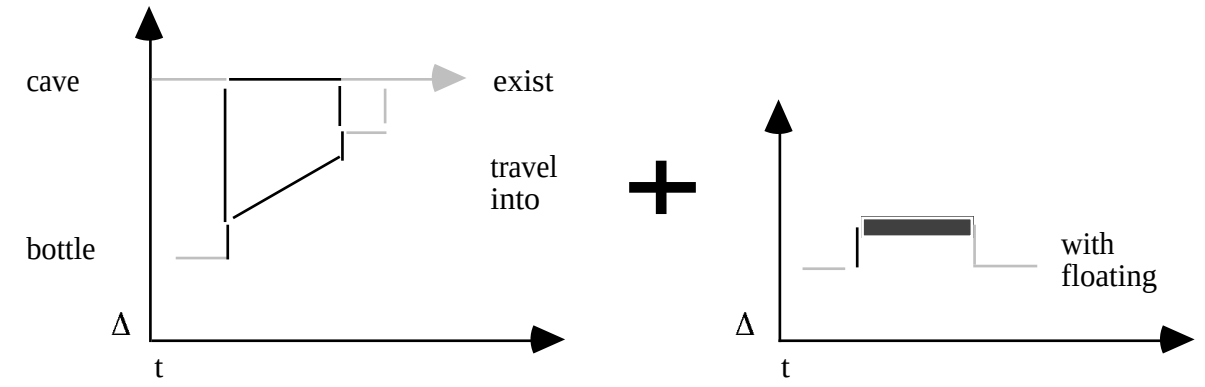
All of these cases (except possibly 11f[23]) follow the principle that the co-event incorporated in the verb expresses a property of the process denoted by the verb that is participating in the causal chain of the construction (Croft 1991:201, fn. 15).

We have seen that manner of motion verbs in English allow an alternative causal-aspectual construal as accomplishments. This alternative construal is a language-specific property of English. It is not available in other languages such as Spanish, as seen in example 5. In languages such as Spanish, the normal way to express motion is by a path-incorporating motion verb, and the description of manner is expressed by an adverbial expression, as in 5b (repeated here as 12):

(12) *La botella entró la cueva flotando*. [lit. 'The bottle entered the cave floating']

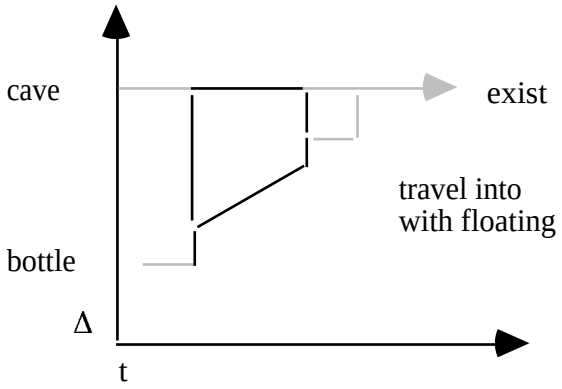
The representation of the verbal profile is the same as for path-incorporating verbs in English. In addition, the gerund form *flotando* 'floating' elaborates the description of the activity engaged in by the bottle. Figure 8 represents the two components—main clause and gerund—and Figure 9 represents their composition:

Figure 8. Path-incorporating verb and gerund in Spanish



[23]Talmy analyzes 11f as 'They put the prisoner into his cell and locked it'. Example 11f could be interpreted as 'They caused the prisoner to be locked in his cell', that is, as a sort of verb of putting (see §4.2).

Figure 9. Path-incorporating verb with gerund in Spanish



The combination of the two verbal profiles requires a construal such that the combination represents an accomplishment. This appears to be a general principle, found for example in the compounding of activity and directed process verbs in Japanese (Chiaki Taoka, personal communication). This principle of semantic composition/construal is probably another manifestation of the Verbal Scale Construal hypothesis presented in §3.4.

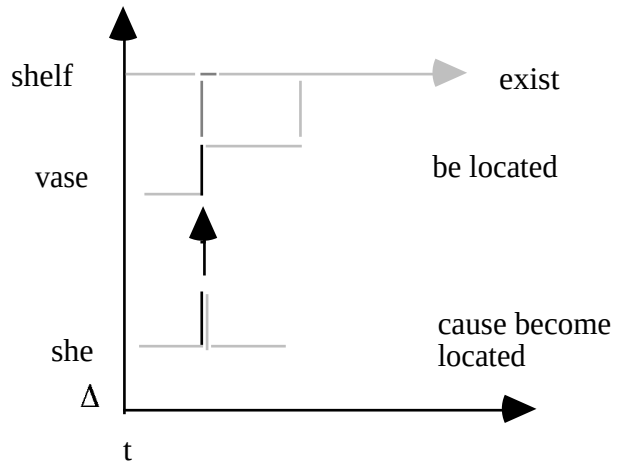
4.2. Application (putting) and removal

In this section, I briefly describe the analysis of certain verbs of application and removal. The first class of verbs I will call caused location verbs, and includes *put.* Caused location verbs, unlike the caused motion verbs to be discussed in §4.4, are construed as achievements, as in 13a, or runup achievements, as in 13b-c:

(13) a. *She suddenly put her hands on her hips.*
b. *In a couple of minutes she put the vase back on the shelf.*
c. *She's putting the vase back on the shelf.*

There is no nontrivial verbal scale in the aspectual construal of 13c: the book is not on the shelf until the end of the process of picking it up and moving it to the shelf. Figure 10 gives the achievement construal of caused location verbs:

Figure 10. Caused location: achievement construal



By far the best known set of verbs in this general category are the application verbs of the *spray/load* class. These verbs have attracted attention for a number of reasons. First, the *spray/load* verbs occur in two different argument linking constructions:

(14) a. *Jack sprayed the paint on the wall.*
b. *Jack sprayed the wall with the paint.*

In 14a, the figure is Object and the ground is an Oblique of a path expression. I will call this the Path construction. In 14b, the ground is Object and the figure is an Oblique of the antecedent *with*. I will call this the *With* construction.

Second, it has long been noted that there is a subtle semantic difference between the two argument linking constructions. Specifically, in 14a the figure is the holistic theme and in 14b the ground is the holistic theme. In other words, in both constructions the Object is the holistic theme.

In Croft 1991, I captured the argument structure alternation by analyzing all path expressions as subsequent obliques, which conforms to the general behavior of path expressions in with other spatial predicates and with other argument linking constructions. If figure is construed as antecedent to ground, then the argument linking in 14b would require an antecedent oblique preposition for the figure, which is what is found (*with*). The difference in holistic theme was captured only by the shift in verb profile, as in 15a-b, corresponding to 14a-b:

(15) a. **agent → figure →** ground
b. **agent → figure → ground**

There is an alleged difference in the optionality of the arguments in the two argument linking constructions. The oblique argument in the Path construction is apparently obligatory, while the oblique argument in the *With* construction is apparently optional:

(16) a. **Jack sprayed the paint.*
b. *Jack sprayed the wall.*

In fact, neither of these observations is quite correct. First, the oblique argument in the *With* construction is only "optional" when there is an understood definite referent for the

argument in the discourse context. This is an example of Fillmore & Kay (1993) call **definite null instantiation** (**DNI**). In certain constructions, certain English predicates may allow arguments to be dropped, as in 17:

(17) *The Koreans won.* [the game in question]

In Croft 2001, I argue that null instantiation, including definite null instantiation, is a property of constructions. That is, certain constructions specify a definite (highly accessible; Ariel 1990) referent for an unexpressed argument of the predicate. It so happens that there is a Transitive Oblique DNI construction which allows at least some *spray/load* verbs and requires a definite referent for the argument usually expressed in an oblique phrase.

