

MEREOLOGY IN EVENT SEMANTICS

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Abstract

This thesis investigates verbal and prepositional representations of change under a non-localistic analysis based on the mereology of events, i.e., a system of aspect that uses event parts as primitives in lieu of path parts. Localistic analyses, developed from motional concepts (e.g., Verkuyl 1993, Asher & Sablayrolles 1994), do not extend to non-motional data (e.g., changes of state or possession) except via metaphor, thereby bypassing essential generalizations about change.

It is argued that, instead of modeling change after the tripartite *source-route-goal* divisions of a spatial path, the various combinations of two eventive primitives - *distinguished point* and *distinguished process* - are sufficient and necessary in accounting for abstract and concrete data, including the four aspectual verb classes of states, activities, achievements and accomplishments (Vendler 1967). The medial lexical specification, *route*, is shown to be unnecessary, being an epiphenomenon of two distinguished points interacting, or inferable through pragmatic considerations. This is shown by examples from English and French.

Event mereology unifies concrete with abstract change under a single system of features for verbs (e.g., *arrive* and *inherit*), prepositions, and their associated phrases (*in the house* and *in debt*). Underspecification and complementation further economize the lexical representations while accounting for cases of semantic ambiguity. Such issues as homogeneity in states/processes, resultatives, aspectual verbs (*continue*, *stop*), agentivity, and the effects of aspectual coercion by English aspectual morphemes (*-ed*, *-ing*) are examined and re-formulated where necessary.

The event-mereological approach is demonstrated to be compatible with various current syntactic analyses, and one such analysis (Travis 1999) is investigated in detail. Event mereology is also shown to extend to more complex aspectual patterns observed of serial verb constructions in Èdó (Stewart 1998).

Résumé

Cette thèse examine les représentations verbales et prépositionnelles du changement en adoptant une analyse basée sur la méréologie des événements, c'est-à-dire sur un système aspectuel qui se sert des parties d'un événement (*event parts*) au lieu des parties d'un trajet (*path parts*) comme primitifs. Les analyses basées sur des lieux, qui ont comme unité de base des concepts de mouvement (e.g., Verkuyl 1993, Asher & Sablayrolles 1994) ne s'appliquent pas aux données qui ne concernent pas le mouvement (e.g., changements d'état ou de possession) sauf les cas où l'analyse se sert de la métaphore, ainsi échappent-elles aux généralisations qui concernent le changement.

Je propose que les combinaisons variées des deux primitifs de type événement, notamment ceux de point défini (*distinguished point*) et de processus défini (*distinguished process*), sont suffisantes et nécessaires pour tenir compte des données abstraites et concrètes, y compris les quatre classes verbales et aspectuelles des états, activités, réussites (*achievements*) et accomplissements (*accomplishments*) (Vendler 1967), il n'est pas nécessaire de modeler le changement sur les divisions triparties d'un trajet dans l'espace en *surce-route-but*. Je montre que la spécification lexicale intermédiaire, *route*, est superflue comme elle est soit un épiphénomène qui est une conséquence de l'interaction de deux points définis, soit prévisible des considérations pragmatiques. La discussion se base des exemples tirés de l'anglais et du français.

La méréologie des événements unifie le changement concret avec le changement abstrait sous un seul et même système de traits pour les verbes (e.g., *arrive* et *inherit*), les prépositions, et les syntagmes qui leur sont associés (*in the house* et *in debt*). La sous-spécification et la complémentation servent à rendre les représentations lexicales plus économes tout en rendant compte des cas d'ambiguïté sémantique. J'examine des sujets tels que l'homogénéité des états/processus, les constructions résultatives, les verbes aspectuels (*continue*, *stop*), l'agentivité, et les effets de coercition aspectuelle des morphèmes aspectuels en anglais (*-ed*, *-ing*); je propose des reformulations là où nécessaire.

Je démontre qu'une approche qui se sert de la méréologie des événements est compatible avec plusieurs analyses syntaxiques actuelles; j'en examine une (Travis 1999) en détail. La méréologie des événements peut bien s'appliquer au comportement aspectuel plus complexe que l'on observe chez des constructions des verbes en série en Èdó (Stewart 1998).

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Chapter One

What is Event Mereology?

1.0 Introduction

While much has been observed and written about aspect in linguistics, it remains a difficult topic for both syntacticians and semanticists. Part of the difficulty lies in the paradoxical nature of aspect: though it is understood and used intuitively in languages, aspectual semantics eludes a single, straightforward analysis due to the diversity of aspectual systems in the world's languages, as well as subtle variations within a single language. Yet at the heart of all natural languages, as part of Universal Grammar, there should be a universal aspectual system with the flexibility to accommodate the range of possibilities in individual systems of aspect. Many different attempts in as many frameworks have been made to isolate the nature of this system (Vendler 1967, Mourelatos 1978, Dowty 1979, Verkuyl 1993, Kamp & Reyle 1993, to name a few). However, though the variety of approaches amount to a mosaic that is tantalizingly close to showing the viewer a complete and unified picture, the viewer cannot bring the picture into focus because the details are overwhelming. In accord with this mosaic metaphor, it is necessary to pull back from the details so that the essence of aspect may emerge.

In this thesis, I develop on the basis of simple principles, a theory of aspect called Event Mereology (EM) to identify the features inherent in a universal aspectual system. Its very name captures the essence of the theory: events are basic ontic objects, and aspect is calculated through mereological means, i.e., by the parts defined from the properties of these events. The aspectual class to which an expression belongs depends upon the part-whole relation of the items in its denotation.

Some universal principles of mereology are so fundamental that these parthood relations are naturally incorporated into linguistic systems, in particular the

domains of aspect and nouns.¹ For example, the concepts of parthood in Event Mereology connect a verb of change *enter* (1a) with its prepositional counterpart *into* (1b) by positing semantic features common to both. As well, EM provides the means of differentiating progressives (2a) from perfectives (2b), by proposing that each construction focuses on different parts of the event (the process or the transition).

- (1) a. Geoff entered the house.
b. Geoff went into the house.
- (2) a. Takako is arriving on Tuesday.
b. Takako arrived on Tuesday.

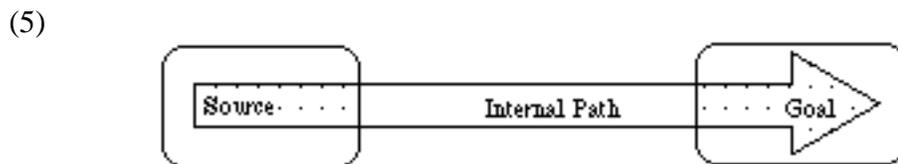
Drawing from diverse insights to produce an intuitive and simple analysis of change that takes advantage of part-whole relations, I develop a new perspective which uses Event Mereology. These insights include, but are not limited to, classic and modern works on verbal aspect (Vendler 1967, Dowty 1979, *et al.*); observations on the progressive from Galton (1984); Discourse Representation Theory or DRT (Kamp & Reyle 1993); and mereological principles from Simons (1987). By taking the divergent ideas in these works and considering their interactions, a coherent picture emerges.

In particular, I argue against localistic theories of aspect, i.e., those analyses that have been developed based on motional and locational criteria. Localistic analyses use spatial primitives to define phenomena of change. Though spatial primitives appear to be natural for dealing with purely locational changes (3a,4a), these spatial concepts must somehow be adapted to account for abstract changes of state (3b,4b):

¹Mereology (the study of parts and wholes) is inherent in the domain of nouns, e.g., the distinction between mass and plural count nouns (i.a,b respectively):
(i) a. Footwear was on sale. b. Shoes were on sale.
Note that in (i.a,b), the nouns refer to the same items, yet the subject-verb agreement is dependent on whether the noun is classified as mass or plural count. The difference lies in how the collection of shoes is viewed: as a whole (as in i.a) or as many individual parts that are collected together (i.b). Thus, the nominal domain requires the theory of parts and wholes to explain the difference between mass and count nouns.

- (3) a. Eric came home in the night.
- b. A solution came to Eric in the night.
- (4) a. Eric switched shirts.
- b. Eric switched majors.

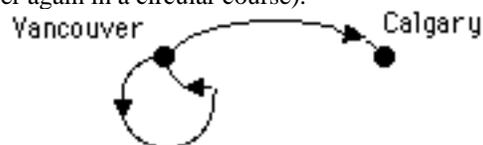
For instance, a location-based analysis might treat *Eric* in (3a) as involving a moving object in physical space that occupy three successive spatial parts, one after the other. Contrast this physical movement with (3b), where *a solution* is not a physical entity, and thus cannot move through physical space. Likewise, in (4b), the act of *switching majors* is not a physical act like *switching shirts* in (4a), but may simply involve a decision made on the agent's part. The tripartite division of motion is graphically represented in (5):



The data below illustrate two physical motions. In (6a), the *source* corresponds to *the store*, the *internal path* to the set of locations between the store and the post office, and the *goal* to *the post office*. While the three parts may appear in the order $\langle \text{source}, \text{internal path}, \text{goal} \rangle$ syntactically, as in (6b), they can vary in order (6c).² The theme in (6c) (*Esther in her car*) moves from the source (*Vancouver*) to the goal (*Calgary*); the internal path passes through at least a point of reference (*the Rocky Mountains*), but the internal path excludes Vancouver or Calgary.³

² $\langle X, Y, Z \rangle$ is the notation for an ordered triple, or three things ordered in time. *X* precedes *Y* temporally, and *Y* precedes *Z* temporally. By commutativity, *X* also precedes *Y*.

³That the internal path excludes Vancouver and Calgary is implied, not entailed. The most salient scenario excludes passage through the source and goal locations during the travel (e.g., going back through Vancouver again in a circular course).



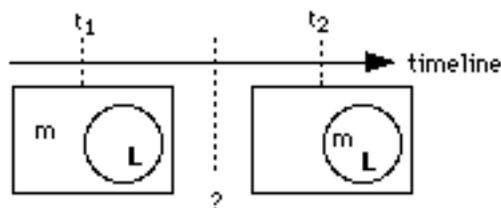
- (6) a. Andrew ran from the store to the post office.
- b. Esther drove her car from Vancouver via the Rocky Mountains to Calgary.
- c. Esther drove her car all the way from Vancouver to Calgary, passing through the Rocky Mountains on her way.

I argue that localistic analyses are inadequate models of change. While spatial information is crucial for any analysis of aspect and change, these localistic analyses cannot be extrapolated into more generalized theories of change without attendant conceptual problems. Critically, change uncontroversially requires temporal components, which are lacking from spatial notions such as paths. All change involves time, but not all change involves place. Localistic theories treat all change as change of place. To handle changes which involve no change of place, localistic theories must resort to metaphor to explain non-locational change. Mismatches arise between specifically locational characteristics (7a, 8a) and abstract states (7b, 8b), because not every use of a locational verb has three parts:

- (7) a. Martha Jo entered the Faculty Club.
- b. Martha Jo entered the lottery draw.
- (8) a. Martha Jo entered the law school.
- b. Martha Jo entered law school.

For example, in (7a), Martha Jo was entering the Faculty Club, performing a distinctly physical movement. It can be argued that the physical path taken by the agent can be divided into three parts, i.e., the area exterior to the Club, the doorway she passes through, and the interior of the Club. However, it is difficult to find an analog of the middle phase for (7b), where Martha Jo bought a ticket but has not yet become a participant in the lottery. Here the act of entrance is abstract: originally Martha Jo (*m*) is not a member of the set of people who are in the lottery (*L*). By buying a ticket, Martha Jo has now become a member of the set of people who are playing in the lottery. It is unclear whether there is, or even can be, an intermediate stage (i.e., Internal Path) between the states where Martha Jo was not participating in the lottery (*m* \neq *L* at t_1) and her participating in it (*m* \in *L* at t_2), shown in (9).

(9)



Thus, one concern explored in this thesis is whether metaphor is a valid linguistic device in the calculus of aspect, a necessary condition for localism to be justified as the basis for all kinds of change. Yet, there is no cogent theory of metaphor. It is of no explanatory help to rely on something that is even more obscure than what it is being used to explain, say some: i.e., explaining the obscure by the more obscure.

The approach developed herein obviates the problem of metaphor by positing events as ontic objects, which naturally include the temporal dimension. Events have natural parts. The aspectual system takes advantage of these natural parts to project corresponding parts (*phases*) onto the timeline. These phases abstract away from the extra information provided in the event, so that the aspectual system does not need to handle information extraneous in its calculation. By calculating aspect with respect to an event's phases, we are able to deal with the temporal component of change naturally.

On another level, this thesis aims to clarify and simplify certain issues in aspectual semantics, which in turn can be used to explain syntactic phenomena. The goal is to establish a system that does not depend on encyclopedic knowledge or common sense, but rather relies on a small set of simple principles that interact to produce the array of aspectual phenomena observed. Economy in linguistic representation is thus actively sought in the development of EM.

While certain problems in aspect may have important ramifications in philosophical discussions, only issues directly relating to syntactic or semantic representations are incorporated into the linguistic analysis. I will argue that some

concerns, like homogeneity, may be pertinent to philosophical problems, but they are not for the aspectual system. This view is balanced by ensuring that the simple tenets of EM are still capable of generating the range of empirical data. The vast array of aspectual systems have in common a set of uncomplicated mechanisms; this set of mechanisms constitute global mereological principles that can be tailored by local mereological principles unique to each language.

This idea of *global* versus *local* mereology has significant impact on the status of localism: EM does not deny that localistic concepts like source and goal are important in verbs of locational change. Clearly, they are important. The universal properties of change, whether they are cross-linguistic universals (e.g., similarities between English and Slavic aspect; *cf.* Slabakova 1998) or cross-categorical universals (e.g., similarities in English between verbs and prepositions involved with change, as was shown in 1a,b), belong in the domain of global mereology. Local mereologies target more specific types of parthood that may participate in semantic interpretation, including language-specific differences and parthood ideas required for locations (since there are some concepts that apply only to spatial phenomena, and which require additional rules). This thesis discusses how the global and local aspects of EM interact.

Chapter One introduces the problem of representing change. In §1.1, I begin by discussing the nature of change in semantics. In §1.2, I examine motion verb classes; in §1.3, I show that verbs of change extend beyond simply verbs of locational change into other semantic domains. In §1.4, I explore in detail a localistic theory, that of Asher & Sablayrolles (1993). I point out areas in which that theory can be improved, including the use of terminology and ontological concepts from Simons (1987) pertaining to events and their parts that are better suited for a general theory of change.

1.1 Why Study Change?

It is intuitive that a movement involves a kind of change in space (10a). However, movement is not the only kind of change possible. In fact, language can express changes in states of being (10b) and possession (10c):

- | | | | |
|------|----|------------------------|-----------------------|
| (10) | a. | John got into the car. | <i>spatial</i> |
| | b. | John got taller. | <i>state of being</i> |
| | c. | John got a new cat. | <i>possessional</i> |

The essence of change could be defined as a contrast between two valuations of a single predicate at different times. What the changes above have in common is that at an earlier point in time (t_1), a predicate (e.g., *be in the car*, *have a new cat*) was false of *John*. Then, at a later point in time (t_2), the predicate is true of *John*. This understanding of change is based not only on intuition, but has formed the basis of theories of change and motion for centuries, from Aristotle onward. More recently, the same idea has been put forth in linguistics by Von Wright (1965). Von Wright posits a transition relation T , which means '*and next*'. Thus, pTq means '*p* and then *q*', or '*p* is temporally ordered before *q*'. Versions of this have been discussed in Dowty (1979), Landman (1991), among others.

When verbs of change are examined, however, there is a tendency to overlook changes of possession and changes of states in favour of motion verbs. There are many reasons for this attraction: it is easy to find examples of motion verbs; there is great variety in the range of motion verb classes; they appear to be more numerous than verbs of change of possession or states (but see §1.3); movements are physically perceptible and thus it is easier to dissect the parts of a concrete motion rather than with an abstract change. Given these reasons, there has been much more attention paid to motion verbs in the literature than non-motion verbs.

I turn to Asher & Sablayrolles (1994) (A&S) for the definitions of *location*, *position* and *posture*, which are examinations of finer-grained distinctions in

motional phenomena. I will then use this information, along with an overview of other authors on the same topic, to motivate the necessity and appropriateness of a generalized theory of change using event primitives. It will be argued that even more is to be learned about the mechanisms of change by focusing our analysis on event mereology than locational concepts.

I will also show that there is a preponderance of verbs that do not involve just locations, but other kinds of changes (§1.3). I argue that there are sufficient verbs in English that do not involve spatial displacement, but do involve change in other types of domains. Thus, it would make no sense to restrict ourselves to locational concepts, when so much of the data is non-motional. This is not to deny that spatial changes have properties unique to the spatial domain; I will argue that this is a result of the difference between global mereology and local mereologies.

As mentioned previously, global mereology captures the set of rules that are operative for all instances of change. Local mereologies, on the other hand, can be thought of as domain-specific rules, of which location is one. The rules of global mereology are present in all local mereologies, but not all rules in local mereologies qualify as global mereological principles. An analogy of the difference between global and local mereology is, federal (*global*) laws are obeyed in all provinces of Canada, but provincial (*local*) laws vary from province to province.

1.2 Subclasses of Motion Verbs

A consequence of the greater focus on motion phenomena has led to a correspondingly closer scrutiny of the subclasses of motion verbs. For example, A&S posit four classes of motion verbs: *change of location* (11a), *change of position* (11b), *inertial change of position* (11c), and *change of posture* (11d).