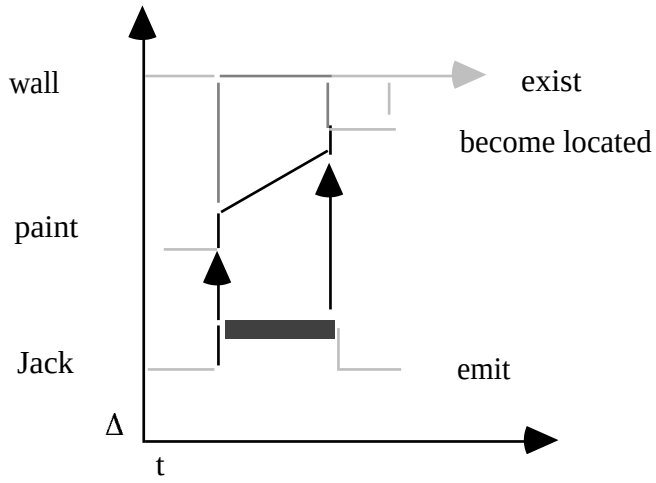
Conversely, in Croft (1998:43), I pointed out that some *spray/load* verbs in at least some contexts allow omission of the third syntactic argument:

(18) *The broken fire hydrant sprayed water all afternoon.*
(19) *The mudpots spattered mud just as we arrived.*
(20) *The guests scattered rice as the bride and groom left the church.*

The verbs in examples 18-20 are basically construed as substance emission predicates (ibid.). Unlike the Transitive Oblique DNI construction, there is no requirement for a definite ground referent in the simple Transitive construction examples in 18-20. However, the interpretation I gave these examples suggests a better analysis of the semantics of *spray/load* verbs in the Path and *With* constructions.

The Path construction construes the situation as substance emission plus directed motion, as can be seen in the representation of 14a in Figure 11:

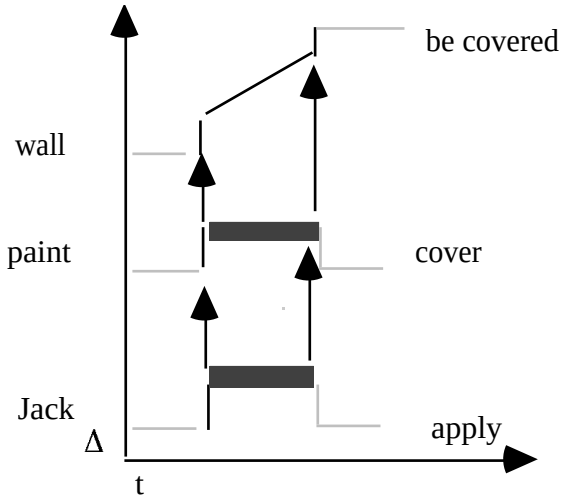
Figure 11. Application verbs in the Path construction



In the Path construction, the verbal scale measures how much paint has ended up on the wall. The verbal scale is somewhat different from that found in directed motion verbs, however. If I have sprayed the paint on the wall halfway, it does not mean that the paint is halfway between the spray can and the wall. Instead it means that half of the paint is now on the wall. In other words, application is incremental putting, the incremental putting of quantities of paint on the wall. For this reason, I have labeled the subevent as 'become located' rather than 'travel'.

In contrast, the *With* construction construes the situation as covering, which involves a semantically obligatory instrument, even if it can be syntactically null in some contexts. The *With* construction construal in 14b is represented in Figure 12:

Figure 12. Application verbs in the With *construction*



In the *With* construction, the verbal scale refers to the degree of covering of the wall with the paint; hence the wall is the incremental theme.

Verbs of removal are the ablative complement of application verbs. In English, removal verbs occur in two constructions, the Path construction and the antecedent Oblique *Of* construction:

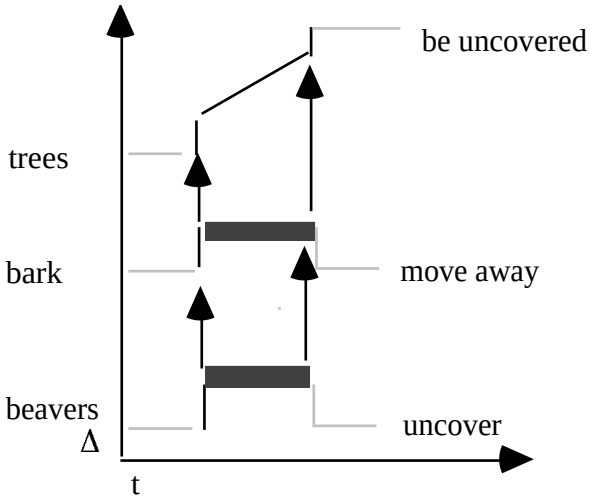
(21) a. *The beavers stripped the bark from the trees.*
b. *The beavers stripped the trees of their bark.*

The antecedent oblique *Of* construction can drop the antecedent oblique expression, though not only under definite null instantiation (see Levin 1993:125):

(22) *The beavers stripped the trees.*

In 21b and 22, removal is construed as uncovering, the opposite of the application construal in the antecedent oblique *With* construction. This construal is represented in Figure 13:

Figure 13. Removal verbs in the Of *construction*



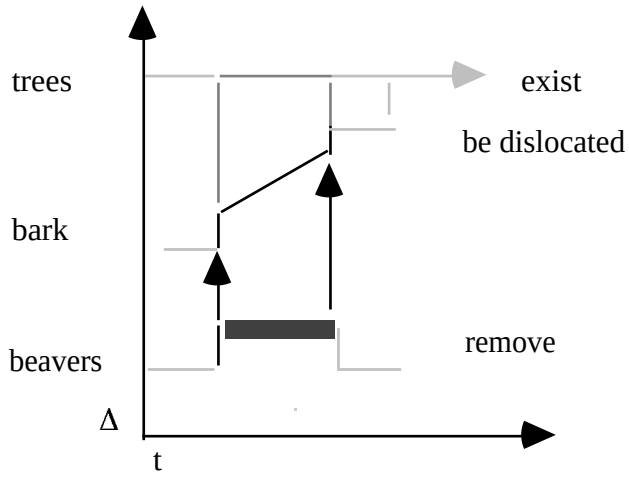
It is more difficult to find examples of the removal verb variant in 21a that can occur in the Transitive construction. One possible example is *suck*:

(23) *The vampire sucked the girl's blood and slipped away.*

Example 23 may be an example of construal of *suck* as obtaining (or ingesting; see §5.2 for verbs of obtaining). However, 23 may alternatively be an example of the Transitive Oblique DNI construction, not the simple Transitive construction.

This construal in the Path construction is represented in Figure 14:

Figure 14. Removal verbs in the Path construction



4.3. Contact, impact and fracture

Contact is essentially a spatial relationship, as Jackendoff (1990) argues. Contact displays the characteristic figure-ground asymmetry. It has been noted by Talmy that logically

symmetrical spatial predicates are cognitively asymmetrical, as illustrated in examples 24a-b (Talmy 2000a:314):

(24) a. *The bicycle is near the house.*
b. ?*The house is near the bicycle.*

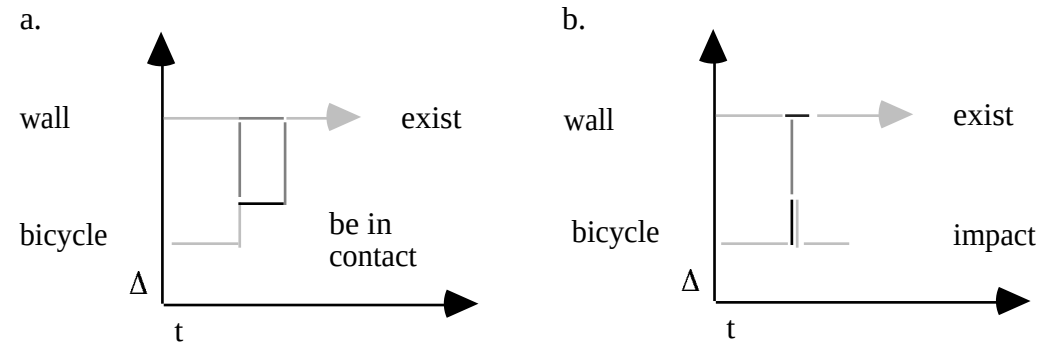
The figure is typically a smaller, more mobile object, while the ground is larger and more immobile. The figure-ground asymmetry is respected in 24a but not in 24b, which leads to oddity. The figure-ground asymmetry is found with verbs of contact such as *touch* (25a-b) and also with verbs of impact such as *hit* (26a-b):

(25) a. *The bicycle is touching the wall.*
b. ?*The wall is touching the bicycle.*

(26) a. *The car hit the wall.*
b. ??*The wall hit the car.*

Thus, the relationship between the two objects in contact is a figure-ground relationship, illustrated for 25a-b in Figure 15a-b:

Figure 15. Contact and impact



Contact and impact verbs have caused-contact counterparts, which occur in the same two argument linking constructions as *spray/load* verbs, namely the Path construction and the *With* construction. In the case of caused contact as in 27a-b, the two variants appear to be merely alternative profiles of the same causal-aspectual structure, as in Figures 16 and 17:

(27) a. *I touched the stick against the fence.*
b. *I touched the fence with the stick.*

Figure 16. Caused contact in the Path construction

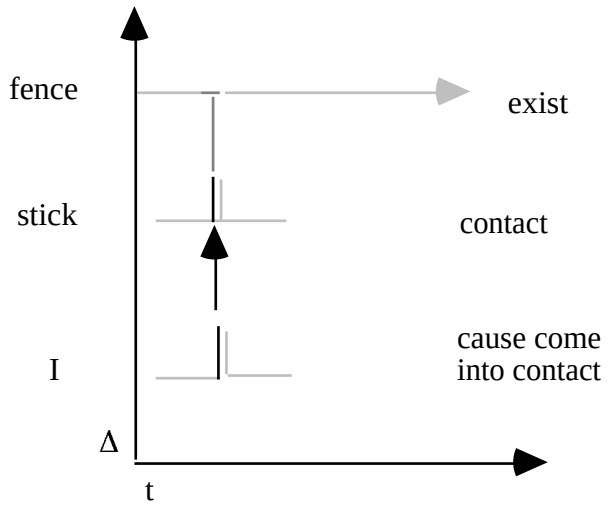
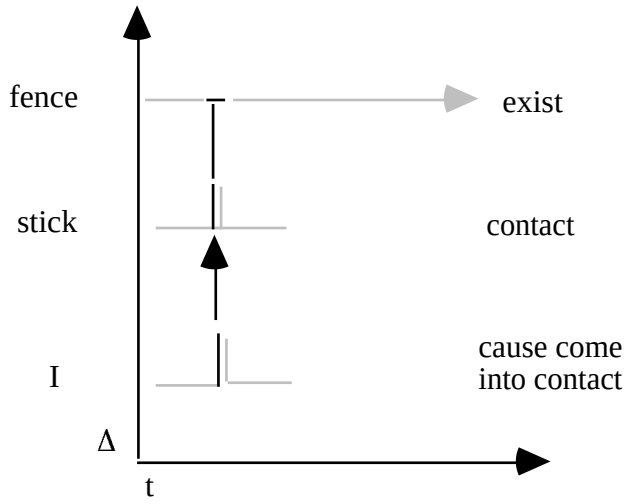


Figure 17. Caused contact in the With *construction*



Caused impact verbs occur in both constructions as well:

(28) a. *I hit the stick against the fence.*
b. *I hit the fence with the stick.*

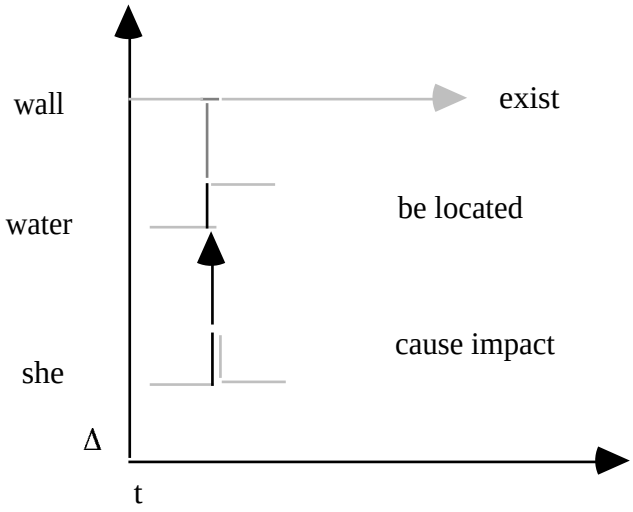
However, there is some evidence favoring a different construal of the caused impact verbs in the Path and *With* constructions. The difference in the construal of caused impact is motivated by the differences in interpretation between certain caused impact verbs that occur in only one of the two constructions, as analyzed by Dowty (1991:596).