- | | | | | |
|------|----|---|---|--|
| (11) | a. | <i>change of location</i>
(CoL) | entrer
arriver
accourir
sortir | <i>to enter</i>
<i>to arrive</i>
<i>to rush up</i>
<i>to go out</i> |
|------|----|---|---|--|

b.	<i>change of position</i> (Cpn)	se déplacer circuler descendre s'élever	<i>to move around</i> <i>to circulate</i> <i>to go down</i> <i>to go up</i>
c.	<i>inertial change of position</i> (inertial Cpn)	courir danser voler	<i>to run</i> <i>to dance</i> <i>to fly</i>
d.	<i>change of posture</i> (Cpr)	s'asseoir se baisser se pencher	<i>to sit down</i> <i>to bend down</i> <i>to lean over/towards/ forward/back</i>

Let us look at the definitions of *location*, *position* and *posture* in A&S. In essence, a location under A&S is a portion of space, whereas a position is a portion of surface of a location. Locations are associated with a functionality (explained below) and are lexicalized by real lexical items or a preposition with a lexical item. In contrast, positions do not have functionality or 'real associated lexical items', but can only be lexicalized by deictic expressions like *here*, *this position*, and *the position she occupies now*, and are dependent on the entity used for their definition.

Functionality, as it has been defined by A&S, contrasts locations and positions. Locations are '*portions of space which can be 'designated' in natural language*' and '*can be recognized as one in which certain types of activity take place*' (A&S, p.170). It is clarified in their footnote 7, reproduced in (12):

- (12) For example, a kitchen is normally a place one recognizes as being one where people can cook and eat, a street one on which cars and people move, a house a place in which people live ... In contrast, positions (see Definition 2) have no such functionality. An unmarked part of the street has no associated activity and is not recognizable as such. It can only be defined deictically (which may involve referring to the position of some object by ostension or by the use of coordinates). (A&S, p.206)

A posture is defined as a special way to be inside one's 'pragmatic shape'. Put another way, an entity may have many parts that can assume different orientations with respect to its other parts. The entity would have a specific shape at any time involving the sum of its parts; that specific shape is called a posture.

Importantly, a change in posture has roughly the same location throughout the change. For example, neither *kneel* or *lean* (13a,b) involve a remarkable movement from the original location or position.

- (13) a. Felix knelt down on the bench.
b. Felix leaned out of the window.

A&S classify (14a) as a *change of location* verb (*entrer*, 'to enter'). (14b) is an example of a *change of position* verb (*se déplacer*, 'to move around'), and contrasts with (14c), which is an *inertial change of position* verb (*courir*, 'to run'). (14d) is a *change of posture* verb (*s'appuyer*, 'to lean').⁴

- (14) a. *Demain j'entrerai à la cuisine, sous un prétexte quelconque.*
'Tomorrow, I will enter the kitchen under some pretext.'
CoL (A&S, p. 168)
- b. *Pauline se déplace en bus au centre ville.*
'Pauline takes the bus in the centre of the city.'
lit. 'Pauline moves around on a bus in the city.'
Cpn (A&S, p. 171)
- c. *Les joueurs courent sur le terrain de football.*
'The players run on the soccer field.'
inertial Cpn (A&S, p. 168)
- d. *Le gardien de but s'appuie contre le mur.*⁵
'The goalkeeper leans against the wall.'
Cpr

A&S distinguishes change of position verbs from inertial change of position verbs with the *sur place* 'on the spot' test. Those verbs which can be combined with *sur place* only suggest a change in position, whereas those that cannot imply a change in position.

To qualify as a change of location verb, A&S require that there is actual change with respect to the reference location. In the cases of (14a-d), the reference locations are respectively *la cuisine* 'the kitchen', *centre ville* 'the centre of the city', *le*

⁴Change of posture verbs can double as stative verbs. We are taking the active reading where Andrew was not leaning against the spiral staircase in the first place. See the next chapter for a discussion of stative verbs.

⁵Adapted from A&S:

(i) *Le gardien de but s'appuie contre le montant de ses buts.*
'The goalkeeper leans against his goalpost.' (A&S, p. 168)

terrain de football 'the soccer field', and *le mur* 'the wall'). Thus, there is only a change of location in (14a). In contrast, *centre ville* in (14b) remains as the background location within which Pauline moves around; the location of the moving object stays constant throughout the event. Likewise, it is argued that (14c) and (14d) do not involve true change in location, as A&S have defined *location*.

Furthermore, change of posture verbs differ from the other three classes in that the movement only involves parts of the entity, not the whole entity as required by CoL, Cpn and inertial Cpn verbs. It is argued in A&S that a Cpr verb (15a) cannot have the meaning in (15b):

- (15) a. Gaby se penche par la fenêtre.
Gaby leans out of the window. (A&S, p. 172)
- b. Gaby passe par/tombe de la fenêtre.
Gaby goes out through/falls out of the window. (A&S, p. 172)

In A&S, change in location, position and posture are all analyzed as tripartite. Only the granularity of the position and posture predicates are different. This is shown in the different types of predicates used (16a-c), but it remains true that each kind of verb requires a three-part division:

- (16) a. ***change of location***
Source(e), SIP(e), Goal(e)
- b. ***change of position***
Init-position(e), SIP-position(e), Final-position(e)
- c. ***change of posture***
Init-posture(e), SIP-posture(e), Final-posture(e)

Asher & Sablayrolles (1994) compare their four subclasses of motion to eight previous approaches in the literature, distinguishing syntactic approaches (Wunderlich 1991, Maienborn 1992, Guillet 1990) from semantic approaches (Hays 1989, Dervillez-Bastuji 1982, Lamiroy 1986, Boons 1985, Laur 1991). They argue that their analysis correlates well with all these analyses, as is shown in table (17). Despite some differences in classification, tests and nomenclature, verbs of movement on the whole exhibit the same properties, showing great compatibility between the different analyses.

(17) (Figure 8, A&S, p. 205)

Asher & Sablayrolles	verbs of change of location		verbs of change of position	verbs of inertial change of position	verbs of change of posture
Wunderlich	verbs of placement	verbs of movement	verbs of location		
Maienborn	Bewegungsverben		Positionsverben		
Guillet	Verbes locatifs				other verbs
Hays	Transposition verbs				non-transposition verbs
Dervillez-Bastuji	Displacement verbs		Agitation verbs		
Lamiroy	verbs of direction		verbs of displacement		verbs of the movement of the body
Boons	displacement verbs		<-- (in the facts) AND (by definition) ->		motion verbs
Laur	Initial and Final verbs		Medial verbs		motion verbs

We have already seen that there are some problems associated with a tripartite analysis, which can likewise extend to changes in posture and position. The predicates may differ, but the same arguments could be made for Cpn and Cpr verbs that only a final state and a complementary initial state are required to capture the idea of change.

Consider for instance (18a) and (18b), respectively change of position and change of posture verbs. In (18a), there is a point at which Andrew has completed his action of descending the staircase. That *distinguished point* is the focus of the event, emphasizing that the action is completed.⁶ We know it to be true that before the distinguished point, Andrew has not yet finished traversing the staircase, if he began the motion at all. Again, a two-phase analysis proves adequate in representing the linguistic information that is to be conveyed by the Cpn verb.

- (18) a. Andrew descended the spiral staircase.
 b. Andrew leaned against the spiral staircase.

⁶The past tense marker on the verb coerces a completive reading, i.e., the event has concluded, establishing a point of change. See §4.2 for more on coercion and the interaction of *-ed* and *-ing*.

Likewise, we can represent the change of posture verb as a two-phase change in (18b). While (18b) could be interpreted as a state, it can also be interpreted as a change from *not leaning against the staircase* to *leaning against it*: from one state to its complementary state. While the default interpretation of *lean* seems to be that of change from an upright, standing position to the leaning position, note that Andrew could have been kneeling at first, or in any other posture before he adopted a leaning posture against the staircase. Take the example of Andrew sitting on a bar stool next to the spiral staircase, while leaning backward against the staircase (19a). This scenario is just as reasonable as one where Andrew is in a standing position (19b).

- (19) a. Andrew sat leaning against the spiral staircase.
b. Andrew stood leaning against the spiral staircase.

The A&S subclasses of motion verbs treat changes of location, position, and posture all separately, yet it has been demonstrated that these three kinds of change all reflect a very distinctively localistic tripartite division, as was shown in (16a-c). A two-phase analysis of change in these three subclasses of motion is shown to be possible, and we will explore this non-tripartite treatment of change in more detail below.

1.3 Non-Motion Verbs of Change

There are two kinds of data that we want to consider that will help clarify the nature of change. One logical step is to investigate whether or not there are sufficient non-motional verbs (and prepositions) to justify a non-localistic analysis. If there are many non-motional verbs, then it becomes a non-trivial question of how changes are dealt with in general. The second type of data that is relevant are motion verbs with non-motional interpretations. When motion verbs are used with non-localistic senses, we can show that the extrapolation of localism to the non-localistic senses results in redundant lexical information.

In this section, I argue that there are many verbs that do fit the description of non-motion verbs. Some of these verbs will be descriptive of physical actions, and as a consequence involve motion of one type or another (20a). However, there will be non-motional applications of these verbs (e.g., 20b), as well as verbs which are strongly abstract, lacking a physical application (*suspect*, as in 20c). Contrast (20c) with (20d), where the object of the verb *suspect* appears concrete, but in its actual interpretation involves an abstract element. Thus, Jasper suspects the chairs of being in a certain state. Examples are given in (21a-c):

- (20) a. Jasper arranged the chairs.
b. Jasper arranged a meeting.
c. Jasper suspected Mary of being unfaithful.
d. Jasper suspected the chairs.
- (21) a. Jasper suspected the chairs of being unsturdy.
b. Jasper suspected the chairs of being illicit goods.
c. Jasper suspected the chairs of being booby-trapped.

Drawing from Levin (1993), I list below several sets of English verbs that do not necessarily involve motion.⁷ The majority of these verbs can also be argued to involve some kind of change, whether they be actual *changes of state* or *states of change* (following Galton 1984; see §2.2 and §3.1). For example, *discover* (22a) is a change-of-state verb, whereas *search* (22b) is a state-of-change verb:

- (22) a. Doug discovered the missing dime.
b. Doug searched for the missing dime.

Of course, this listing is not meant to be comprehensive, but representative of the diversity of verbs involving change. Levin has analyzed her set of English verbs both in terms of syntactic behaviour and semantic criteria. Since Levin uses her semantic classes to test her classification of syntactic patterns, I have selected only semantic classes instead of listing the verbs by their syntactic behaviour.

⁷Some of the verbs listed in the classes may have motional interpretation, e.g. *criss-cross* (A1), *stalk* (H3).

- (23) **A** ***Verbs of Combining and Attaching***
(L22=Levin's class 22)
- A1** ***Amalgamate Verbs (L22.2)***
• amalgamate (WITH), affiliate, alternate, associate, coalesce, coincide, compare, confederate, confuse, conjoin, consolidate, contrast, correlate, criss-cross, entwine, entangle, harmonize, incorporate, integrate, interchange, interconnect, interlace, interlink, interlock, intermingle, interrelate, intersperse, intertwine, interweave, mate, muddle, ?pair, rhyme, ?team, total, unify, unite
• engage (TO), introduce, marry, oppose, wed
- B** ***Verbs of Creation and Transformation (L26)***
- B1** ***Build Verbs (L26.1)***
• build, arrange, assemble, bake, blow, carve, cast, chisel, churn, compile, cook, crochet, cut, develop, embroider, fashion, fold, forge (metal), grind, grow, hack, hammer, hatch, knit, make, mold, pound, roll, sculpt, sew, shape, spin (wool), stitch, weave, whittle
- B2** ***Grow Verbs (L26.2)***
• grow, develop, evolve, hatch, mature
- B3** ***Verbs of Preparing (L26.3)***
• prepare (meal), bake (cake), blend (drink), boil (egg, tea), brew (coffee), clean, clear (path), cook (meal), fix (meal), fry (egg), grill, hardboil (egg), iron, light (fire), mix (drink), poach (egg), pour (drink), roast (chicken), roll, run (bath), scramble (egg), set (table), softboil (egg), toast, toss (salad), wash
- B4** ***Create Verbs (L26.4)***
• create, coin, compose, compute, concoct, construct, derive, design, dig, fabricate, form, invent, manufacture, mint, model, organize, produce recreate, style, synthesize
- B5** ***Knead verbs (L26.5)***
• knead, beat, bend, coil, collect, compress, fold, freeze, melt, shake, squash, squish, squeeze, swirl, twist, wad, whip, wind, work
- B6** ***Turn Verbs (L26.6)***
• turn, alter, change, convert, metamorphose, transform, transmute
- B7** ***Performance Verbs (L26.7)***
• perform (play), chant (prayer), choreograph (dance), compose (symphony), dance (waltz), direct (movie, play), draw (picture), hum (tune), intone (prayer), paint (picture), play (music, game), produce (movie), recite (poem), silkscreen, sing (song), spin (story), take (picture), whistle (tune), write (book)
- C** ***Engender Verbs (L27)***
• engender, beget, cause, create, generate, shape, spawn
- D** ***Calve Verbs (L28)***
• calve, cub, fawn, foal, kitten, lamb, litter, pup, spawn, whelp

- E** ***Verbs with Predicative Complements (L29)***
- E1* ***Appoint Verbs (L29.1)***
 • appoint, acknowledge, adopt, consider, crown, deem, designate, elect, esteem, imagine, mark, nominate, ordain, proclaim, rate, reckon, report, want
- E2* ***Characterize Verbs (L29.2)***
 • characterize, accept, address, appreciate, bill, cast, certify, choose, cite, class, classify, confirm, count, define, describe, diagnose, disguise, employ, engage, enlist, enroll, enter, envisage, establish, esteem, hail, herald, hire, honor, identify, imagine, incorporate, induct, intend, lampoon, offer, oppose, paint, portray, praise, qualify, rank, recollect, recommend, regard, reinstate, reject, remember, represent, repudiate, reveal, salute, see, select, stigmatize, take, train, treat, use, value, view, visualize
- E3* ***Dub verbs (L29.3)***
 • dub, anoint, baptize, brand, call, christen, consecrate, crown, decree, label, make, name, nickname, pronounce, rule, stamp, style, term, vote
- E4* ***Declare verbs (L29.4)***
 • declare, adjudge, adjudicate, assume, avow, believe, confess, fancy, find, judge, presume, profess, prove, suppose, think, warrant
- E5* ***Conjecture verbs (L29.5)***
 • conjecture, admit, allow, assert, deny, discover, feel, figure, grant, guarantee, guess, hold, know, maintain, mean, observe, recognize, repute, show, suspect
- E6* ***Masquerade verbs (L29.6)***
 • masquerade, act, behave, camouflage, count, officiate, pose, qualify, rank, rate, serve
- E7* ***Orphan verbs (L29.7)***
 • orphan, apprentice, canonize, cripple, cuckold, knight, martyr, outlaw, pauper, recruit, widow
- E8* ***Captain verbs (L29.8)***
 • captain, boss, bully, butcher, butler, caddy, champion, chaperone, chauffeur, clerk, coach, cox, crew, doctor, emcee, escort, guard, host, model, mother, nurse, partner, pilot, pioneer, police, referee, shepherd, skipper, sponsor, star, tailor, tutor, umpire, understudy, usher, valet, volunteer, witness
- F** ***Verbs of Perception (L30)***
- F1* ***See verbs (L30.1)***
 • see, detect, discern, feel, hear, notice, sense, smell, taste
- F2* ***Sight verbs (L30.2)***
 • sight, descry, discover, espy, examine, eye, glimpse, inspect, investigate, note, observe, overhear, perceive, recognize, regard, savor, scan, scent, scrutinize, spot, spy, study, survey, view, watch, witness
- F3* ***Peer Verbs (L30.3)***

- peer, check (on), gape, gawk, gaze, glance, glare, goggle, leer, listen (to), look, ogle, peek, peep, sniff, snoop (on), squint, stare

G ***Verbs of Assessment (L34)***

- assess, analyze, audit, evaluate, review, scrutinize, study

H ***Verbs of Searching (L35)***

H1 *Hunt verbs (L35.1)*

- hunt, dig, feel, fish, mine, poach, scrounge

H2 *Search verbs (L35.2)*

- search, advertise, check, comb, dive, drag, dredge, excavate, patrol, plumb, probe, prospect, prow, quarry, rake, rifle, scavenge, scour, scout, shop, sift, trawl, troll, watch

H3 *Stalk verbs (L35.3)*

- stalk, smell, taste, track

H4 *Investigate verbs (L35.4)*

- investigate, canvass, explore, examine, frisk, inspect, observe, quiz, raid, ransack, riffle, scan, scrutinize, survey, tap

H5 *Rummage verbs (L35.5)*

- rummage, bore, burrow, delve, forage, fumble, grope, leaf, listen, look, page, paw, poke, rifle, root, scrabble, scratch, snoop, thumb, tunnel

H6 *Ferret verbs (L35.6)*

- ferret, nose, seek, tease

I ***Destroy verbs (L44)***

- destroy, annihilate, blitz, decimate, demolish, devastate, exterminate, extirpate, obliterate, ravage, raze, ruin, waste, wreck

J ***Verbs of Change of State (L45)***

J1 *Break verbs (L45.1)*

- break, chip, crack, crash, crush, fracture, rip, shatter, smash, snap, splinter, split, tear

J2 *Bend verbs (L45.2)*

- bend, crease, crinkle, crumple, fold, rumple, wrinkle

J3 *Cooking verbs (L45.3)*

- cook, bake, barbecue, blanch, boil, braise, broil, brown, charbroil, charcoal-broil, coddle, crisp, deep-fry, Fench fry, fry, grill, hardboil, heat, microwave, oven-fry, oven-poach, overcook, pan-broil, pan-fry, parboil, parch, percolate, perk, plank, poach, pot-roast, rissole, roast, sauté, scald, scallop, shirr, simmer, softboil, steam, steam-bake, stew, stir-fry, toast

J4 *Entity-Specific Change of State (L45.5)*

- blister, bloom, blossom, burn, corrode, decay, deteriorate, erode, ferment, flower, germinate, molder, molt, rot, rust, sprout, stagnate, swell, tarnish, wilt, wither

J5 Verbs of Calibratable Changes of State (L45.6)
 • appreciate, balloon, climb, decline, decrease, depreciate, differ, diminish, drop, fall, fluctuate, gain, grow, increase, jump, ?mushroom, plummet, plunge, rocket, rise, skyrocket, soar, surge, tumble, vary

K *Verbs of Existence (L47)*
K1 Verbs of Entity-Specific Modes of Being (L47.2)
 • billow, bloom, blossom, blow, breathe, bristle, bulge, burn, cascade, corrode, decay, decompose, effervesce, erode, ferment, fester, fizz, flow, flower, foam, froth, germinate, grow, molt, propagate, rage, ripple, roil, rot, rust, seethe, smoke, smolder, spread, sprout, stagnate, stream, sweep, tarnish, trickle, wilt, wither

Below, I take a verb from each class and give an example of its use with both an abstract and physical use of that verb (if applicable). The (a) sentences are physical, and (b) sentences are abstract. Verbs from these thirty-five classes are more than adequate to establish that there are many non-motional verbs, and a generalized analysis of change would account for both non-motion and motion verbs.