Dowty observes that certain caused impact verbs are found only in the Path construction. One such verb is *dash*, as in 29 (Dowty 1991:596):

(29) *She dashed the water against the wall.*

Dowty argues that *dash* and similar verbs are basically construed as verbs of change of location in this construction, as in Figure 18:

Figure 18. Caused impact in the Path construction

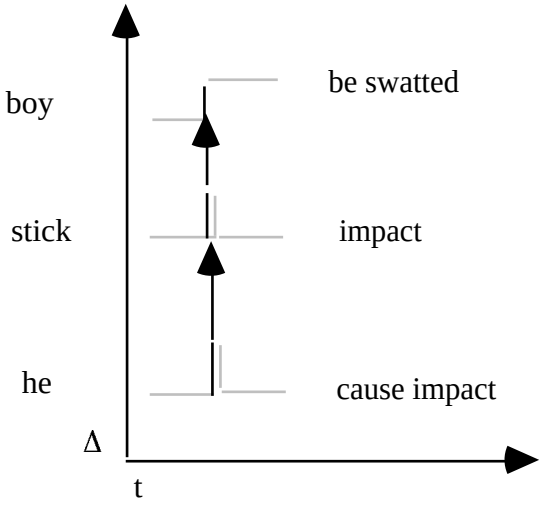


Dowty also observes that certain other caused impact verbs are found only in the *With* construction. One such verb is *swat*, as in 30 (Dowty 1991:596):

(30) *He swatted the boy with the stick.*

Dowty argues that such verbs are construed as prototypical caused change of state verbs, in that such verbs imply some sort of lasting effect, or at least an intended lasting effect, in the Object. This analysis is represented in Figure 19:

Figure 19. Caused impact in the With *construction*



Dowty's analysis of caused impact verbs is supported by the analysis of verbs of fracture, where the difference between the fate of figure and ground is clear. In the Path construction

as in 31, it is the Object (figure) that undergoes the change of state, and the oblique phrase largely indicates the locus of the breaking event:

(31) *I broke the stick against the fence.*

The representation of this construal is given in Figure 20:

Figure 20. Fracture in the Path construction

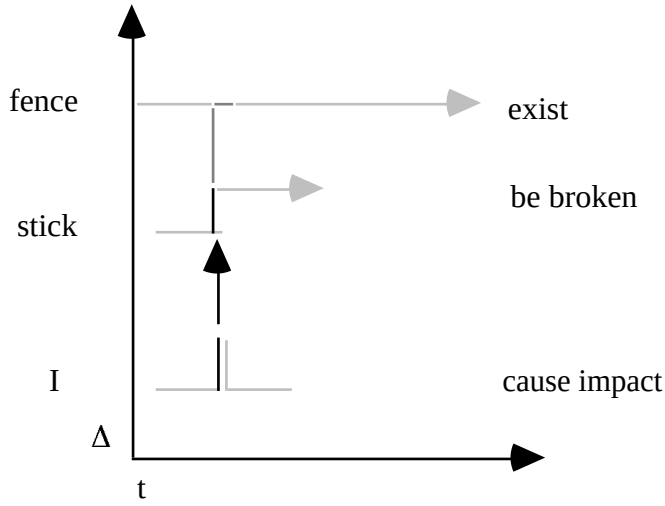


Figure 20 is not unlike Figure 18, in which there is a change of state (in Figure 18, just a change of location) for the figure, and the ground simply acts as a spatial reference point.

In the *With* construction as in 32, on the other hand, it is the Object ("ground") which undergoes the change of state, while the "figure" is the prototypical instrumental thematic role:

(32) *I broke the fence with the iron bar.*

The representation of Fracture verbs in the *With* construction is thus the same as for prototypical punctual causation; it is illustrated in Figure 21:

Figure 21. Fracture in the With *construction*

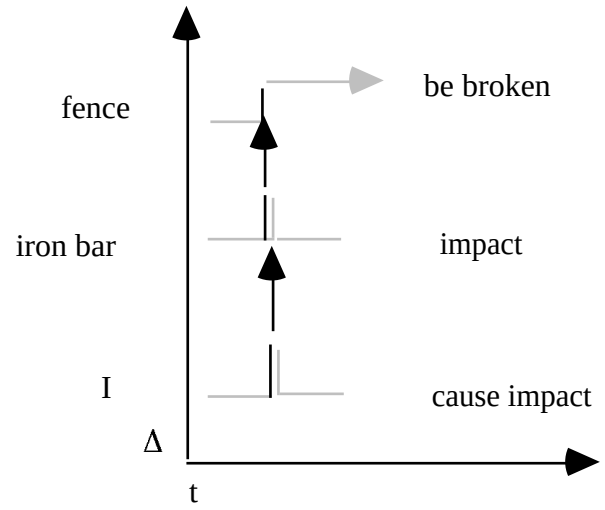


Figure 21 looks very much like Figure 19, in which a change of state is brought about in the "ground" object with the "figure" being construed as instrument.

The analysis of impact and fracture given in this section provides support for the analysis of the runup achievement construal of *Greg was breaking the coconut* in §3.4 (Figure 7). In that representation, the coconut is described as undergoing an undirected process as it is being struck by Greg before it finally breaks. One might argue that instead Greg is merely acting on the coconut without any effect, so the coconut's subevent is in fact merely 'exist' until it breaks. But the analysis of the *With*-construction variant of impact verbs given above implies that the impact brings about a change of state of the patient, that is, the patient subevent is dynamic, something like weakening to the point of breaking.

4.4. Extended caused directed motion

The directed motion semantic structures examined in §4.1 all have the figure as initiator. There are also caused directed motion situations, in which an agent brings about motion in a distinct figure participant. There are two types of caused directed motion. One type, ballistic motion, involves punctual (so-called 'onset') causation. Ballistic motion is illustrated in 33, and will be discussed in §4.5:

(33) *Jack threw the ball across the street.*

The second type, the topic of this section, involves extended causation. There is a diverse collection of semantic types with extended caused directed motion, and their analysis is particularly challenging.

The first type of extended caused directed motion is pushing/pulling; it is illustrated in example 34 and represented in Figure 22:

(34) *Jack pushed/pulled the cart into the house.*

Figure 22. Caused directed motion: pushing/pulling

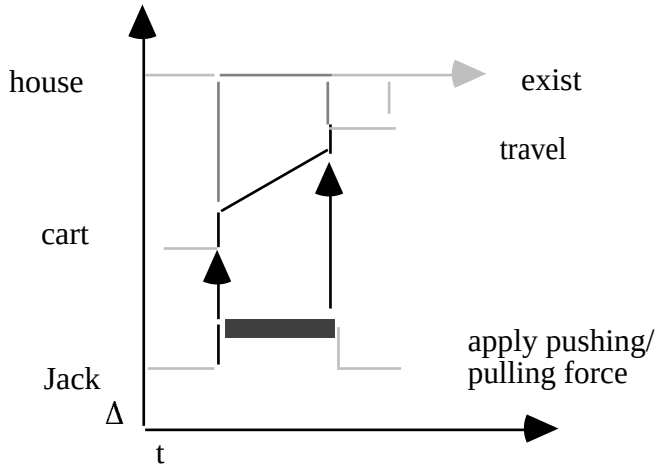


Figure 22 is essentially like Figure 3 with an antecedent agent added to the situation.

Push can also describe an event of ballistic motion, as in *I pushed the book across the table*, where I give the book a push and it moves across the table without any further application of force on my part. This interpretation can be represented just like other ballistic motion construction (see §4.5).

Push and *pull* occur in another construction, in which no resulting action takes place:

(35) a. *Jack pushed (on) the door, but it didn't move.*
b. *Jack pulled (at) the door, but it didn't move.*

The situation described is one of application of force which is successfully resisted. The same meaning can be expressed with a less-affected object construction, in which the figure is expressed as an Oblique.