- | | | | |
|------|----|----|--|
| (24) | A1 | a. | The two lovers were united. |
| | | b. | The two countries were united. |
| | B1 | a. | Bill and Mary wanted to build a house together. |
| | | b. | Bill and Mary wanted to build a future together. |
| | B2 | a. | Bridget grew day by day. |
| | | b. | Bridget's trust grew day by day. |
| | B3 | a. | Brian poured his marbles out. |
| | | b. | Brian poured his heart out. |
| | B4 | a. | Bethany organized her books. |
| | | b. | Bethany organized her thoughts. |
| | B5 | a. | Boris collected the loose change. |
| | | b. | Boris collected anecdotes. |
| | B6 | a. | Belle changed the lightbulb. |
| | | b. | Belle changed her mind. |
| | B7 | a. | Blake played hockey. |
| | | b. | Blake played mind games. |

- C a. Connie created a stained glass window.
b. Connie created a story.
- D a. The fish spawned its eggs.
b. The announcement spawned dissent.
- E1 a. The senator adopted a child.
b. The senator adopted a motion.
- E2 a. Erwin selected a CD to play.
b. Erwin selected a word to say.
- E3 a. Edna labeled the cannister as dangerous.
b. Edna labeled her manager as dangerous.
- E4 a. Eugene found Ellen a cheap apartment.
b. Eugene found Ellen guilty.
- E5 a. *no physical uses for Conjecture verbs*⁸
b. Ellen maintained that she was innocent.
- E6 a. Elwy camouflaged his jeep.
b. Elwy camouflaged his accent.
- E7 a. *no physical uses for Orphan verbs*
b. Queen Elizabeth outlawed hunting.
- E8 a. Ethan guarded the prince.
b. Ethan guarded the secret.
- F1 a. Felicia felt the carpet.
b. Felicia felt sad.
- F2 a. Fred savoured the caviar.
b. Fred savoured the irony of the situation.
- F3 a. Freya listened to the waterfall.
b. Freya listened to her heart.
- G a. Giles studied the book.
b. Giles studied music.
- H1 a. Henrietta dug a hole out of the ground.
b. Henrietta dug a confession out of the groundskeeper.
- H2 a. Hugh searched the metallurgical lab.
b. Hugh searched his memory.

⁸The sentence *Ellen maintained the engine* has the meaning *Ellen kept the engine in working order*, and may be semantically linked to *Ellen maintained her innocence*. Both have a meaning of continued process. However, this appears unique to *maintain* and not the conjecture verbs as a whole. *Ellen observed the man walking* and *Ellen observed Passover* may be another instance of a conjecture verb that has both physical and abstract uses.

- H3 a. Harriet smelled the rose.
b. Harriet smelled a rat. *figuratively*
- H4 a. Howard raided the fridge for a midnight snack.
b. Howard raided his mind for ideas.
- H5 a. Hilda rummaged through her drawers.
b. Hilda rummaged through her recollections.
- H6 a. Hank sought his long lost love.
b. Hank sought closure.
- I a. Ingrid's boat was destroyed.
b. Ingrid's career was destroyed.
- J1 a. Jim broke Jame's leg.
b. Jim broke Jame's concentration.
- J2 a. Jane bent the stick.
b. Jane bent the rules.
- J3 a. Jules roasted the turkey.
b. Jules roasted the guest at the Friar's Club.
- J4 a. The flower blossomed.
b. Love blossomed.
- J5 a. Jeananne gained two pounds.
b. Jeananne gained my respect.
- K1 a. The silver was tarnished.
b. His reputation was tarnished.

It appears from the above that the object of the verb controls the interpretation, whether it be physical (24 K1a) or abstract (e.g., 24 K1b). If the object is concrete, then there is a physical change that occurs; an abstract concept like *reputation* can only change in an abstract sense.

Zeugma appears to be of use here. Cruse (1986) proposes as one of the tests of ambiguity, that independent senses of a lexical form cannot be simultaneously used without causing a degree of oddness (*zeugma*); i.e., the two meanings are antagonistic. A classic example of zeugma is given below, where *John* and *his driver's license* select different senses of the verb *expire*:

(25) ?John and his driver's license expired last Thursday.

Cruse (1995) argues that polysemy deals with the degree of distinctness between two or more readings, whereas polylexy is the extent to which separate entries in the lexicon are justified. He assumes that polylexy is a sub-class of polysemic variants, and that a certain degree of polysemy must be demonstrated in order for polylexy to be relevant. It seems that there must be distinct polysemy in the cases presented in (24), as the examples in (26a,b) show. There is sufficient distinctness in the two senses, the strictly physical and the strictly abstract. However, it is not clear if we require polylexy.

- (26) a. Jane bent the stick. It broke.
b. ?Jane bent the rules. They broke.

If our goal is to unite physical and abstract changes into a single analysis of change, then we need there to be a connection between the concrete and abstract senses of the verb. It is clear that we do not have full ambiguity characterized by discreteness and antagonism (Cruse 1995), as in the case of the two senses of *bank*.

- (27) a. I moored the boat to the bank.
b. I robbed the bank.

For a verb like *bend*, it remains part of the meaning that an agent caused something normally rigid (either a stick or a set of rules) to yield to his intent. The abstract sense is a metaphorical extension of the physical sense, and the vast range of data shown in (24) confirms that the abstract sense is regularly derived from the physical.

Thus, I propose that there is no polylexy involved, but that for verbs of change, metaphoric extension creates a *sense spectrum* (Cruse 1986), on which physical and abstract senses are merely 'local senses'. Zeugma arises between senses which are more distantly separated points on the sense spectrum. In one sense, the physical use of a verb establishes a point of origin on the sense spectrum, and metaphorical uses draw out the points along the sense spectrum. The type of

object, i.e., the degree of abstractness of the object, establishes a 'metaphoric' distance from the 'original' use of the verb.

1.4 A Localistic Analysis: Asher & Sablayrolles (1994)

That the fundamentals of a theory of aspect be generalizable for most (if not all) languages is an objective of this thesis. If the human capacity for perceiving change and motion is universal, then the human linguistic capacity for expressing change and motion is likely to make use of certain language universals in the linguistic expression of change over time.⁹ The underlying linguistic mechanisms involved in expressing aspect must be general enough to account for aspectual universals, yet be sufficiently flexible to generate the diversity of aspectual systems observed across languages.

The simplest way to expound the problem is to investigate one example of a localistic analysis. Through a detailed critical analysis of the chosen framework, the factors motivating the abandonment of localism as the driving force behind aspect will be used as guidelines in developing the precepts of EM. The remainder of this chapter will explore one particular localistic analysis (Asher & Sablayrolles 1994), isolating the motivations for departing from that theory and for developing Event Mereology. The structure of this investigation will roughly mirror the structure of the thesis, where the key issues motivating EM are formalized and examined fully with supporting data. Once the key elements of EM have been introduced, applications of EM will be given, in particular its functionality in syntax.

In this subsection, I present an investigation of the location-based analysis in Asher & Sablayrolles (1994), referred to as A&S. A&S specifically addresses

⁹I am addressing the interface between perception and semantics, i.e., translating perception into components used by the language faculty, rather than cultural differences in the understanding of time and change. In other words, I am not addressing differences in temporal philosophy across cultures as in Sapir-Whorfian terms. For instance, a culture that considers time to be cyclical would be unlikely to have such views incorporated into their language.

French motion verbs and prepositions, but their analysis also extends to English verbs and prepositions. It is also chosen because it is a precise and well-developed theory, amenable to critical discussion.

A&S's analysis is a good beginning on a difficult problem, bringing some essential insights to bear. One question that arises is whether or not a localistic analysis like A&S provides mechanisms that are general enough for expressing change. I use A&S to pinpoint the features inherent in a localistic theory of aspect. Then, the localistic analysis in A&S is explored with respect to the following issues.

Firstly, the localistic theory overgenerates. A&S advocates a system of lexical representations with three parameters when one of the parameters is extraneous. The parameters operate on a path-based system that overgenerates the number of motion verb classes. It is possible to introduce modifications to their analysis of change and constrain the number of verb classes while preserving certain of their insights into the behaviour of motion verbs.

Secondly, the localistic theory appears to mix linguistic and extra-linguistic considerations. We can improve the A&S analysis by considering also eventualities without spatiotemporal location of the concrete type. In other words, the inclusion of abstract eventualities, such as the (b) examples listed in (24) earlier, will allow additional insights into phenomena of change. There are two types which are relevant: motion verbs used in abstract contexts (27a), and non-motion verbs (27b).

- (27) a. John ran into trouble.
b. John forgot his troubles.

A similar example from French involves the verb *décoller*, which means 'to take off' or 'to unstick'. This verb can be used for an airplane taking off (28a) and for taking a picture off a wall (28b). The former is figurative, whereas the latter is the standard use of the verb. Naturally, a unification of the standard and figurative uses of the same verb is desired. It will be shown that a mereology of events will ameliorate the A&S analysis.

- (28) a. *L'avion a décollé.*
The plane took off.
- b. *Jean a décollé la photo.*
Jean took the photo down.

1.4.1 Localism and Change in A&S

Asher & Sablayrolles (1994) is one of a long tradition of works on aspect, motion and spatial phenomena (Gruber 1976, Cienki 1989, Taylor 1989, Hawkins 1993, *inter alia*) that assume that a typical path of motion, i.e., the spatial projection of a movement, has three distinct parts that are ordered temporally. These parts - *Source*, *Internal Path* and *Goal* - are grammaticalized.¹⁰ The English prepositions in (29), along with the longer list given in (30a-c), are often cited as evidence for the grammatical necessity of these three path components, because they seem to pick out specific parts of the motion. Source, Internal Path and Goal prepositions are also respectively called *initial*, *medial*, and *final* prepositions in A&S.

- (29) Our bus traveled *from* Toronto *via* Kingston *to* Montréal.
- (30) a. SOURCE *initial* *from, off (of), out of, ...*
b. INTERNAL PATH *medial* *via, past, through, across, ...*
c. GOAL *final* *to, into, onto, ...*

In a localistic analysis of change, these three non-overlapping spatial segments are adopted as semantic primitives, in the sense that the lexical specification of a verb of motion is broken down in terms of these three segments. All three segments are obligatory and independent of one another in the theory in order for the verb to be properly interpreted.

A&S propose a typology of French motion verbs and prepositions based on just such a tripartite perspective of change. Their analysis of events requires change

¹⁰The intermediate component has been called by various names in the literature: Strict Internal Path (Asher & Sablayrolles 1994), the perlativ (Cienki 1989), IMPERFECTIVE PATH (Hawkins 1993). In this thesis, the term *Path* will refer to a path of motion that includes the source, the internal path and the goal, whereas *Internal Path* will refer specifically to a Path modulo the Source and Goal segments, and will be a term used synonymously with Strict Internal Path (*SIP*) in this thesis.

to be lexically encoded for each of the three spatial components (*Source*, *Internal Path* and *Goal*). Under the A&S theory, each spatial component is a parameter with seven possible settings.

1.4.1.1 Seven Proximity Relations

The seven possible settings for the three spatial parameters are elementary spatial proximity relations: *Inner-Halo*, *Inner-Transit*, *Contact*, *Contact-Transit*, *Outer-Halo*, *Outer-Transit* and *Outer-Most*. These spatial primitives are defined with respect to a *reference location (RefLoc)* that acts as a landmark for the motion in question. For example, in (31a) the reference location is *Chicago*, embedded in a prepositional phrase, whereas in (31b) it is *the downtown station*, the direct object of the verb.

- (31) a. Lisa's plane landed in Chicago.
 b. Mark's train left the downtown station.

Under A&S, a change of location (CoL) verb encodes the proximity of the reference location over the Source, Internal Path and Goal periods that extend over the event's duration with the seven spatial relations, given verbally in (32a-g) (from A&S):

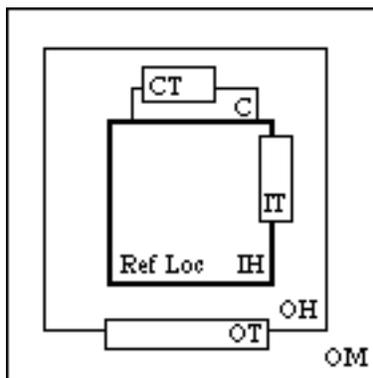
- (32) a. **Inner-Halo(x,y)**: *x* is strictly in the functional inside of *y*, i.e., *x* is in a non-tangential part of *y*.
 b. **Contact(x,y)**: *x* is in the functional outside of *y*, and *x* and *y* are in contact but share no (internal) points.
 c. **Outer-Halo(x,y,C)**: *x* is in the functional outside of *y*, but at a distance less than the critical distance *C* (beyond which is the area which is not in proximity of *y*).
 d. **Outer-Most(x,y,C)**: *x* is in the functional outside of *y* and at a distance greater than the critical distance, i.e., *x* is not in proximity of *y*.
 e. **Inner-Transit(x,y)**: *x* shares at least one of its points with the frontier of *y*, i.e., *x* is externally connected with *y*.
 f. **Contact-Transit(x,y)**: *x* shares a point with the boundary which delimits the fact of being in contact with *y* and the fact of being in an Outer-Halo relationship with *y*.
 g. **Outer-Transit(x,y)**: *x* shares a point with the boundary which delimits the fact of being in the outer-halo of *y* and the fact of being in an Outer-Most relationship with *y*.

The same relations are expressed formally in (33a-g), preceded by their abbreviations (also from A&S):¹¹

- (33) a. **IH** Inner-Halo(x,y) def $PP(x,f-int(y,x))$
 b. **C** Contact(x,y) def $PP(x,f-ext(y,x))$ weak-contact(x,y)
 c. **OH** Outer-Halo(x,y) def $PP(x,prox(y,x,C))$
 d. **OM** Outer-Most(x,y) def $PP(x,f-ext(y,x))$
 $\neg PP(x,prox(y,x,C))$
 e. **IT** Inner-Transit(x,y) def $EC(x,y)$
 f. **CT** Contact-Transit(x,y) def $Contact(x,y)$ Outer-Halo(x,y,C)
 g. **OT** Outer-Transit(x,y) def $Outer-Halo(x,y,C)$
 $Outer-Most(x,y,C)$

The actual organization of the seven generic locations is graphically illustrated in (34), with the abbreviations as shown in (33). A&S subclassifies CoL verbs according to the zones that the object occupies successively at the three different periods of the motion.¹²

(34) (Asher & Sablayrolles 1994, Figure 1, modified)



1.4.1.2 Nine Verb Classes

(35a-i) summarizes the nine classes hypothesized by A&S. A&S partitioned 216 French intransitive verbs into ten classes, of which nine are expressed in terms of locational parameters.¹³ These nine verb classes are

¹¹ $EC(x,y)$: x is in external contact with y (i.e., touching but no overlap). $PP(x,y)$: x is a proper part of y .

¹²The object that undergoes movement is referred to variously as *cible(x)* and *mobile(x)* in A&S.

¹³The tenth class, *Dévier* 'to deviate', is omitted because it involves ideal trajectories and the deviation of the action from the ideal. It does not fit into A&S's localistic system, since it involves a heavy component of modality in its formulation that cannot be dealt with in terms of parts of a path. This point will be discussed in further detail in §3.2.3.5, where it will be shown that Event Mereology can be extended to cover verbs like *dévier*.

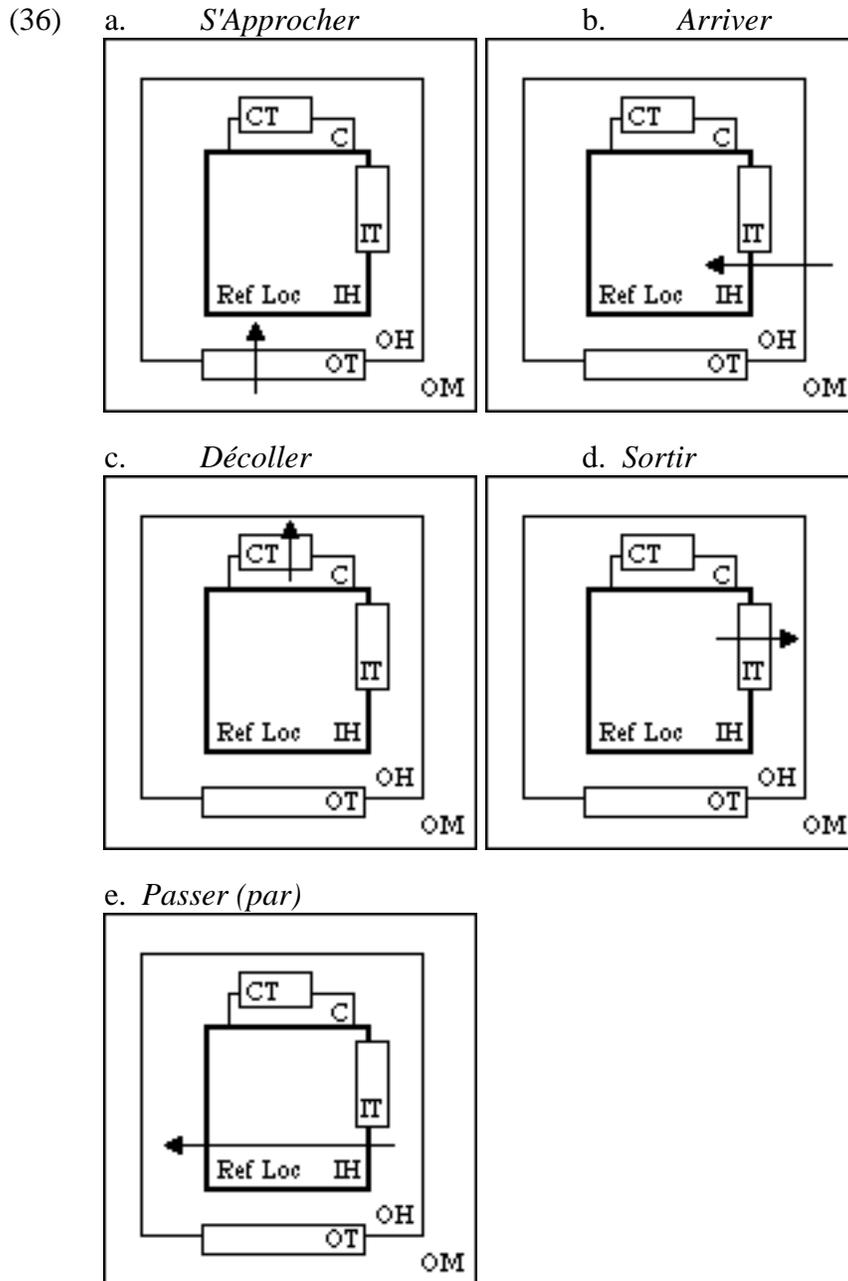
subclassified as having *initial*, *medial* or *final* polarity, as they focus on the Source, Internal Path, and Goal respectively.¹⁴

<u>final polarity</u>			<u>Source, Internal Path, Goal</u>		
(35)	a.	<i>S'Approcher</i> Approach	OM	OT	OH
	b.	<i>Arriver</i> Arrive	OM	OH	IH
	c.	<i>Se poser</i> Land	OH	CT	C
	d.	<i>Entrer</i> Enter	OH	IT	IH
<u>initial polarity</u>					
	e.	<i>S'éloigner</i> Distance-from	OH	OT	OM
	f.	<i>Partir</i> Leave	IH	OH	OM
	g.	<i>Décoller</i> Take-off	C	CT	OH
	h.	<i>Sortir</i> Exit	IH	IT	OH
<u>medial polarity</u>					
	i.	<i>Passer (par)</i> Cross	OH	IH	OH

These verbs can be represented by an ordered n-tuple $\langle x, y, z, \dots, n \rangle$ with each zone represented by a member in the ordered n-tuple. The localistic analysis of A&S specifies three distinct and temporally ordered zones, and so each verb is representable by an ordered triple. For instance, *Sortir* can be represented as the ordered triple $\langle IH, IT, OH \rangle$, corresponding to $\langle source, internal\ path, goal \rangle$.

These verb classes are illustrated in the diagrams (36a-e). The arrow indicates the complete path of motion, and passes through three different zones. The tail of the arrow corresponds to the Source, the middle to the Internal Path, and the arrowhead to the Goal.

¹⁴A&S uses the term *median*, whereas I use the term *medial*; the two terms used interchangeably in this thesis.



For instance, (36a) shows the *S'Approcher/approach* class.¹⁵ The motion begins in Outer-Most, passes through Outer-Transit, and ends in Outer-Halo. Semantically, this corresponds to the intuition that an approach towards a reference location does not mean one arrives at the reference location, but rather outside of it.

¹⁵When French verb classes are discussed, the verb representing the class will be used (*S'Approcher* class, for example). When English verb classes are discussed, the English verb representative is used (e.g., *Approach* class). If both are used (*French/English* class), the latter glosses the verb before the slash.

If we reverse the polarity of motion (i.e., with the arrowhead on the other end instead), then we derive the counterpart, the *S'éloigner* class.

(36b) shows another final polarity verb class: *Arriver*, where the moving object enters the Inner-Halo of the reference location. Its initial polarity counterpart is the *Partir* class. Likewise, (36c) and (36d) show initial polarity verb classes *Décoller* and *Sortir*, which have final polarity counterparts *Se poser* and *Entrer*, respectively. (36e) illustrates a medial polarity verb class, *Passer (par)*. This class is unique in that there are no counterparts in polarity.

1.4.1.3 Sixteen Spatial Prepositions

A&S also classifies spatial preposition with spatial relations to indicate their positional and/or directional properties. A&S's classification system for prepositions is shown in the table in (37), yet only four (Inner-Halo, Contact, Outer-Halo and Outer-Most) of the seven possible values are used in the prepositional classification scheme.¹⁶

(37)	<u>IH</u>	<u>C</u>	<u>OH</u>	<u>OM</u>
<u><i>Positional</i></u>	<i>chez; dans</i> at; in	<i>sur; contre</i> on; against	<i>sous; derrière, à</i> below; behind; at	<i>loin de</i> far away from
<u><i>Initial</i></u> <u><i>directional</i></u>	<i>de chez</i> from -'s	<i>de sur</i> from on to	<i>de derrière</i> from behind	<i>de dehors</i> from outside
<u><i>Medial</i></u> <u><i>positional</i></u>	<i>au fil de</i> through	<i>le long de</i> - (in the course of)	<i>along</i>	<i>au-delà de</i> beyond
<u><i>Final</i></u> <u><i>positional</i></u>	<i>jusque dans</i> up to the inside of	<i>jusque sur</i> up on to	<i>vers</i> towards	<i>pour</i> for

¹⁶Further refinements to the prepositions are possible, such as the entity's intrinsic orientation, as in the English prepositions *behind* and *below*.

1.4.2 Spatiotemporal Trajectories

Against this background, I introduce the first issue to be dealt with: the nature of changes, motions, events and locations. It is shown in this subsection that this particular localistic analysis could benefit from a clarification of the roles of space and time with respect to a crucial function, $STref$.

1.4.2.1 Spatiotemporal Trajectories in A&S

Following Vieu (1991), A&S treats motions as events (also known as eventualities). A&S assumes that all objects have spatiotemporal extent, i.e., extension through both space and time. An object x in a movement has a spatiotemporal trajectory, denoted by the function $STref(x,e)$, which is the spatiotemporal extent of x at the time of the event e , containing both spatial and temporal information. A temporal slice t may also be taken, provided that t is temporally included in the trajectory $STref(x)$. A&S phrase it thusly:

- (38) Eventualities are concrete but complex objects. They may have both objects as constituents and also other eventualities. Every concrete entity, we suggest along with Vieu (1991), has a spatiotemporal trajectory, which we will denote with the aid of a function $STref$. $STref(x)$ is the spatiotemporal extent of x ... $STref(x)$ is a new discourse entity designating the trajectory described by x all along its 'life'. $STref$ may be additionally parametrized with the aid of a temporal variable: $STref(x,e)$ (or $STref(x,t)$) denotes the 'temporal slice' of $STref(x)$ whose time matches the time of the event e (or the time t), if e (or t) is temporally included in $STref$; otherwise it is not defined. (A&S: p.166)

The claim in (38) requires further investigation. Mathematically, there is nothing wrong with associating temporal or spatial location with either physical objects or events. However, it is a long step from this to treating physical objects which are actors (as it were) in an event relation to the event as events making it up. Surely, a man and the tools he uses bear a different relation to baking a cake than the subevents of beating the eggs, folding the eggs into the flour, sifting flour, etc.

It will be useful to invoke two terms from Simons (1987) here (see §1.4.3 for a full explanation). A *continuant*, such as a man, exists as a whole at any time that it exists; it is different from an *occurrent*, which persists through time and is defined by its temporal parts. We can separate the physical location of a continuant from its temporal location. Thus, if *Roy was in Toronto on August 6th, 1999*, Roy was at a location at a specific time. In contrast, if *the TTC strike was in Toronto on August 6th, 1999*, then the occurrent, *strike*, could be said to have *occurred* at that time. Whereas the continuant *Roy* could undergo change, the occurrent *the TTC strike* cannot change per se: its existence as an entity is intimately linked to a temporal specification.

The localistic aspect of A&S reveals itself in the kind of mechanisms it adopts. A&S assumes that all events of locational change invariably have a beginning (*Source*), an end (*Goal*), and a middle (*Internal Path, SIP*).¹⁷ This tripartite division embodies one aspect of localism, and is also found in Gruber (1976), Verkuyl (1993), and countless other analyses. *Source(e)* is a function returning a 'location' (segment), as is *Goal(e)*. *Source(e)* and *Goal(e)* are defined as locations whose spatiotemporal referent, *STref(Source(e))* or *STref(Goal(e))*, contains or is in contact with *STref(e,Initial(e))* or *STref(e,Final(e))*, respectively.¹⁸

Under the A&S analysis, a *Path(e)* is a set of sequences of locations that includes also the source and goal locations. The Internal Path is obtained as the spatial difference between the spatial extent of the entire event and its end-point locations, *Source(e)* and *Goal(e)*. In other words, the Internal Path consists of the largest subsequence (or segment) of locations, minus the Source and Goal segments. Thus, a Path consists of the sum shown in (39). A&S uses this

¹⁷A&S use *Strict Internal Path*, but I refer to it as *Internal Path* for consistency, as previously mentioned. SIP is still used as an abbreviation to distinguish Internal Path from Inflectional Phrase, abbreviated as IP.

¹⁸*Initial(e)* evaluates the point in time that event *e* begins, and *Final(e)* returns the point in time that event *e* ends. *Init(e)* is also used for the former function.

tripartition into Source, Internal Path and Goal in their representations of change-of-location verbs.

$$(39) \quad Path(e) = Source(e) + SIP(e) + Goal(e)$$

Note the type of entity that *STref* applies to: concrete entities (continuants). In §1.4.2.2, however, it will be shown that *STref* is applied by A&S to locations and events (occurents) also. I question the appropriateness of *STref* for these other entity types.

1.4.2.2 Problems with Spatiotemporal Referents in A&S

There are several problems with *STref* as it is used in A&S. What is the connection between the one-place (*STref(x)*) and two-place function (*STref(x,e)*)? What does it mean to apply the one-place function to locations? It also seems odd to apply the one-place function both to events (occurents) and things (continuants). It is unclear what kinds of entities A&S allow to have spatiotemporal extent, as *STref(x,e)* is used in many different contexts. While *STref(x,e)* may refer to an object's spatiotemporal trajectory, examples like *STref(l_i)*, *STref(e)*, and *STref(e,Init(e))* show that *STref* may apply to locations, events, and slices of time respectively. Clearly, this flexibility is confusing. Whereas continuants may exist as complete entities through time (forming a spatiotemporal trajectory), occurents are entities only because they have temporal parts and are incomplete at any one time. It is strange to speak of occurents as having a trajectory when they are not objects that undergo any type of movement. To combine continuants with occurents as a single ontological category is problematic, and *STref* should not be able to apply to these two very different ontological categories.

Consider an analogous example. The function *kg(x)* converts weight from imperial pounds to metric kilograms, and *m(y)* converts height from imperial feet to metric meters. Both are measurement conversions from the imperial system into metric, but clearly the conversions are not the same. Now, suppose we posited a

unified function called $metric(x)$, which converts imperial units into metric units. Clearly, we would be collapsing two very different functions, $kg(x)$ and $m(y)$, into a single 'omnipotent' function. How, given a person's imperial measurement x and the function $metric(x)$, can we decide which kind of measurement conversion is required, weight or height? Only the unit of measurement would give a clue as to the kind of measurement required, but $metric(x)$ must then be compositionally defined by the two different functions, with access to the type of units involved explicitly stated in its definition. This parallels what A&S have done with the $STref$ function: they expect $STref$ to double as two kinds of functions, according to the type of object involved. Yet, as we have seen in the analogy, it is important to acknowledge that the 'omnipotent' function is made of two dissimilar functions operating on different types of inputs.

A possible interpretation of $STref(x,y)$ is that x represents the object, and y the event. $STref(x,y)$ is defined as $STref(x) \quad STref(y)$ if non-empty, and undefined otherwise. However, $STref(x)$ applied to both events and things seems more doubtful, since as Simons (1987) argues, continuants and occurrents are very different entities ontologically. While $STref(x)$ seems plausible for events, it is more doubtful when applied to locations. Ontologically, locations are continuants. Time is inherent to events, meaning that they cannot be defined without an element of time. In contrast, a continuant can be defined without the element of time: a continuant is an independent entity that can exist at different points in time.

Yet, we see A&S use $STref$ for x where x is a location, when a location cannot have a spatiotemporal trajectory. It is strange to speak of the temporal trajectory of a location or its spatiotemporal extent. A location is considered fixed and does not move.¹⁹ (40) below is one of many instances where $STref(x)$ is applied to a location in A&S (p. 166):

¹⁹Certain types of locations may change in size or range, or even move (e.g., *the bazaar* is a location, but it can vary in size from hour to hour as merchants set up stalls or take them down).

- (40) For each sequence of locations $\langle l_1, \dots, l_n \rangle$ we have $P(STref(e), \sum_i STref(l_i))$, and for each i , $EC(STref(l_i), STref(l_{i+1}))$, i.e., adjacent locations in the sequence are externally connected.

A location lacks a definable temporal span, and is not an occurrence of any kind. It is also improbable that $STref(l)$ could be shorthand for $STref(x, l)$, that is, the spatiotemporal trajectory of an object at location l . $STref$ charts locational changes of an object x through time. In fact, a principal fact about change is that change must occur over time. It makes no sense to speak of change of location over a location, as $STref(x, l)$ would suggest.

Neither does it make sense for there to be $STref(e)$, also used in the cited passage in (40). $STref(e)$ would refer to the spatiotemporal extent of an event. While events can have a spatial extent and a temporal span, events themselves cannot change, because their very nature precludes the possibility of themselves changing (Simons 1987). We can only speak of an event's object participants changing. Thus, $STref(x)$ only makes sense when x is an object. When x is a location or event, functions other than $STref$ need to be defined to avoid confusion.

One aim of this thesis is to clarify the interrelations between events, locations and time to avoid unclear definitions seen in the $STref(x, e)$ relation in the A&S model. The Event Mereology system presented is conceptually simpler to understand and use. To be a little more specific, it suffices to say that events remain unaltered, but lexical information can trigger the projection of phases and segments onto a timeline or spatial (or other kind of) domain. Since the event retains all relevant information, its separate projections of phases and segments onto temporal and spatial domains avoids the $STref(x, e)$ confusion in A&S.

These might be the type of locations that A&S refer to: locations whose boundaries that fluctuate in time. However, this method is unnecessarily complicated, especially if we are looking at a sequence of locations as in (40). I believe that a location with variable boundaries over time owes its variation to the fact that it too is a continuant that may have different parts at different times. That an object is interpreted as a location is based more on its use in a syntactic frame than the object's inability to change. For example, a moving object can also be a location: in *John boarded the bus*, the bus is his destination location, but that does not mean that the bus, a continuant, cannot also move, as in *The bus traveled down the road*.

1.4.3 Simons (1987)

Simons (1987) brings together various kinds of mereology from various sources in the literature to give an overall account of the formal theory of part, whole, and related concepts. On the basis of the works he has surveyed, he identifies certain philosophical defects in classical extensional mereology (CEM) analyses: CEM asserts the existence of mereological *sums* that are unattested by evidence outside the theory; CEM also is not applicable to most types of objects that we deal with on a day-to-day basis. To put it another way, CEM is a theory that does not relate to the types of part-whole constructs that are relevant in the real world.