In the sense of *push* represented in Figure 22, it is assumed that not only does the figure move to the destination, but so does the agent. Thus, one might argue that the proper representation of extended-causation *push* is that the agent as well as the figure moves. This analysis is the so-called 'Subject resultative' analysis, because the resulting state described by the traversal of the path applies to the Subject.

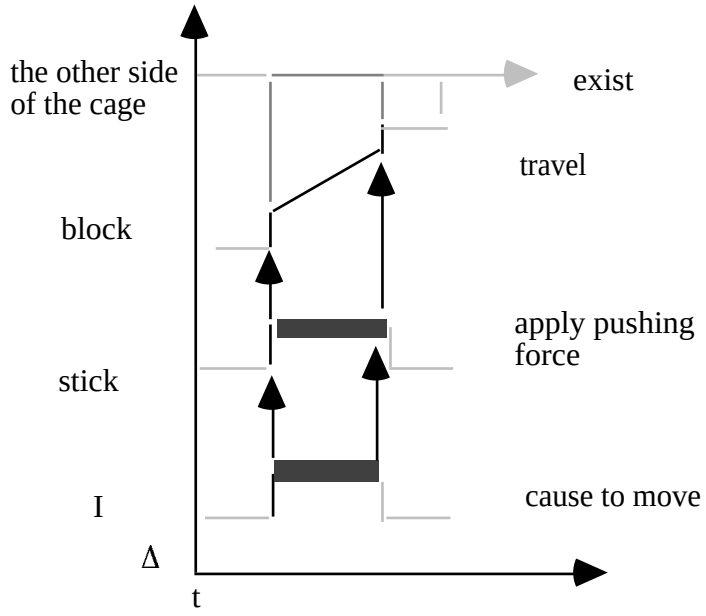
The Subject resultative analysis violates the principle that a situation encoded by a verb must describe a nonbranching causal chain (see Croft 1991:269; Rappaport Hovav & Levin MS). For this reason, it would be ideal if an alternative analysis preserving the nonbranching causal chain constraint can be proposed. I believe that this is possible for all the Subject resultative constructions that I am aware of (taken from Rappaport Hovav & Levin MS), and in fact the alternative analysis is superior to the Subject resultative analysis in most cases.

In pushing situations, the agent's motion is a consequence of the type of force applied to the figure by the agent, and not a part of the causal chain encoded by the verb. In fact, there are less typical instances of pushing in which the agent does not move:

(36) *I pushed the block to the other side of the cage with a stick.*

In 36, the agent does not move at all; only the stick moves, pushing the block. This situation is represented in Figure 23:

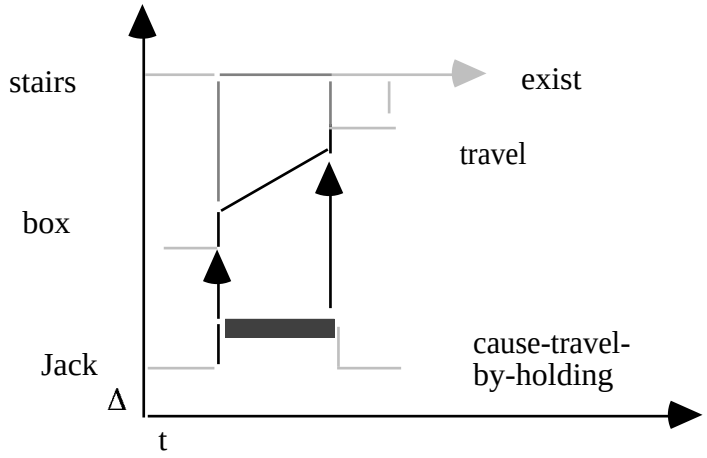
Figure 23. Pushing with an instrument



I propose the same analysis for carrying verbs, illustrated by example 36 and Figure 24:

(36) *Jack carried the box up the stairs.*

Figure 24. Carrying as extended caused directed motion



The analysis of carrying verbs in Figure 24 appears to be superior to alternative analyses of the subevents, even though it does not explicitly express the fact that the agent also moves with the figure. Two alternative analyses of the agent and figure subevents are given in 37 and 38:

(37) Agent subevent: travel
Figure subevent: move-by-being-located-at

(38) Agent subevent: move-while-holding/hold-while-moving
Figure subevent: travel

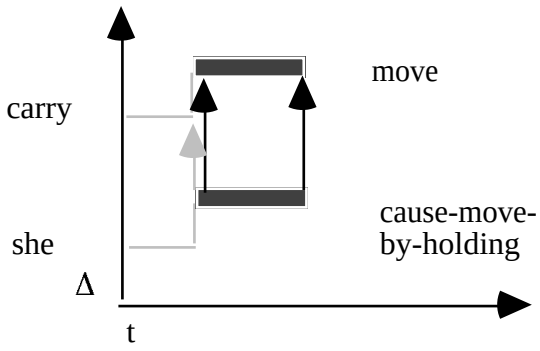
The analysis in 37 has the agent move, and the figure's motion is a consequence of its being located with the figure. Yet it is the agent who is doing the holding, that is, applying force to the figure (specifically, extended causation of rest). The analysis in 38 represents the fact that the agent is doing the holding. But it does not capture the fact that the situation expressed by 36 is about the motion of the figure, and the fact that the agent also moves is incidental to the relevant meaning of the carrying verb.

The analysis in Figure 24, in which the agent subevent is 'cause-travel-by-holding', is similar to the analysis of directed manner of motion verbs in Figure 3, in which the agent subevent is 'travel-with-Manner'. The directed manner of motion verbs also occur as undirected activity verbs. The same is true of the carrying verbs, in certain contexts:[24]

(38) a. *This truck carries 5 tons of gravel.*
b. *She carries her baby on her back.*
c. *Who is carrying her suitcase?*
d. *Watch out! He's carrying a gun!*
e. *That policeman always carries a pistol.*

The examples in 38 are probably best analyzed exactly like undirected manner of motion verbs, in which the figure subevent is 'cause-move-by-holding', as in Figure 25 for example 38b:

Figure 25. Undirected carrying



Rapaport Hovav & Levin (MS) also describe a number of other apparent caused motion constructions that appear to involve Subject resultatives. In the remainder of this section, I will offer analyses of these constructions in the three-dimensional model that preserves the principle of nonbranching causal chains.

The first class of examples uses another English construction which overtly expresses the path of motion:

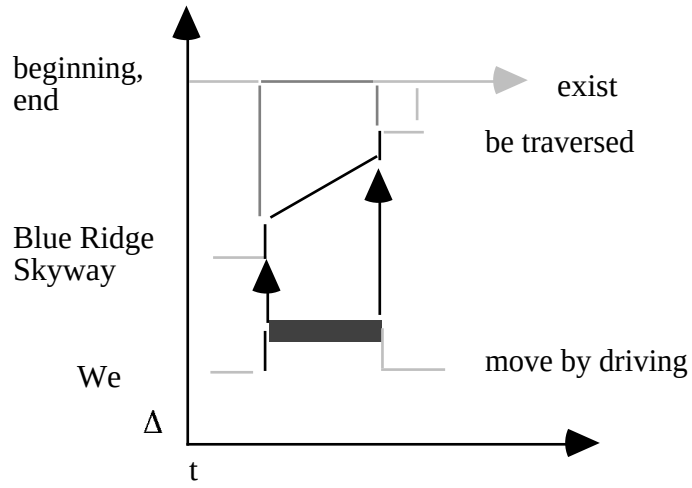
(39) *We took the IRT*[25] *from Grand Central to the Brooklyn Fine Arts Museum.*

[24]Carrying verbs also occur in a Path DNI construction: *My brother carried the luggage* is acceptable if a specific Path (e.g. from train station to car) is known to the interlocutors in the discourse context.
[25]I am assuming that *IRT* means the subway line, not a train on the line. In the latter case, the sentence should be analyzed as correlated motion (see below).

(40) *We drove the Blue Ridge Skyway from beginning to end.*

In 39-40, there is overt expression of the path as Object, as well as a desription of its traversal with respect to ground reference points. The analysis of 39-40 is just like that for other constructions with the path overtly expressed (see §4.1). This analysis is given in Figure 26:

Figure 26. Directed motion with overtly expressed path



Another class of examples cited by Rapaport Hovav & Levin (MS), using their own examples as well as examples from others that they cite, is what I will analyze as **correlated motion** verbs:

(41) a. *Fly American Airlines to Hawaii for your vacation!*
b. *The wise men followed the star out of Bethlehem.* (Wechsler 1997:313)
c. *The sailors managed to catch a breeze and ride it clear of the rocks.* (Wechsler 1997:313)
d. *He followed Lassie free of his captors.* (Wechsler 1997:313)

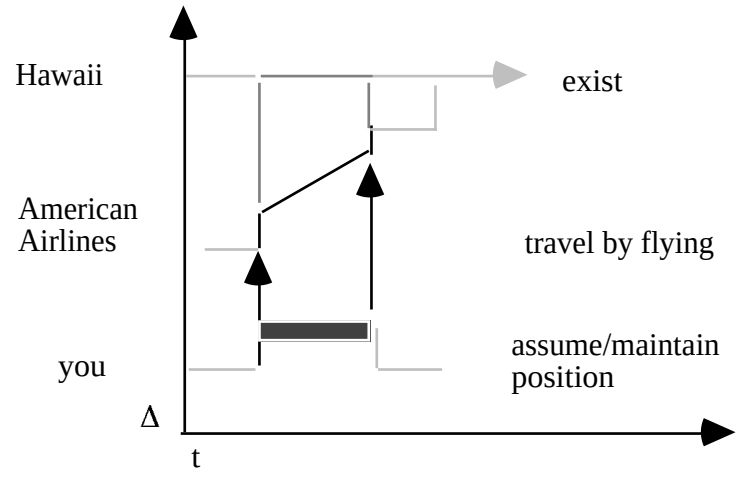
In correlated motion verbs, the situation is about the movement of the agent, and it is the figure's motion which is used to transport or guide the agent. The contrast between carrying and correlated motion is illustrated by the following examples:

(42) a. *The train took us to Berlin Zoo station*.
b. *We took the train to Berlin Zoo station.*

Example 42a is a *carry* verb: the train carries us to Berlin Zoo station. Example 42b is correlated motion: we choose to locate ourselves on the train and the train goes to Berlin Zoo. Example 42a would be appropriate if we just hopped on a train to see where it would go. Example 42b would be unacceptable in that reading, because we intentionally put ourselves on the train in order to go to Berlin Zoo. There is also another reading of 42b: we carried a (toy) train to Berlin Zoo. The ambiguity of 42b is further evidence of the distinctness of the carrying and correlated motion meanings.

Correlated motion is analyzed as the agent assuming a position correlated with that of the figure, and the agent thus moves as the figure does. This analysis is represented for example 41a in Figure 27:

Figure 27. Correlated motion



In Figure 27, the agent assumes and maintains a position which is defined relative to the position of the next participant in the causal chain. I will call the agent the **correlated figure**, since its position/motion is correlated with that of the figure referent. In fact, the figure of the motion expressed by the verb functions as the ground relative to the correlated figure.

Maintaining position is an inactive action (see §2.5.3). Maintaining position involves the exertion of force to maintain a position relative to the reference point/ground. The processual construal of maintaining position is exactly what is needed for correlated motion, because in correlated motion, maintaining one's position entails moving with the correlated figure. The relationship between the correlated figure and its ground, the true figure of the verbal motion, is a spatial one, not (necessarily) a causal one. The correlated figure is itself moving, and in directed correlated motion, that movement traverses a path defined with respect to a ground referent (in Figure 28, Hawaii).

The Subject referents in 41 correlate their position with the Object referent by maintaining a certain close distance (*follow*), by getting in/on the Object referent and thereby allowing herself to be conveyed by the Object referent (*ride*, *fly*, *take* [a vehicle]), or by not only being conveyed by the Object referent but also controlling the Object referent's motion (*fly* when the subject is the pilot, and *drive*, discussed below[26]). In all these cases, the Object referent moves along the path and the Subject moves along the path by virtue of the Object referent's motion and the Subject referent's colocation or correlated location (*follow*) with respect to the Object referent. In 41b, the star is construed as moving, that is, perpetually receding in the distance as the three wise men leave Bethlehem.

Sometimes it is not easy to determine whether the verb should be analyzed as a correlated motion verb or as true extended caused motion. For example, in example 43, cited in Rappaport Hovav & Levin MS as an apparent Subject resultative, my intuition is that the sentence about taking the dog to the store—i.e., caused motion—not about John going to the store (which would be correlated motion):

(43) *John walked the dog to the store.* (Verspoor 1997:151)

The examples in 44 shows both construals with another verb, *drive*:

[26]In these cases, the relation between the correlated figure and the true figure is a force-dynamic one, with the correlated figure acting on the true figure.

(44) a. *I drove my car to the garage after the accident (it was not damaged that badly).*
b. *I drove my car to the party (and so I don't need a ride home).*
c. *I drove my car to the edge of town and watched the sunset.*

Example 44a clearly has a caused directed motion interpretation: it is about conveying the car so that it may be repaired. Example 44c has a correlated motion interpretation: it is about the driver getting to a destination. Example 44b is a more subtle case, but is best analyzed as caused directed motion: the relevant meaning is that I brought my car to the party, even though the purpose of bringing this fact up at this point in the conversation is that I can use it to go home.

In other words, the correlated motion construction only appears to have a Subject resultative interpretation as a consequence of the Subject referent's intended correlated position with the moving Object referent and the Subject referent's intention to reach the same destination as the Object referent. This analysis preserves the nonbranching causal chain hypothesis. But examples given above imply that there is a force-dynamic relationship between Subject and Object referents in these so-called Subject resultatives.