Simons cites two reasons for the above deficiencies. Firstly, CEM does not deal with temporal and modal notions in its logic. While it is possible to extend CEM to account for these notions, there is a more fundamental problem, which is *mereological extensionality*. Mereological extensionality states that objects with the same parts are identical. However, if mereological extensionality is adopted, then two questions arise.

The first question involves objects that have different parts at different times. For example, if John got a haircut on Saturday, mereological extensionality would imply that John with long hair on Friday is not the same as John with short hair on Saturday, because the sums of the parts are not identical on those respective days. However, such fluctuations in the parts are extremely common. For instance, if we replace a laser printer cartridge, do we have a new laser printer? If a company fires and hires people on a regular basis, does it become a different company with every hiring or firing? Clearly, the answer is no: something allows us to identify an object as a laser printer or a company despite the fact that its parts may be in flux.

The second problem involves modality, i.e., some objects might have had some parts other than those that they in fact have, but remain the same object nonetheless. For example, a company might have had a male CEO instead of the

female CEO that they currently have, but in either case the company's identity would be preserved.

1.4.3.1 Against Classical Extensional Mereology

Simon's response to these problems is the idea of the *integrated whole*. He rejects the four characteristics that were prevalent in CEM: *tenselessness*, *non-modality*, *the extensionality of parts*, and *the conditioned existence of general sums*. For Simons, the event is an integrated whole that involves time and modality, whose parts are not extensional, and general sums do not exist.

While some of the four CEM characteristics may be correctly applied for domains that are extensional, not all domains are extensional. To unify domains instead of simply accounting for CEM, Simons pursues the idea of a global mereology, i.e., the bare minimum required in having a part-whole relation. I follow Simons in adopting four principles required for this minimalist mereology: *Falsehood*, *Asymmetry*, *Transitivity*, and *(Weak) Supplementation*.²⁰

- | | | | | |
|------|----|-----------------|-----------|----------------------------------|
| (41) | a. | Falsehood | $x \ll y$ | $E!x \quad E!y$ |
| | b. | Asymmetry | $x \ll y$ | $\neg(y \ll x)$ |
| | c. | Transitivity | $x \ll y$ | $y \ll z \quad x \ll z$ |
| | d. | Supplementation | $x \ll y$ | $z(z \ll y \quad \neg(z \ll x))$ |

These four principles are essential to the part-relation, but sometimes additional principles may need to apply. The four rules constitute the global mereology, whereas in various local mereologies these four principles do not suffice, e.g., in the realm of certain kinds of objects. Simons claims that the nature of the objects controls the choice of local mereologies and the set of additional principles required, i.e., which local mereology modifies the global mereology. A clear example is the case of spatial prepositions, which often involve specifically spatial

²⁰' \ll ' means *is a proper part of*, 'O' means *overlaps*, and 'E!x' means *x exists and x is a singular individual*.

information such as direction, which are not required in the more general system of aspect that we are developing.

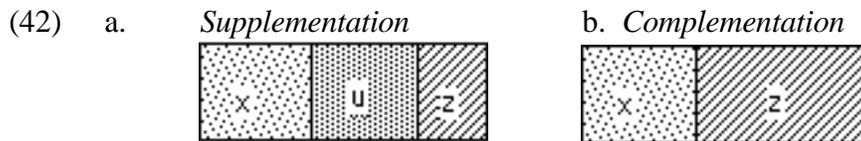
Falsehood (41a) states that if x is a proper part of y , then there is a unique part x and a unique whole y that x is part of. This principle is the most opaque in terms of applications in aspect. The most I dare to conjecture is that parts typically defined on the event are lexicalized only once.

Asymmetry (41b) states that if x is a proper part of y , then y cannot be a proper part of x . If a process is a part of an event, then that event cannot be a proper part of the process. This seems intuitively true. As well, Asymmetry allows events to have parts which are states, but disallows states to have events as parts. Asymmetry thus brings up the question of the ontological relationship between events and states, an issue that is discussed later in this thesis.

Transitivity (41c) states that if x is a proper part of y and y is a proper part of z , then x is a proper part of z . This also seems non-controversial as a description of parts.

Of greatest import to the Event Mereology under development is the proper-parts relation of *Supplementation* (41d), or more precisely, *Complementation*. Complementation is the property which will allow us to generate the two parts (*Goal, not-Goal*) as suggested in §1.4.5.4.

Supplementation (41d) states that if x is a proper part of y , then there is some z such that z is a proper part of y but z and x do not overlap. Supplementation allows there to be some subpart u that is a proper part of y , but does not include x or z (42a). In other words, supplementation allows y to have three parts: x , u , and z . In comparison, *complementation* states that there is a part z , a proper subpart of the entire object y , such that there is no subpart u of y that is neither a part of z or a part of x . In other words, y is bisected into two and only two parts, x and z (42b).



I posit that Complementation is the key behind transitions, since optimally such changes are represented biphasically. Recall that earlier this chapter, we established that a two-phase analysis of change accounts for more data than a three-phase analysis. Complementation also allows us to simplify the representation of change in the lexicon. It allows us to deduce the state prior to the change, which will be opposite to the final state. Once able to predict one of the two states, we can derive one state through a rule, leaving it out of the lexical representation. Only the goal state needs to be encoded. This principle will be the focus of the current proposal.

The four principles cited above are so essential to parthood that it is not implausible that they have linguistic applications. In this thesis, I will demonstrate that the fourth principle, that of Supplementation/Complementation, has significant impact on aspect. If it can be shown that a mereological principle is essential to a module of universal grammar, then it is not unreasonable to extrapolate that other principles of mereology can also influence semantics. It is beyond the scope of this thesis to account for examples of other types of mereological principles that apply in language; only Supplementation and its impact on aspect will be examined in detail.

Relevant to our linguistic analysis is that the same dichotomy between global mereology and local mereologies found in Simons (1987) likewise applies to our Event Mereology analysis. CEM takes local principles such as extensionality (true for some kinds of objects but not all) and lets them apply globally to all domains instead of locally to the proper set of objects affected by the connotation. I claim that the localistic analyses parallel CEM: the intuitions gleaned from locations and

movement are made global and applied to all sorts of changes, including non-locational phenomena.

Rather, there should be a set of principles which is common to all instances of change, that applies equally to locational and non-locational phenomena. It is this minimal set of principles that we want to capture, since it is applicable globally to all kinds of parts and wholes. In contrast, localistic ideas such as Internal Path are valid within the context of a spatial submereology, but must in light of consistency be restricted to the peculiarities of that particular local mereology dealing specifically with spatial data. Such localistic ideas must not be retroactively applied to all instances of change. If they are applied to all changes, then we run into the conceptual difficulties with the abstract constructional polysemy cases.

1.4.3.2 Definitions: Events

I adopt terminology from Simons (1987). An *occurrent* is an object that possesses temporal parts, commonly called events, states, or happenings.²¹ A motion like (43a), which has temporal parts, is thus analyzed as an occurrent, as is a change of state (43b), which also has temporal parts.

- (43) a. Maria entered the hospital.
b. Maria entered a coma.

Continuants are objects without an inherent temporal property. Continuants are distinct from occurrents, because time is built into the concept of occurrents. Whereas a continuant, like the participant *Maria* in (43a) above, is present as a whole at any time that it exists, an occurrent extends through time. A continuant may also have different properties at different times, and thus may undergo change. However, occurrents cannot change, because they cannot first have and then lack a property, or vice versa. Examples of continuants are given in (44a), while occurrents are given in (44b):

²¹Simons' term *occurrent*, originally from Broad (1933), when used in the plural *occurrents*, should not be confused with the similar-sounding term *occurrence* from Mourelatos (1981).

- (44) a. *continuants*: John, Toronto, hospital, apple, ...
 b. *occurrents*: *flying, racing, sleeping, becoming, waiting, ...*

Two occurrents may be superposed without being identical. For example, in the scenario presented in (45a), the two events may be happening simultaneously, yet still be two distinct events. John's sleep (45b) could have been occurring at the same time as his ride on the train (45c).

- (45) a. John slept all the way from Kingston to Toronto aboard the train.
 b. John slept aboard the train.
 c. John rode the train from Kingston to Toronto.

In contrast, if two continuants occupy exactly the same space at the same time (i.e., they are superimposed), they must be the same object. Consider the following sentences (46a) and (46b), where *the Star of India* and *the gem* must be the same object, because they exist in the same place at the same time:

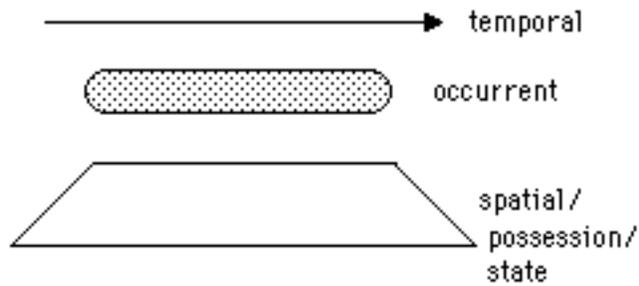
- (46) a. The Star of India was set in the apex of the Crown of England at noon, New Year's Day, 1999.
 b. The gem was set in the apex of the Crown of England at noon, New Year's Day, 1999.

1.4.3.3 Definitions: Spreads, Spells and Spans

The following definitions (47a-c) apply to occurrents (*e*). I illustrate these terms with *occurrent diagrams*, as in (48). To interpret the diagram, the occurrent is represented as a shaded oval in the centre of the diagram. A timeline (with the past-future axis extending from left to right) is a possible (and important) domain for projections from the occurrent. Since it is always possible to measure the temporal interval of an occurrent, the timeline is obligatory. Below the occurrent are the domains that are not obligatory, such as the spatial, possessional, or stative domains.

- (47) a. *spread* spr[e] the space exactly occupied by an occurrent
 b. *spell* spl[e] the time exactly occupied by an occurrent
 c. *span* spn[e] the spatiotemporal extent of an occurrent

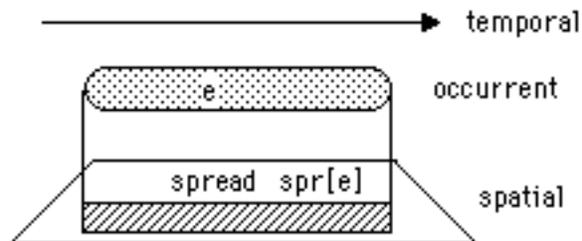
(48)



While Simons (1987) uses *spread* to refer to spatial phenomena only, for the theory we are developing, it is crucial that we permit other kinds of domains to be referred to. Thus, we generalize the term *spread* to apply to any domain, from spatial to possessional to stative. Within *spread* itself, we can further distinguish (at least) between *spatial spreads*, *possessional spreads*, and *state spreads*.

A *spatial spread* includes all the spatial coverage that an occurrent may take place over. Consider again sentence (43a), *Maria entered the hospital*. The spread of the occurrent in that sentence is the space occupied by Maria during the entire process of entering the hospital. For example, the spread of her action might be the route she takes from her car in the parking lot to the emergency room, or just her stepping through a set of doors. A spatial spread is illustrated in (49), where a portion of space has been delimited from the continuum of space:

(49)

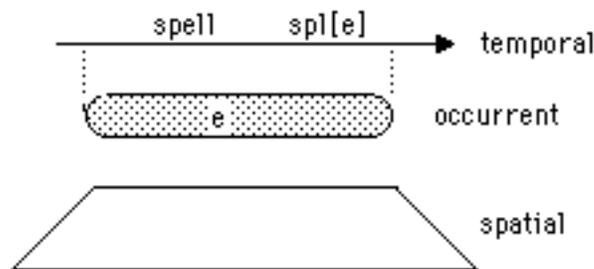


Sometimes prepositional phrases may delimit the spread of an occurrent, as in (50). The spread of that action is the entire spatial path taken by the walker from the store to the gymnasium. It is a type of interval that occurs on the spatial continuum.

(50) Felix walked from the store to the gym.

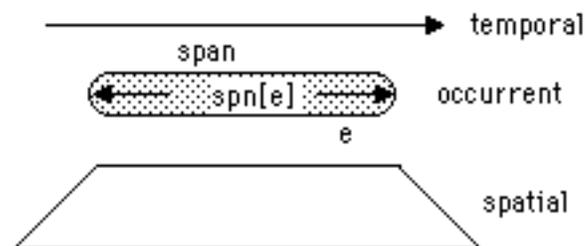
A *spell* is the temporal counterpart of a spread. It is a kind of temporal interval that extends from the initial point of the event to the end of the event. It matches up with the uptake process in an *accomplishment* or *activity*, or just the point of change in an *achievement*. *Spells* can be of zero duration. One projects a spell from parts of the event onto the timeline. The spell of the occurrent in (50) would be the time that it took Felix to walk from the store to the gym. A spell is illustrated in (51):

(51)



The *span* of the occurrent is a combination of both spatial and temporal properties. For example, in (50), it is the time and the space Felix occupied during his walk from the store to the gym. An occurrent is *at* its span, *in* any larger region, and *covers* any smaller region. The span is not a projection, but can be considered a part of the occurrent. The span of an occurrent is the case where the part is not a proper part of the occurrent, but the whole of the occurrent. It is illustrated below:

(52)

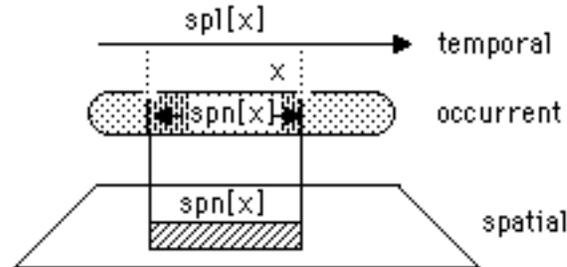


We extend these three functions to also apply to subparts of events. Thus, if an occurrent has a part x , then we are able to make reference to its spatial projection as the spread of x (53a), its temporal length as the spell of x (53b), and its

spatiotemporal extent as the span of x (53c). The three functions, as applied to x , are illustrated in (54):

- (53) a. $spr[x]$ the space exactly occupied by x
 b. $spl[x]$ the time exactly occupied by x
 c. $spn[x]$ the spatiotemporal extent of x

(54)



One merit of Event Mereology is that it takes events as primitives, instead of locations or intervals as primitives (as localism does). That means that we treat the event (occurrent) as a whole, as a complex structure containing much information, not just temporal or spatial. For instance, an occurrent could include information about the subject, the object, motions and locations they are involved in, or the states of change. While we can use the functions to give us the temporal and non-temporal projections of the occurrents and its parts, we need terminology to refer to actual parts of the occurrents. It is crucial that we do not fall into the trap of merging the two very different concepts of the intervals of spatial/temporal projections and the spatial/temporal parts of the occurrent that project those intervals.

1.4.3.4 Definitions: Phases, Slices, Segments and Sections

Terminology applying to parts of occurrents (as opposed to projections of those parts) are defined below, following Simons (1987):

- (55) a. *phase* a temporally connected temporal part of an occurrent
 b. *slice* a phase of zero duration
 c. *segment* a spatially connected spatial part of an occurrent
 d. *section* a segment of zero width in one dimension

Phases are temporal parts of occurrents, or temporally connected temporal parts of an occurrent. A *slice* is a phase of zero duration. Though easily confused with *spell*, spells are distinct entities. One may speak of the spell of a phase, since the function $spl[x]$ would return the temporal length of the temporal part x (i.e., the phase). However, one cannot speak of the phase of the spell. To clarify with an analogy: one may speak of the weight of the man, but not the man of the weight. For example, Shylock may demand a pound of flesh from Antonio, but not an Antonio of a pound of flesh.

Note as well that while one can measure the weight of a man like Antonio, we cannot, given a measure of weight (say a pound), match that to a specific part of Antonio: various parts qualify for that measure of weight. Likewise, an interval of time (spell) could correspond to different phases of the occurrent. Take the case of *making dinner*. Suppose that in making tonight's dinner (event e), I boil an egg (subevent b) at the same time as I sautee onions (s), for the same length of time t . Then, the spells of the phases of the subevents b and s are both the interval t . It is not a one-to-one mapping from t to the phases of b and s , however. One cannot, given just the spell, find the corresponding phases because there may be different subparts of the occurrent that have the same spell.

A *segment* is the counterpart of a phase, which is to say it is a proper part of the occurrent. A *section* is a segment of zero width in one dimension. Again, a segment is not to be confused with a *spread*. Like spreads, however, we will generalize the term segment for use with different domains: *spatial segments*, *possessional segments*, and *state segments*.

We can also take the span of a phase or the span of a segment, which returns the parts of the occurrent that correspond to both the phase and the segment. Put another way, $spn[x]$ returns both the segmental and phasal parts. Note that we can obtain the spread of a phase by identifying its span (adding on its segmental parts),

then taking its spread; likewise, we can obtain the spell of a segment through identifying its span first.

1.4.4 Overgeneration with Spatial Parameters

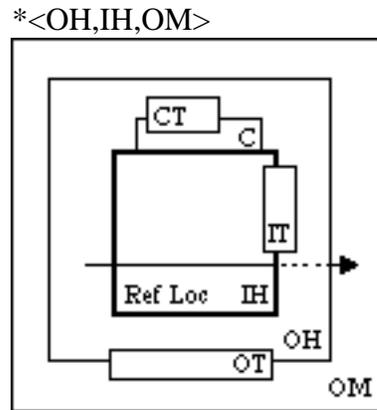
Another place where the A&S system may be improved is to reduce the overgeneration of possible change-of-location verb classes. Ideally, there will be no predicted classes that are unused. Under A&S's system, there are no constraints as to which values the three parameters of Source, Internal Path and Goal are permitted to have. It will be shown that in lieu of arbitrarily assigning values to the three parameters required in the lexical entry of a CoL verb, simple constraints may be posited to reduce the overgeneration of aspectual classes. The division of the path into parts will be demonstrated to be consistent across verb classes and predictable.

1.4.4.1 Gaps and Continuousness in A&S

Let us represent A&S CoL verbs as a ordered triplet $\langle \textit{Source}, \textit{Internal Path}, \textit{Goal} \rangle$. If there are no restrictions on the three parameters, then all seven spatial relations may be chosen as values. The combination of parameters with their values generates 343 ($7 \times 7 \times 7$) possible CoL verb classes. Yet as mentioned in §1.4.1.2, there are only nine CoL verb classes actually posited in A&S. This works out to 9/343 or less than three percent of the total possible classes.

It may be argued that certain combinations are naturally excluded by the configuration of the seven spatial zones previously shown in (34). Such a continuousness hypothesis would limit the number of verb classes to less than 343. This argument would exclude motions that jump from one zone to another that is not adjacent to it, as in (56), where the hypothetical verb class goes from an Outer-Halo source to an Inner-Halo internal path, but then skips all intermediate zones and jumps to an Outer-Most goal.

(56)



While such an argument holds with the intuition that spatial motion is linear and continuous, there remain difficulties with the overgeneration of classes.²² For instance, why is there not a ⟨OT,OM,OH⟩ motion, when the adjacency of the three zones ought to permit such a continuous path? The gaps follow predictable patterns, as shown in (57). Note that the Internal Path parameter is shown in parentheses for each verb class:

(57)

<i>Goal</i> → (SIP) <i>Source</i> ↓	Inner-Halo IH	Contact C	Inner-Transit IT	Contact-Transit CT	Outer-Halo OH	Outer-Transit OT	Outer-Most OM
IH	+				Sortir <i>Exit</i> (IT)		Partir <i>Leave</i> (OH)
C		+			Décoller <i>Take-off</i> (CT)		
IT			+				
CT				+			
OH	Entrer <i>Enter</i> (IT)	Se poser <i>Land</i> (CT)			+ Passer (par) <i>Cross</i> (IH)		S'éloigner <i>Distance-</i> <i>from</i> (OT)
OT						+	
OM	Arriver <i>Arrive</i> (OH)				S'Approcher <i>Approach</i> (OT)		+

One observation regarding the system in A&S is that the transit zones (IT, CT, OT) never appear as Source or Goal in the specification of a CoL verb, as highlighted by the shaded table cells. In addition, these three zones happen to be the

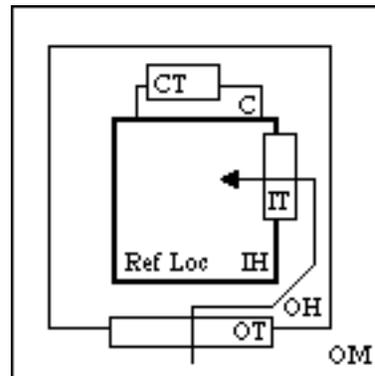
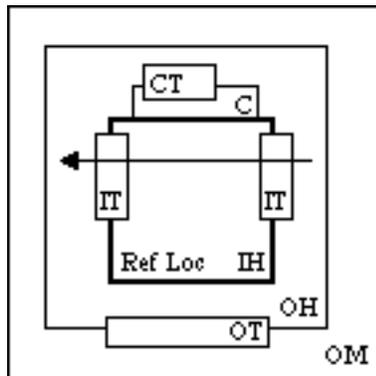
²²There are a couple of verbs involving spatial dislocations which are not continuous, such as the verb *teleport*.

1.4.4.2 Problems with Medial Polarity in A&S

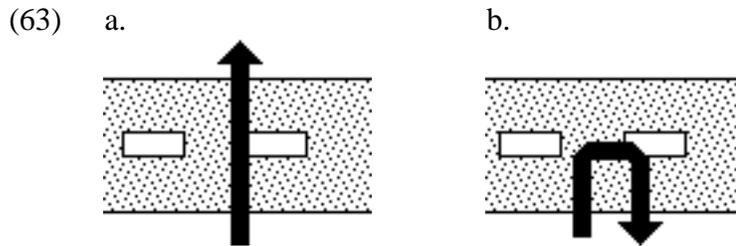
The *Passer (par)/cross* class of CoL verbs is also the only class on the diagonal marked with the + symbol in (57), i.e., it is the only class in A&S that permits identical zone values for both Source and Goal (both Outer-Halo). Yet, it seems arbitrary to say that the object does not move through the Contact zone, the Inner-Transit zone nor the Contact-Transit zone during the movement; intuitively it is necessary to also cross the C, IT and CT zones (60a). The same argument may be applied to the *Arriver* class <OM,OH,IH> (60b) and the *Partir* class <IH,OH,OM>, both of which provide no explanation for the absence of passage through the Outer-Transit and Inner-Transit zones. (60a) illustrates a path that should be taken for the *Passer (par)* class, and (60b) the *Arriver* class.

(60) a. *Passer (par)*
 ?<OH,IT,IH,IT,OH>

b. *Arriver*
 ?<OM,OT,OH,IT,IH>



One concludes that the A&S treatment of these classes as tripartite can be improved upon: as many as five different spatial parameters could be required in the lexical specification, yet A&S limit the number of parameters to three, omitting several spatial relations that need specification, as shown. Thus, a tripartite division of a path is as arbitrary as, say, the five-part path divisions in (60a-b). A non-arbitrary treatment of the CoL lexical representations is necessary. Later in this thesis, I will show that a binary division captures better the actual semantics of CoL verbs.



Of course, the only plausible interpretation of a sentence like (62) is (63a), never (63b). Yet, given the representation $\langle OH, IH, OH \rangle$, the A&S system would incorrectly permit both scenarios for the English example in (62). An accurate account of the verb *cross* should not permit the interpretation in (63b) under any circumstances, and the A&S analysis can be modified to produce the right predictions.

1.4.5 The Medial Parameter Versus Complementarity

One possible way to reduce the number of redundant verb classes but salvage the tripartite analysis is to restrict the four primary relations (OM, OH, IH, C) to Source and Goal, and the three transit relations (IT, CT, OT) to the Internal Path. However, while this method gains us a better ratio (9 out of $4 \times 3 \times 4 = 48$ possible classes, or roughly 19%) of actual to possible classes, it still overgenerates.

1.4.5.1 Eliminating the Medial Parameter

On the basis of the evidence in §1.4.4, it seems that a plausible amendment might be to eliminate the Internal Path parameter, since the value of that parameter is predictable once the Source and Goal values are known. In addition, the three zonal values most strongly associated with the Internal Path (Inner-, Outer- and Contact-Transit) would be barred as possible values for Source and Goal. The elimination of the medial parameter, the Internal Path, is closer to the approach adopted in Event Mereology. The removal of the Internal Path parameter eliminates redundant classes, but it is still a predominantly location-based analysis with attendant localistic peculiarities that do not translate well to abstract data.

Consider the localistic analysis modified from A&S for English verbs. Sixteen possible verb classes are predicted by the bipartite theory: a 4 x 4 grid with {IH, C, OH, OM} values. The previous ratios of 9 out of 343 is improved drastically to 9 out of 16, or roughly 56%. While this is an improvement, can we make the system more economical?

Aside from the A&S verbs, we also predict several classes other than those already identified. We predict there to be many more verb classes that involve the Contact zone, i.e., <IH,C>, <C,IH>, <C,OH> and <OH,C>. Some verbs that appear to correspond to these new verb classes are respectively the *Ooze-*, *Absorb-*, *Throw-* and *Catch-*classes, italicized in chart (64). Class names are indicated by an underscored verb representative of the verbs in its class:

(64)

<i>Final Init</i>	Inner-Halo IH	Contact C	Outer-Halo OH	Outer-Most OM
IH		<i>Ooze</i> , <i>bleed</i> , <i>drool</i> , <i>surface</i> , <i>seep</i> , <i>sweat</i> , <i>trickle</i> , <i>perspire</i>	<u>Go-out</u> , defenestrate, empty, exhale, vomit, exhume, extract, spit	<u>Leave</u> , send, go, deliver, desert, discharge, disperse, expel, fire, mail
C	<i>Absorb</i> , <i>blot</i> , <i>hydrate</i> , <i>sponge-</i> <i>up</i> , <i>incorporate</i> , <i>soak-up</i>		<u>Take-off</u> , detach, eject, unbolt, disconnect	<i>Throw</i> , <i>drop</i> , <i>toss</i> , <i>forward</i>
OH	<u>Enter</u> , board, box, breathe, drain, drink, drug, poison, eat, fill, infuse, suck, penetrate	<u>Land</u> , attach, bolt, connect, drench, lift, glue, hang, lay, perch, stick, stain		<u>Distance-from</u> , isolate, flee, export, scatter, retreat
OM	<u>Arrive</u> , bring, come, invade, converge, hire, fetch, return	<i>Catch</i> , <i>trap</i> , <i>snare</i>	<u>Approach</u> , attract, import, near	

There remain many gaps, even with the newly proposed verb classes. For one, the shaded diagonal cells, e.g., <OH,OH>, leave it unclear as to what happens between the Source and the Goal. In fact, there may be no change at all. The four classes that have identical Initial and Final phases are not true CoL verbs. These

cells may represent verbs of stasis instead, such as *stay*, *remain* and *keep* (see Chapter Three).

1.4.5.2 On *Ooze* and *Absorb*: Different Syntactic Patterns

Another problem with this 4x4 hypothesis is that the two of the hypothetical classes (the *Ooze*-class and the *Absorb*-class) seem mostly restricted to liquid-like objects (65a,b), (66a,b). One could attempt to attribute the restriction to the mass-count distinction, since liquids are generally mass terms. However, when (66c) is compared with (66b), it is shown that the mass-count distinction is not the relevant factor in the grammaticality of the sentences, as hypothesized, since *drops of wine* are countable. (66d) shows that the actual physical substance, i.e., whether the substance is semi-fluid enough, is essential to the acceptability of the sentence. It is more conceivable that a gelatinous substance like gummi bears can be absorbed than solid objects like pebbles.

- (65) a. The wall oozed slime.
b. ?The wall oozed marbles.
- (66) a. The sponge absorbed the wine.
b. ??The sponge absorbed the pebbles.
c. The sponge absorbed the drops of wine.
d. ?The sponge absorbed the gummi bears.

Ooze and *absorb* have their reference locations (*italicized* above) in subject position, and the moving object in direct object position. These two classes pattern differently from other CoL verbs, where the reference locations normally appear within PPs (67a) or in the direct object position of the verb (67b). Thus, it is unclear if the *Ooze*- and *Absorb*-classes should be treated like standard CoL verbs if their syntactic patterns differ.

- (67) a. The woman jumped [PP into *the pool*].
b. The snake [VP entered *the hole*].

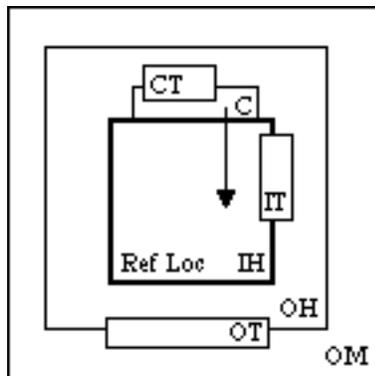
1.4.5.3 On *Surface* and *Sink*: Change-of-Position Verbs

Are verbs like *surface* and *sink* (68a,b) truly CoL verbs that involve a Contact zone? Verbs like *surface* (68a) at first glance appear to have a Inner-Halo source and a Contact goal, and the converse for *sink* (68b).

- (68) a. The submarine surfaced on the lake.
b. The boat sank into the lake.

In A&S, verbs of locational change (*come*) are distinguished from verbs of positional change (*descend*) and verbs of postural change (*kneel*), and it appears that *surface* and *sink* are in the class of verbs of positional change, rather than CoL verbs. This classification scheme is necessary for A&S's analysis, because their theory currently lacks the proper structure to treat these kinds of verbs under the CoL lexical specification system: as the diagram in (69) shows, there is no zone between C and IH for the action of the verb *sink*.

(69)



There are several ways to modify the A&S analysis. The first solution reclassifies the verb *sink* by saying Contact is not the Source for all cases of *sink*, as shown in these examples:

- (70) a. (Drifting lower,) The weather balloon sank into the clouds.
b. The submarine sank one more league into the sea, to a total depth of ten leagues.

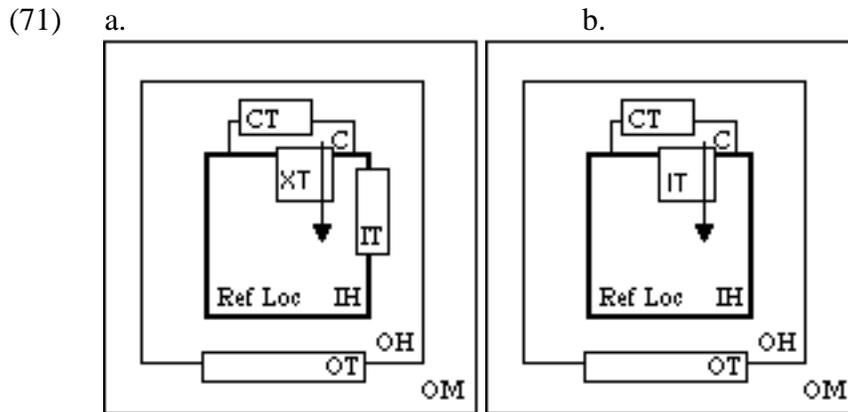
In (70a), the weather balloon need not have been in contact with the cloud cover at all, thereby reclassifying *sink* as being in the same class as *enter*. However,

(70b) raises the spectre of the problem of the treatment of changes of locations that occur entirely within the same medium (in this case, the sea).

Movement is a change in gradient within the same reference location, which means a localistic analysis treating *sink* as a CoL verb would require the addition of more spatial relations within Inner-Halo, say Inner-Most (IM) and a Innermost-Transit (IMT). However, this approach means that *sink* would have at least two different lexical entries, to deal with the different uses of *sink* (i.e., <OH,IT,IH>, for 70a, vs. <IH,IMT,IM> for 70b). Such polysemy would degrade the usefulness of the system.

The classification of *sink* as a verb of positional change qualifies as this type of solution, where additional zones have to be introduced. While I believe that the evidence argues in favour of *sink* being different in its representation, I disagree that change-of-location (CoL) verbs differ from change-of-position (Cpn) verbs as drastically as A&S would suggest. Later in this thesis, I will go beyond the analysis in A&S, taking into consideration the fact that *sink* and other verbs like it possess sufficient similarities such that a single analysis of change is possible. A&S would propose that inertial Cpn verbs like *run* do not have a tripartite path structure encoded in their lexical entries, but does not take into consideration the incremental nature of such verbs. In contrast, I propose that a clearer division of labor between world knowledge and grammar will naturally accommodate the idea of incrementation; this point is discussed in Chapter Two.

The change-of-position verb category of verbs might have been adopted because other kinds of solutions would cause difficulties for A&S, such as the positing of a new transit relation XT between Contact and Inner-Halo for *sink* (71a), or the use of Inner-Transit as the transit relation between Contact and Inner-Halo for *sink* (71b):



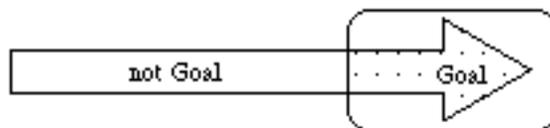
Yet these modifications would raise the same kinds of questions as above about overgeneration, usefulness of transit zones, and the proliferation of number of parameters required to express a single CoL verb. Having already discussed these concerns earlier, this discussion on verbs like *sink* only stresses the importance of developing a non-tripartite system.

To recap, it seems that this new 4x4 system is flawed because the values for the Source and Goal parameters are independent of one another. If left freely to combine, they generate arbitrary verb classes and verb classes with significantly different syntactic patterns to warrant a distinct analysis (e.g., the *Ooze*-class). The conclusion we must draw is that the connection between Source and Goal values is not arbitrary, but predictable.

1.4.5.4 Complementarity in Event Mereology

Complementarity, i.e., the idea that defining a part from a whole leaves the remainder as a second part, resolves the problem of overgeneration with arbitrary Source and Goal values. Instead of two values being specified in the lexical entry of a CoL verb, only one value is required: complementarity allows us to derive Source values from Goal values through complementation. The motion in (72) is subdivided into a *Goal* part, and by complementation the *not-Goal* part is derived. This bipartite division forms the template for change-of-state representations:

(72)

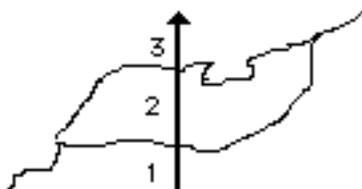


Consider the function of a verb like *enter* in (73). Under A&S, its lexical entry specifies an Outer-Halo source, an Inner-Transit internal path, and an Inner-Halo goal. The intuition behind this analysis is that the ultimate destination is the Inner-Halo of the reference object, in this case, Canada. In addition, it is assumed that there is a route going from the U.S. into Canada, and this route can be subdivided into Source, Internal Path, and Goal.