A more challenging example are directed motion performance verbs (Verspoor 1997:151, cited in Rappaport Hovav & Levin MS):

(45) a. *John danced mazurkas across the room.*
b. *The children played leapfrog across the park.*

I would argue that the created performance—the mazurkas or the leapfrogging—engages in fictive motion (Talmy 2000a, chapter 2) across the room/park. Fictive motion is imputed in examples of static arrangements of objects, as in 46, describing a series of rocks from one side of a stream to the other:

(46) *The rocks crossed the stream.*

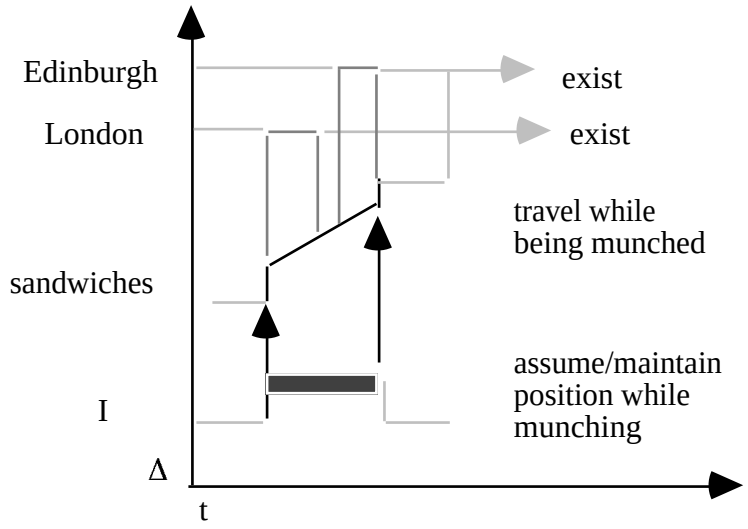
Following the fictive motion analysis of 46, I would argue for a fictive motion analysis of the series of mazurkas or leapfroggings in 45a-b. In this analysis, the performers are co-located with the performance because their activity creates the performance. Hence 45a-b should be analyzed as correlated motion: fictive motion of the "actual" figure, and actual motion of the correlated figure.

Another challenging example are verbs of incidental activity with motion (I thank Richard Hudson for bringing these examples to my attention):

(47) a. *I read Harry Potter from London to Edinburgh.*
b. *I knitted socks from London to Edinburgh.*
c. *I munched sandwiches from London to Edinburgh.*

A correlated motion analysis is possible for this class of examples as well. The reading/etc. are co-events with the correlated motion (see §4.1, example 11). There is one verbal scale, which is something like "travel while Harry-Potter-reading/sock-knitting/sandwich-munching/etc." However, that verbal scale would be associated with the patient/figure rather than the agent/correlated figure. It is clear that the verbal scale of the co-event is associated with the Object argument in the examples in 47. One would have to argue that the fictive motion is of the incremental reading/knitting events and of the iterated munching events that make up the aspectual contour of the verbal scale argument, as in Figure 29:

Figure 29. Correlated motion with co-event



As with 45a-b, there is fictive motion of the "actual" figure, and actual motion of the correlated figure. There appears to be a different between 45 and 47 in that in the former, the Object denotes the events that engage in fictive motion, while in the latter, the Object denotes a participant, parts of which are involved in the events that engage in the fictive motion. Nevertheless, that is true of many ordinary accomplishments as well: at any given time t, only one point of the relevant property of the participant is involved in the process measured out by the verbal scale.

In fact, one can have fictive motion combined with a virtual participant (Langacker MS):

(48) *I watched the scenery from London to Edinburgh.*

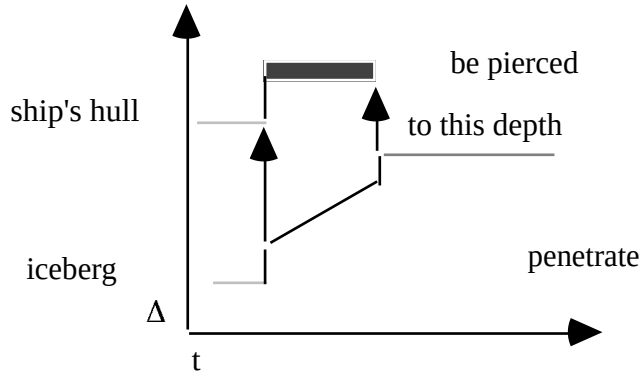
The Object *the scenery* is not a particular scene but a successive series of scenes, each of which I watch as I incrementally travel from London to Edinburgh. Here, the fictive motion is the succession of scenes as well as the succession of my watching events.

A final example of a putative Subject resultative that Rapaport Hovav & Levin offers involves penetration (Dowty 1991:570, ex. 25):

(49) *Moving slowly but inexorably, the iceberg took several minutes to pierce the ship's hull to this depth.*

In fact, Dowty offers example 49 as an example of a boundary-crossing verb with a Subject incremental theme, like example 6 in §4.1. I argued in §4.1 such examples should be analyzed as having a path incremental theme (see Figure 7 in §4.1) that is distinct from both entities undergoing the change of state, and thus it is the path, not the Subject, that is characterized by the resultative expression *to this depth*. This analysis of example 49 is represented in Figure 30:

Figure 30. Penetration



The iceberg is the holistic theme, in that its movement is causing the verbal scale (degree of penetration) to be traversed. The resultative phrase *to this depth* describes the result state of the holistic theme (see §7.1 for the analysis of resultatives).

In fact, in reality both ship and iceberg may be moving. However, as with verbs of collision, the Subject is construed as the Figure and the Object is construed as Ground, that is, reference point for the motion of the figure. The ship can be construed as holistic theme in the Passive construction, as in *The ship's hull was penetrated to this depth.* The alternative construal of the ship as holistic theme in the passive is further evidence for the Verbal Scale Profiling hypothesis, since in the Passive, only the ship's hull, not the iceberg, is part of the verbal profile (see Croft 1998a:55-57 for the analysis of the Passive).

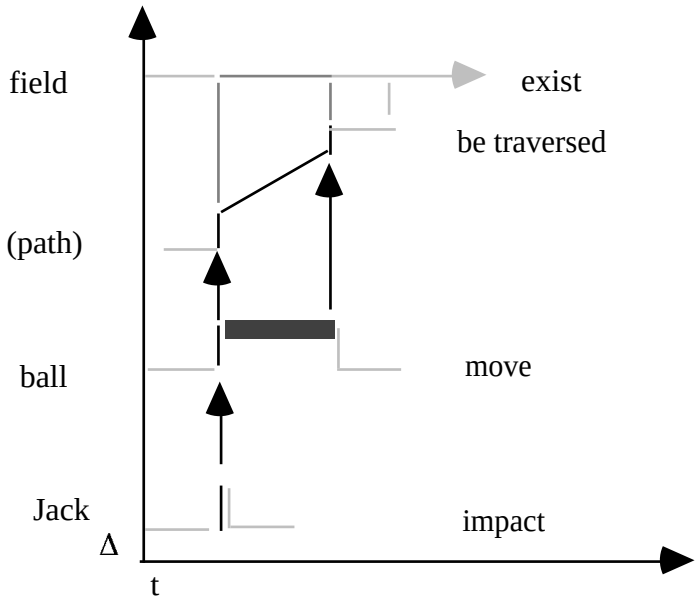
4.5. Ballistic motion

Talmy (1988) analyzes ballistic motion, as in example 48, as onset causation: the initiator (Antagonist in his terms) transmits force only at the beginning of the event, and the endpoint (Agonist) continues to move or changes state after the end of the punctual onset causation:

(50) *Jack kicked the ball across the field.*

Onset causation would then be represented as in Figure 31:

Figure 31. Ballistic motion as onset causation



If ballistic motion is analyzed as onset causation, however, then ballistic motion verbs should be accomplishments. But the aspectual type of ballistic motion is not an accomplishment, as can be seen by the interpretations possible for ballistic motion in the Progressive construction:

(51) *Jack was kicking the ball across the field.*

Ballistic motion verbs in the Progressive has three interpretations, all of which are characteristic of punctual situation types. Example 51 can be interpreted as denoting the runup process of a runup achievement construal: Jack is for example running towards the ball to prepare for the kick. But the kick itself is punctual.