(73) Norbert entered Canada from the United States.

But a crucial question remains: what does the verb *enter* really need to encode? A&S subdivide the path into three: *United States* as the source, *Canada* as the goal, and the border between them as the internal path. If the entry is across a body of water, say Lake Ontario (74a), then the internal path could have an actual length. If it is across the 49th parallel, however, it is reduced to a point (74b). I argue that such a tripartite division is extraneous in the lexical entry of the verb *enter* itself.

(74) a.



b.



For the verb *enter*, it is obligatory that something has arrived within the Inner-Halo of the reference location at the end of the event. That will be shown to be the only aspectual information needed for the verb *enter*. Before the event ends (i.e., when the *Goal* is reached), there is a stretch (*not-Goal*) in (72) above that correlates with *Source*. All we need to know about this stretch of space-time is that the moving object cannot be within the reference object's Inner-Halo during that

time.²³ All other information is not relevant linguistically. The two periods of *Goal* and *not-Goal* are projected from the event. In fact, only the *Goal* needs to be encoded lexically; *not-Goal* can be derived non-arbitrarily through complementation. What does not qualify as *Goal* must be *not-Goal*.

Thus, negation or complementarity can generate two distinct and opposite zones from a single specified value. So *enter* in (73) above gives us two contrasting locations that the object occupies at different times: the earlier time and place are as shown in (75a), and the later time and place shown in (75b). The locations are generated from the information encoded in *enter*: that the destination location is the Inner-Halo of the reference location, and the source portion of the path must *not* be in Canada.

- (75) a. Norbert was not in Canada.
b. Norbert is now in Canada.

In a similar vein, the prepositional phrase *from the United States* specifies the source portion of the trajectory, and the goal portion may be derived through complementation. The effect of having three different portions of the path that can be called Source, Internal Path and Goal is a logical consequence of the linear structure of paths interacting with multiple points that bisect the line into two, and should not be confused as a necessary linguistic specification of paths. See Chapter Two for more discussion on the derivation of the apparent tripartite structure.

²³Trajectories that cross themselves, or ones that repeatedly enter and exit a particular zone before settling in the destination zone are perhaps best called *tease* scenarios). For example, Vanessa may wander in and out of a parking lot before settling down in it, and that is still expressible by *Vanessa entered the parking lot*. This is shown below:

(i)



The multiple instances of Vanessa entering the parking lot are reduced to the case where a single point, i.e., the final change, is the only one relevant. The underspecification of the process leading up to that final change allows for the tease scenario to be one of the possibilities.

Linguistically, a binary division characterized by complementarity is encoded by each CoL verb and motional preposition. Through common sense unconnected with the linguistics, however, we can always construe the path as tripartite or multipartite through the compositional build-up of information from various binary divisions. In other words, two binary divisions may have points of transition that do not align, thereby creating an intermediate zone. However, it should be emphasized that the tripartite division is non-linguistic in the sense that it is not encoded, but derivable through compositionality. With the approach developed in this thesis, it matters not whether the information is obtained from elements within a single sentence, or from the synthesis of different parts of discourse. I show that an intrinsically tripartite analysis of change does not have the flexibility of a bipartite system that uses complementarity.

1.5 Structure

The preceding subsection explored the concerns about the localistic analysis proposed in Asher & Sablayrolles (1994). Those concerns motivate a re-analysis of the lexical representations of verbs of change-of-location. The key concepts of Event Mereology presented herein are introduced in a manner parallel to the A&S critique. Below, I summarize the issues that form the nuclei for subsequent chapters, and delineate the scope of each chapter.

Chapter Two takes up the issue of the basic ontic objects that are dealt with in the aspectual analysis. The goal of this chapter is to establish that a mereology of events is more basic than a mereology of locations, and therefore should be used for a general theory of change. Terminology relating to aspect is given in this chapter. Localistic theories rely on metaphor to satisfy the requirements of change; the inappropriateness of using metaphor as an explanatory device in the aspectual semantics is demonstrated. It will be shown that underspecification can be used to

reduce the amount of information needed to be encoded in the lexical entries. Furthermore, the localistic idea of Internal Path will be shown to arise from the interactions of two points of transition, whose alignment is pragmatically determined.

Chapter Three follows up on the ideas in Chapter Two, turning the focus to the representation of aspectual information, i.e., the notion of *change* and how it is encoded lexically. I discuss the idea in Galton (1984) that there are *states of change* and *changes of state*; it will be argued that these two modes are crucial mereological concepts in aspect, and are necessary and sufficient in generating the range of aspectual classes observed. Two different examples of the use of these two mereological concepts are explored in this chapter: (i) in verbal aspect, and (ii) in prepositional semantics.

Firstly, I revisit the idea that verbs of change-of-state are best represented as a state and its derived, complementary state. I review aspectual systems such as Dowty (1979), Pustejovsky (1991), Verkuyl (1993), *inter alia*, and work out how Vendler verb classes (*states*, *activities*, *achievements* and *accomplishments*) are characterized under the principles of Event Mereology. Secondly, I examine the parallelisms between prepositional semantics and semantics of verbs of change. Medial prepositions, which *prima facie* seem to require the notion of Internal Path, are demonstrated to be compatible with the theory developed herein, which does not adopt Internal Paths as semantic primitives.

Chapter Four explores the interactions of the individual components proposed in Chapter Three. Discussed are issues such as resultatives, how verbs and prepositional phrases interact in EM, and the parallelism between *state of change* and *change of state*, and *progressive* and *perfective* aspects, i.e., aspectual coercion by *-ing* and *-ed*. A system of aspectual features is developed and tested with a wide range of data pertaining to aspectual compositionality.

Chapter Five demonstrates how Event Mereology may be applied syntactically, by examining one specific syntactic analysis (Travis 1999). Previous analyses that led to the development of Travis (1999) are briefly discussed, and the connection between those analyses and the principles of Event Mereology elucidated. It will be shown that the key semantic concepts of Event Mereology fit well with the issues underlying that syntactic analysis. As well, I explore the application of Event Mereology in Èdó, a serial verb language in Nigeria, in distinguishing two patterns of serial verb constructions. I expand on Pi & Stewart (1998), showing that the analysis of change in this thesis is applicable to the Èdó data.

Finally, in Chapter Six I discuss the implications and consequences of Event Mereology, and directions for future research.

Chapter Two

Events and Mereologies: Stating the Basics

2.0 Introduction

One key idea introduced in Chapter One is the reduction of unnecessary information from the lexical representation of change. Ideally, there should be just enough information to distinguish the necessary varieties of change, without losing generalizations about change that involve issues of polysemy. Accounting for semantic ambiguity in motion and non-motion phenomena, then, is a significant step in the development of Event Mereology.

In §1.4, it has been proposed that a path is divided into two parts only: a *Goal* segment and a *not-Goal* segment that corresponds to what are called *Source* and *Path* in a localistic analysis. In a sentence such as (1a), the verb *arrive* encodes the existence of a destination, and a route taken to reach that destination. While we can infer the existence of some source and path of the motion, the most important aspectual information is that of a point of change that distinguishes the arrival location. By complementarity, the source and path are assumed but not encoded, to allow for the generalization of change into non-motional domains, as exemplified in (1b). An abstract goal like *an impasse* does not necessarily have an intermediate stage corresponding to the internal path of motion verbs.

- (1) a. Ben arrived at Dorval Airport.
b. Ben arrived at an impasse.

For a concise yet precise theory of the aspect of change, I propose that we must limit the amount of information encoded in the lexicon. I will show that not all types of semantic information must be exhaustively mapped out, for change to be represented. On the contrary, two simple mechanisms, i.e., *distinguished points* and *distinguished processes*, capture the range of empirical data. In other words, indefiniteness or underspecification are crucial to the formulation of change.

In this chapter, I explore the role underspecification plays in a theory of aspect. I claim that underspecification is core to Event Mereology, removing the amount of irrelevant information feeding into the calculus of aspect. I will show that this reduction of unnecessary mechanisms produces exactly the ambiguity observed in the data.

Thus, this chapter has three objectives: first, it discusses ambiguity and underspecification, and their prevalence in many linguistic domains; second, it familiarizes the reader with event-related and aspectual concepts in general, and incorporates the idea of underspecification into the ontology of events; third, it examines some classic issues in aspect as treated in localistic analyses, then argues in support of an event-based mereological treatment of the same issues.

It is a crucial part of any semantic theory to make explicit the assumptions and terminology used. Firstly, the terminology and definitions tend to vary from analysis to analysis, even though they describe the same concepts. An exposition of the terminology that I will use is therefore necessary to minimize confusion. Secondly, the clearer the ideas, the stronger the analysis. Though some of the topics seem to be disparate at first, it will be shown that these ideas constitute parts of a greater whole.

This chapter is organized as follows. §2.1 begins with a review of the concepts of ambiguity (in particular *constructional polysemy*; Copestake & Briscoe 1995) and indefiniteness (or underspecification), which support simplicity and economy in lexical representations.

In §2.2, I present the idea of the *distinguished point* and its interactions with aspectual classes. In §2.3, I discuss differences in ontological outlook between Event Mereology and localism. Localism is explained in more detail, and the Internal Path characteristic of localistic analyses shown to be a derived notion rather than a primitive. Finally, I will contrast Event Mereology with localism, showing the

range of phenomena that would not be adequately explained from a spatial perspective alone. This expands upon arguments already made in Chapter One.

2.1 Ambiguity and Indefiniteness

Two topics critical in lexical semantics are discussed in this section: the notion of ambiguity or polysemy, and the notion of indeterminacy or indefiniteness. While both ambiguity and indeterminacy figure into the structure of Event Mereology, the distinction between these two concepts must be made clear, since they are often confused with one another.

I explore ambiguity, indeterminacy, and other arguments in favour of economy in representation in this section, to provide a foundation upon which to build the Event Mereology.

2.1.1 Ambiguity

In brief, ambiguity applies to differences in meaning arising from a single structure, such as the typical examples in (2). In (2a), the ambiguity arises from the word *pitcher*, which can mean either the container or the baseball player. In (2b), the ambiguity is amphibolic: the two different meanings stem from two possible syntactic structures (3a,b) for the same sentence.

- (2) a. Edward found the pitcher.
b. The detective saw his partner with a pair of binoculars.
- (3) a. The detective saw [his partner with a pair of binoculars].
b. The detective saw [his partner] with a pair of binoculars.

Gillon (1990) argues that one of the better definitions of ambiguity is stated as (4), i.e., ambiguity is 'a many-one relation between syntactic entities and expressions':

- (4) An expression is ambiguous iff the expression can accommodate more than one structural analysis. (Gillon 1990, ex. 14)

Though the actual mechanisms may vary, this view of ambiguity as different syntactic mappings has been espoused by Cresswell (1973), Montague (1970a, 1970b), Katz (1972, 1977), among others. Gillon points out that the above definition has, among its virtues, generality: it applies uniformly in cases of ambiguity arising from lexical, phrasal, sentential, and provides an explanatory account of many-one relations between phonic forms that have the same graphic form (e.g., *reject* as a verb [re-'ject] or a noun ['re-ject]).

In contrast, indeterminacy refers to words and the properties associated (or more precisely, not associated) with them. Gillon states that "an expression is indeterminate iff there is some property which neither is included in the expression's connotation nor is a species of any property included in its connotation." For instance, the word *doctor* is indeterminate as to the properties of gender, since its connotation does not include or exclude being of any specific gender.²⁴ In a sense, all nouns are indeterminate, since there is always a property that is not included in the connotation of a nominal expression. Another term for indeterminacy is underspecification.

Both ambiguity and indeterminacy play essential yet different parts in Event Mereology. With respect to ambiguity, recall that I argued in §1.3 that the difference between the concrete and abstract uses of a verb of change was polysemy but not polylexy, and that the abstract-concrete difference arises out of a sense spectrum. Below, I will support that claim with some observations in Copestake and Briscoe (1995), reviewing their examples of constructional polysemy (*sense modulation*) and sense extension (*sense change*).

²⁴Note that *generality* is distinct from both ambiguity and indeterminacy. For example, *doctor* is general, not indeterminate, with respect to medical specialty: a *doctor* can be a *gynecologist*, *pediatrist*, *pediatrician*, *surgeon*, *general practitioner*, etc. Gillon (1990) covers the differences between ambiguity, generality, and indeterminacy in depth, and surveys previous definitions and tests for ambiguity, such as Scheffler (1979), Zwicky and Sadock (1975), Roberts (1984), among others.

Indeterminacy, on the other hand, ties in with the general principle that not all information can or should be represented fully in the lexicon; there must always be a degree of underspecification. So too with verbs of change: not all information about change is required to produce the array of linguistic data; certainly some concepts such as homogeneity may be applicable at a conceptual level, but they are not required in the aspectual system. Such information is simply left unspecified.

2.1.2 Constructional Polysemy

Ambiguity is also known as polysemy, literally 'many meanings'. Copestake & Briscoe (1995) observe that there are two types of polysemy: homonymy (unsystematic and idiosyncratic polysemy), such as *pike* being both a fish and a weapon, and systematic polysemy, as in the case of *bottle*, which has two different but related meanings (nominal 5a vs verbal 5b). Cruse (1995) refers to the homonymy examples (*bank, pike*) as antagonistic; related senses are referred to as co-operative. A systematic sense extension relates the object with an action that involves the object; consider as well verbs such as *hammer, phone, and whip*.

- (5) a. Cory opened the bottle.
b. Cory will bottle the wine.
- (6) a. Greta took the hammer.
b. Greta hammered the metal flat.
- (7) a. Martin picked up the phone.
b. Martin phoned Andrew.
- (8) a. The inquisitor owns a whip.
b. To whip someone is considered an inhumane act.

Copestake & Briscoe (1995) observe as well a distinction between two classes of systematic polysemy: *sense extension* and *constructional polysemy*. Sense extensions include the examples (5) to (8) above, and involve processes such as conversion or zero-derivation, and are rule-governed. This type of sense change

derives new senses from basic senses, but must depend upon lexical rules (e.g., *-ful*, 'grinding') to produce the new senses.

In contrast, constructional polysemy is sense modulation, which specializes or broadens meaning in context. Though Copestake and Briscoe do not explicitly define or characterize constructional polysemy except by example, some of their examples are worth noting. Their concept of constructional polysemy covers indeterminacy (or underspecification), and cases of analogical extension.

Take the example of *reel*, noted in Atkins & Levin (1992). Depending on its context or premodifier, the word may take on the meaning of a fishing reel or a film reel. While the specifics are different, it is a logical extension of meaning from one kind of reel to the other; this modulation of sense resembles the discussion on sense spectra in Cruse (1986), where a cline of uses for the word *mouth* (ranging from a human mouth to the mouth of a river) is demonstrated. The examples in Copestake & Briscoe (1995) and Cruse (1986) pertain to sense modulations in objects. The example below (in abbreviated form) comes from Copestake & Briscoe, drawing a spectrum between 'newspaper-as-institution', 'newspaper-as-abstract-text', and 'newspaper-as-physical object':

- (9)
- a. That newspaper is owned by a trust.
 - b. That newspaper is left of centre.
 - c. That newspaper has obscure editorials.
 - d. That newspaper is full of metaphorical language.
 - e. That newspaper is full of spelling mistakes.
 - f. That newspaper has an unreadable font.
 - g. That newspaper is covered with coffee.

I provide original examples of verbal sense spectra below, focussing on the verb in its dual uses of concrete and abstract senses. In (10), the object slowly becomes more and more abstract, moving from a physical entity (*the prince*), to an opening (*the archway*), to an entity that could be either concrete or abstract (*the secret*), to an entirely abstract entity (*his thoughts*). Likewise, (11) shows a similar spectrum with the verb *collect*.

- (10) a. Ethan guarded the prince. *concrete*
 b. Ethan guarded the front door.
 c. Ethan guarded the archway.
 d. Ethan guarded the location of the secret garden.
 e. Ethan guarded the secret.
 f. Ethan guarded his words.
 g. Ethan guarded his thoughts. *abstract*
- (11) a. Boris collected the loose change. *concrete*
 b. Boris collected baseball cards.
 c. Boris collected computer games.
 d. Boris collected anecdotes.
 e. Boris collected his wits. *abstract*

A feature of sense spectra is that adjacent senses are plausible in co-predication circumstances, but distant senses are not. Thus, (12a) is acceptable while (12b) is not, for the different senses of *newspaper*. Examples for the verbs *guard* and *collect* are given in (13) and (14) respectively:

- (12) a. That newspaper is full of metaphorical language and spelling mistakes.
 b. *That newspaper is owned by a trust and is covered with coffee.
- (13) a. Ethan guarded the archway and the location of the secret garden.
 b. *Ethan guarded the prince and his thoughts.
- (14) a. Boris collected computer games and anecdotes.
 b. *Boris collected the loose change and his wits.