The second interpretation of 51 is as iterated incremental kicking of the ball so that it does get across the field. In this case, it is an accomplishment verb, and the path of motion is the verbal scale. But this accomplishment is not the same situation as construed in the Past tense in 50: it is a process of repeated kicking, not a single kick followed by a temporally extended process of the ball going across the field. (In fact, the Past tense can also have the iterated incremental kicking reading as well.) Instead, the ball is a derived holistic theme (see §1.2.5).

The third interpretation of 51 is Jack repeatedly kicking the ball all the way across the field. This is the iterated version of the semelfactive Past tense reading: the iterated achievement is the situation of kicking the ball all the way across the field. In this interpretation, the path expression is not an incremental theme.

Finally, the container adverbial can only be interpreted as describing the runup process or the derived holistic theme of repeated incremental kicking, if it is interpretable at all:

(52) a. *In ten seconds, Jack kicked the ball across the field.*
(runup process reading preferred)
b. *Jack kicked the ball across the field in ten seconds.*
(derived holistic theme reading preferred)

All of these intepretations point to an achievement construal, and hence punctual causation, for ballistic motion. The punctual construal analysis of ballistic motion is presented in Figure 32, and the iterated activity construal in Figure 33:

Figure 32. Ballistic motion as punctual causation

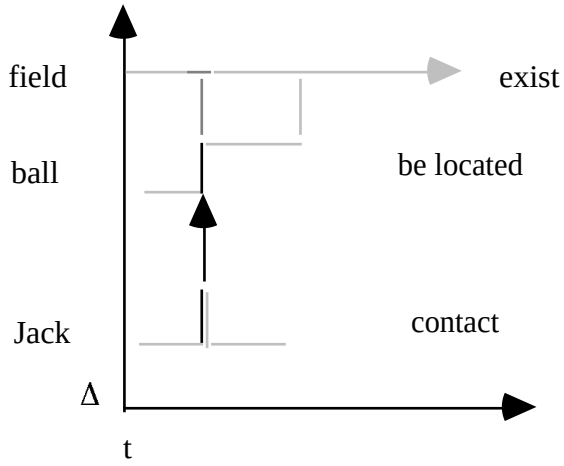
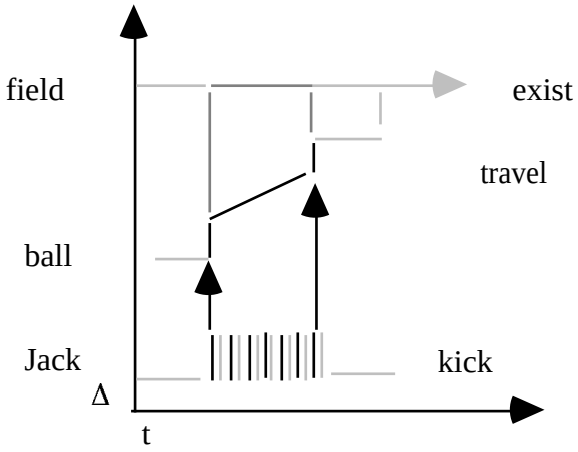


Figure 33. Iterative activity construal of ballistic motion



In other words, ballistic motion is very similar to caused change of location (i.e., *put*). The chief difference is that in the case of *put*, the agent ceases contact with the figure at the end of the path, while in ballistic motion, the agent ceases contact with the figure at the beginning of the path.

The analysis of ballistic motion as punctual causation entails that there are only two types of causation from an aspectual point of view, punctual causation and extended causation. This analysis is possible because the clear separation of causal and aspectual structure in the three-dimensional model has allowed us to make aspectual predictions from the model of onset causation which have then been falsified.

Example 48 involves an impact verb construed as a ballistic motion verb. The impact reading is found in the Transitive construction: *He kicked the ball.* The impact reading does not entail ballistic motion, and ballistic motion is absent in the case of an immobile ground: *He kicked the wall. Kick* is not a prototypical impact verb in that it is not allowed in the Path construction: **He kicked his foot against the wall* (contrast *He kicked the wall with his foot*). In this respect, it is like *swat* (see §4.3).

Ballistic motion also allows for less directly affected targets. This phenomenon can be illustrated with *throw*. Example 53 is an achievement, since *throw* like *kick* is a verb of ballistic motion:

(53) *Sue threw the ball over the house.*

If the path is a simple spatial one, then the path is entailed to have been completed:

(54) **Sue threw the ball over the house, but it landed on the roof.*

If the preposition does not indicate an endpoint, then of course the path traversed by the object does not entail arrival at the endpoint:

(55) *Sue threw the ball towards the fence/towards Jack.*

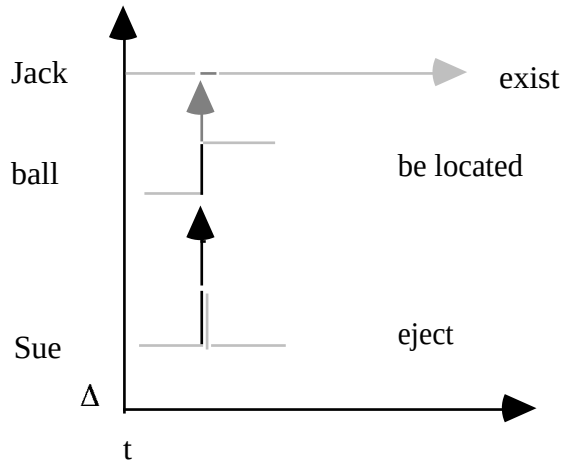
There is also the "aiming" interpretation with *at*, one of the prepositions of English that indicate less direct affectedness:

(56) *Sue threw the ball at the tin can/at Jack.*

At in 56 is a causal preposition, not a spatial one (contrast *towards* in 55, which is spatial). *At* can be used with human objects, in which case the human object is the intended target of a cause-contact event. For Sue to succeed, Jack need only be hit by the ball; he need not catch it, and in fact the sentence suggests that Sue does not intend to engage in a cooperative activity with Jack so that Jack catches the ball.)

Example 56 is represented in Figure 34:

Figure 34. Ballistic motion with a less directly affected target



The agent subevent is ejection of the ball, not unlike substance emission, such that there is a change of location of the figure to somewhere in the vicinity of the ground referent. In this analysis ballistic motion is directed motion by ejection.

Ballistic motion verbs are also used to describe transfer of possession. As such, they also belong with the transfer and possession constructions discussed in chapters 5-6.