Constructional polysemy bears upon an issue already discussed in Chapter One, namely, the difference between concrete and abstract senses of verbs. A sense can be broadened in context. Copestake & Briscoe (1995) illustrate this behaviour with the word *cloud*, which is normally a mass of water vapour, but may be extended to other floating masses, such as *dust cloud*, *cloud of smoke*, or *cloud of mosquitoes*. Copestake & Briscoe say that "we might treat the basic sense as taking a default content qualia value which can be overridden by a modifying phrase."²⁵ Their view is compatible with the one espoused by Event Mereology, namely the metaphoric distance from a basic point on a sense spectrum suggested in Chapter One. In other words, it may be the case that most physical instances of a verb action can be

²⁵Qualia structure, proposed by Pustejovsky (1993), is a feature of the representation of nouns that encodes such ideas as form, content, agentive, and purpose (telic) roles.

overridden by a co-occurring abstract noun, coercing an abstract sense out of the verb. They believe that sense modulation is produced by the process of syntagmatic co-composition (Pustejovsky 1991), stemming from a single lexical sense.

Another example of sense modulation would be the word *round*. Note that the adjective *round* has two possible meanings (at least): a two-dimensional roundness, such as applied to pizzas or tires (15a); and a three-dimensional roundness, as applied to globe-like objects (15b). Both meanings are related, since the latter is an extension of the former.²⁶ This can also be viewed as an example of vagueness of the word *round*.

- (15) a. The pizza is round.
b. The planet Earth is round.

Sense modulation, then, takes a single sense, usually the physical as the basis, and extends it to more abstract uses. Thus, constructional polysemy is useful in our semantic analysis of change. It is desirable to have a uniform treatment of physical and abstract verbs of change, motivated by observations in Chapter One. Constructional polysemy assists the attainment of the unification of analyses, since we do not need to posit separate verbs for each verb of change when it is merely a modulation of a single sense. We are able to account for abstract and concrete readings with a single verb, allowing sense modulation to produce the differences between concrete and abstract. Therefore, treating ambiguous readings of the verbs in concrete and abstract contexts as constructional polysemy strengthens our hypothesis that abstract changes should be treated no differently than physical changes.

²⁶These examples also show the tendency of language to ignore certain imperfections so that the object qualifies for a predicate despite real-world imprecisions. Ideally, for a thing to be round it should be perfectly circular. However, we can still call a pizza, a basketball, or a winter tire round despite their imperfections. We abstract away from the fact that these objects are not perfectly round, and idealize them to fit under the meaning of roundness.

2.1.3 Underspecification

While constructional polysemy explains how a single verb can be affected by contextual elements to yield both concrete and abstract senses, it remains a distinct issue from how aspect is encoded in the lexical entries of verbs, and how prepositions and aspectual morphemes affect aspect. More precisely, how can we represent aspect most economically in the lexicon?

The issue here is one of how much does the grammar or lexicon specify, versus how much do we fill in. It is not the job of language to tell us when someone dies; that is a task for world knowledge. Rather, we communicate information by using the available tools in language to let the hearer know the scenario envisioned by the speaker, using her own knowledge of the real world to reconstruct it. In this capacity, semantics is the interface between a speaker and a hearer, who are able to communicate because a system known to both is used to convey the essentials of the event discussed. This set of rules is like the rules of a game, where all the players are able to play a meaningful game because they understand the same rules.

An event involves many different factors, and the use of language is incapable of expressing the event in its entirety. This should not be viewed as a flaw of language, but the very essence of language: words and sentences by their very nature limit the number of meanings conveyable, since one purpose of language is to allow meaningful communication between speakers. Grice (1975) proposed maxims for conversation based on the idea of cooperation between speakers: be informative, truthful, relevant, brief and orderly. Thus, the semantics should reflect the same kinds of qualities, since it is ultimately meaning that is communicated. We then expect that the meaning component would be capable of handling much information with the least amount of conceptual complexity.

I believe that underspecification, or indeterminacy, is a way to reduce the number of mechanisms involved. Event Mereology hypothesizes that two kinds of

elements in the system of aspect (the *distinguished point* and the *distinguished process*) are necessary and sufficient for capturing the range of aspectual classes observed. Obviously, much information concerning motional and non-motional change must be left out. Event Mereology claims that the two distinguished features are the only necessary linguistic information that has to be encoded for aspect. How much real-world information (pragmatics) is linguistically relevant? How much information must be encoded in the lexicon or the syntax? Other issues, such as homogeneity, may be conceptually interesting and valid, but do not participate at the level of the aspectual calculus. Consequently, redundant features need not be incorporated into the aspectual system. This division between the division of labour between world knowledge and grammar will be examined in more detail in §2.3.

For now, let us consider other examples in linguistics that show indeterminacy. In one sense, indeterminacy arises because language necessarily abstracts away from the real world; the amount of real world information is too complex to deliver through the linguistic faculty comprehensively. There must be some amount of selectivity. A distinction must be made as to what the language faculty handles and what is handled by other cognitive systems. Our perceptions and thoughts about the real world may provide us with more distinctions than is needed for the calculus of aspect.

One way to highlight the difference between real-world information processed on a non-linguistic level, and grammatical information processed on a linguistic level, is to show that different languages encode grammatical information differently while retaining a cross-linguistic cognitive uniformity.

Leech (1974), for example, discusses how different languages vary in the number of terms used to describe objects and concepts. In German, the word *Stuhl* covers both categories that we call *stool* and *chair* in English. However, it does not mean that speakers of German are incapable of making the distinction between

stools and chairs. Likewise, French divides what we call a *river* in English into *fleuve* (a river that flows into the sea) and *rivière* (a tributary). There is an observable and definable conceptual difference between the two words for *river* in French, easily learnable by English speakers. Yet, the grammatical feature that distinguishes *fleuve* from *rivière* (namely, the type of terminus of the river mouth) is underspecified; it is not encoded in English. Surely, the distinction is useful in the real world, particularly for riverboat captains. However, it does not mean that every language in the world is obliged to include that feature.

2.1.4 The Colour Spectrum

Another example of the difference in the specification of properties in different languages is in colour terminology. The colour spectrum is a smooth continuum, which varies in three dimensions: hue (the wavelength of reflected light), luminosity (the amount of light reflected), and saturation (freedom from dilution with white). It has been claimed that the human eye can discriminate at least 7.5 million just noticeable colour differences (Brown and Lennenberg 1954). From the viewpoint of physics, there are no physical factors that divide the colour spectrum into colour categories. In fact, languages differ considerably in the number of colour terms they possess, and in the denotational range of these colour terms. Lyons (1968) gives several examples. To illustrate, the Welsh colour term *glas* is the equivalent of English *blue*, *green*, and even *grey*. In Tsonga, *basa* encompasses both English *white* and *beige*, whereas *tshwuka* includes English *red*, *pink*, and *purple*.

The question arises as to how arbitrary these colour classifications are. Taylor (1995) summarizes two approaches: the structuralist approach (Bloomfield 1933, Gleason 1955) which asserts that colour categorization is arbitrary, and the focal colours approach pioneered by Berlin and Kay (1969).

From the structuralist point of view, the arbitrariness of colour terms is suggested to be indicative of the arbitrariness of language as a whole. Gleason (1955) states:

- (16) Consider a rainbow or a spectrum from a prism. There is a continuous gradation of color from one end to the other. That is, at any point there is only a small difference in the colors immediately adjacent at either side. Yet an American describing it will list the hues as *red, orange, yellow, green, blue, purple*, or something of the kind. The continuous gradation of color which exists in nature is represented in language by a series of discrete categories...There is nothing inherent either in the spectrum or the human perception of it which would compel its division in this way. The specific method of division is part of the structure of English.

Taylor (1995) cites the following implications of the structuralist approach to colour: all colour terms in a system have equal status; all referents of a colour term have equal status; the only legitimate object of linguistic study is the language system, not individual terms in a system. However, there is evidence against an entirely arbitrary assignment of colour terms to their colour denotations.

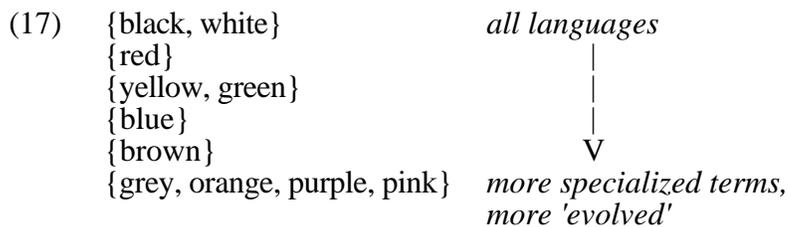
Berlin and Kay (1969) investigated basic colour terms in ninety-eight languages, and discovered that perception was in fact a crucial component of colour classification. Basic colour terms are those terms that are not subsumed under other terms (**scarlet, *crimson* - types of *red*); that are morphologically simple (**golden, *bluish-green*); that are not collocationally restricted (**blond* - describes only hair); that are of frequent use (**puce, *xanthic*).²⁷ Their findings indicate that colour classifications across languages is not as arbitrary as the structuralists claim.

Berlin and Kay claim that *focal colours* exist, and that languages appeared to select their colour terms from a hierarchy of eleven focal colours. When subjects are asked to draw boundaries for the colour terms in their language on a colour chart, there is often great variability across languages, and even among speakers of the same language. A speaker may even reclassify a colour sample differently on

²⁷In these examples, the asterisk indicates that a colour term does not qualify as basic, not that the form is unattested in the language.

different occasions. However, when subjects are asked to select good examples of the basic colour terms in their language, variability is drastically reduced. The criteria for a good *red* for a speaker of one language will largely coincide with the criteria for a good *red* for a speaker of a different language. These focal reference of basic colour terms are called *focal colours*.

As well, they suggested that an evolutionary hypothesis to explain the hierarchy. Berlin and Kay's other claim is that languages draw their colour terms from the implicational hierarchy in (17). The existence of a colour term in the list entails that the language also has the colour terms higher in the list. For example, if *green* is a colour term in language X, then language X also has the colour terms *red*, *black*, and *white*. The converse is not true: that *green* is a term does not entail that the language will have the colours *brown*, *grey*, or other colours lower in the list:



Citing exceptions to the original Berlin and Kay (1969) empirical study, other authors have made modifications to the hierarchy, but these variations do not concern us here. The key insight is that basic colour terms are finite, and that each colour term varies as to its denotations. Whereas the human eye can distinguish between thousands of hues and shades, languages partition colours differently. While human perception clusters colours around paradigmatic instances, i.e., the focal colours, each language may group these focal colours into basic colour terms.

As an example, consider the terms for green-blue, a category that Kay and McDaniel (1978) calls *grue*. Terms for *grue* often are bifocal: the term refers to both focal blue and focal green, rather than to one or the other of the two focal colours or a colour in-between. It is not a problem for the individuals to distinguish

between blue from green, but it is the language that classifies both colours under a single word. Zulu is such a language: it has a *grue* term (*luhlaza*), and the fact that Zulu *grue* is bifocal is shown in the expressions below, which can be used to distinguish English *blue* from *green* if necessary:

- (18) a. *luhlaza njengesibhakabhaka*
'grue like the sky'
- b. *luhlaza njengotshani*
'grue like the grass'

Essentially, we abstract away from information unnecessary in the use of language. So while green and blue vary in wavelength, a '*grue*' speaker would abstract away from that perceptual difference and classify them with a single linguistic term. This is an example of underspecification: having a fixed template in mind, the perceptual data is reinterpreted to fit into the linguistic categories that pre-exist in the language in question. While focal colours are not arbitrary, in that human perception of focal colours seems to be uniform across the world, what seems arbitrary is the language's choice to collapse focal colours into a basic colour term. Colour, then, claims Heider (1971), is 'a prime example of the influence of underlying perceptual-cognitive factors on the formation and reference of linguistic categories.'

2.2 Distinguished Points

There are natural points of transition inherent to certain classes of actions. For example, in (19a), the act of clue discovery occurs at an instantaneous point in time. The clue was at first undiscovered, but at a specific moment of transition, discovered. Similarly in (19b), Watson's death occurs at a natural point when his body no longer functions.²⁸

²⁸Of course, there are various definitions of when death has occurred: a clinical death may be different from other kinds of death. It is important to note that the transition point of death can vary from situation to situation, since our concepts of death vary. However, the fact that we can

- (19) a. Holmes discovered a clue under the desk.
b. Watson died.

It may be argued that the discovery of the clue is not instantaneous, e.g., in the scenario where Holmes first looks under the desk, then moves aside a shoe to uncover a bloodstain. Similarly, it is plausible that Watson may have clung to life for days though on the edge of death, with his bodily functions shutting down one by one until he is declared clinically dead. These observations are quite acceptable, but there is a big difference between the uptake process which leads to the point of transition, and the point of transition itself.

An occurrent may have certain of these natural points of transition lexicalized. The lexicalized versions are called *distinguished points*. A *distinguished point* is a linguistic feature, and certain word classes are defined on the basis of the presence or absence of a distinguished point.

2.2.1 Distinguished Points and Aspectual Classes

The distinguished point grammaticalizes natural endpoints. Its presence in aspectual data has been long noted in the literature; I use Vendler (1957)'s four aspectual classes to illustrate. The four aspectual classes, *statives*, *activities*, *accomplishments*, and *achievements*, emerge from an attempt to characterize a number of patterns in the aspectual data. Vendler characterizes these four classes thusly:

- (20) a. *Statives*
A loved somebody from t_1 to t_2 means that at any instant between t_1 and t_2 A loved that person.
- b. *Activities*
A was running at time t means that time instant t is on a time stretch throughout which A was running.

agree on the existence of such a point tells us that there is a culmination point associated with the verb *die*.

- c. *Achievements*
A won a race between t_1 and t_2 means that the time instant at which A won the race is between t_1 and t_2
- d. *Accomplishments*
A was drawing a circle at t means that t is on the time stretch in which A drew that circle

A distinguished point is indicative of an *achievement* or *accomplishment*. Intuitively, the attainment of a new state or the culmination of an action indicates the presence of a definable endpoint. Whereas an achievement includes those actions that have a definite instantaneous transition (21), an accomplishment involves actions that do have uptake processes (22):

- (21) *achievements*: arrive at the airport, win a race, find a coin, die,
- (22) *accomplishments*: build a house, eat a cake, draw a picture, figure out a puzzle....

An achievement may be viewed as a change in polarity: with *Bill arrived at the airport*, there is a change from Bill not being at the airport to his being at the airport or its immediate vicinity. *Reach* has a similar polarity, whereas *leave* has the opposite one. Cognitive verbs also have this change of polarity: *notice, spot, recognize, identify, discover, find, convince*. All of these involve a change in the cognitive relation between the denotation of the subject and the denotation of the object.

The absence of the distinguished point is characteristic of *activities* (23). *Statives* also lack distinguished points (24). Neither of these have an innate point of change associated with their semantics, though other grammatical elements (e.g., the addition of the past tense morpheme *-ed*) could coerce a derived point of change (see Chapter Four).

- (23) *activities*: run, swim, think, sleep, cry,
- (24) *statives*: love, hate, know,

2.2.1.1 The Imperfective Paradox

Certain tests have been suggested in the literature to distinguish these aspectual classes. For example, we can use the *Imperfective Paradox* (Dowty 1979, Bach 1986, Pustejovsky 1991, *et al.*) to separate activities such as *run*, *jump*, and *think* from accomplishments and achievements. The method of application is through the use of the progressive aspect. If the progressive of the verb *V* (*x is V-ing*) entails the perfective (*x has V-ed*), then the predicate is an activity or process.

For instance, the Imperfective Paradox shows that the verb *run* is a simple activity without a lexicalized distinguished point. Its present progressive does not entail that an endpoint must be reached. (25a) entails that Andrew has already done some running (25b).

- (25) a. Andrew is running.
b. Andrew has run.

In contrast, *arrive* is not an activity and has a natural, distinguished endpoint. (26a) does not entail that Andrew has already arrived (26b). The same is true of *writing his thesis* in (27):

- (26) a. Andrew is arriving.
b. Andrew has arrived.
- (27) a. Andrew is writing his thesis.
b. Andrew has written his thesis.

The semantics of an activity dictates that it can be completed to some degree and still be in progress, because there is no natural endpoint. However, neither an achievement nor an accomplishment can be said to have been completed until the natural endpoint associated with it has been attained.

2.2.1.2 Point Adverbials and Frame Adverbials

There are many other tests to distinguish the Vendler classes from one another. Of immediate interest are the *Point Adverbials Test* and the *Frame Adverbials Test*. The *Point Adverbials Test* (Dowty 1979, Krifka 1987, Pelletier &

Schubert 1989, Pustejovsky 1991) distinguishes achievements. The prepositional phrase *at noon* (or any point-like time adverbials) can be applied to point-like verbs (28a-c). It is likely that the natural point of transition is grammatically represented as a distinguished point, allowing the transition to occur over an instant. Note that accomplishments (28d,e) can also be well-formed with point-adverbials. However, the actions of the accomplishments take longer than an instant, and the point-adverbial becomes a frame-adverbial (see below) that starts at the specified time. Thus, in (28d), the most acceptable interpretation is that Mary ate her lunch during the noon hour, rather than eating it all in the blink of an eye:

- (28) a. John died at 3 p.m.
 b. John found his wallet at 3 p.m.
 c. Mary arrived at noon.
 d. Mary ate her lunch at noon.
 e. Mary wrote a letter at noon.

The *Frame Adverbials Test* (Pustejovsky 1991) distinguishes accomplishments by the addition of *in (the span of) an hour*, as in (29a,b). This frame-adverbial should not be confused with the schedule-adverbial (*starting*) *in an hour*, which is best observed in the present tense (*Mary builds a house in a year*). Achievements do not have the same interpretation of the frame-adverbial, as shown in (29c,d). In (29c), Mary does not stretch out her arrival (normally an instantaneous state change) over an hour; instead, she is scheduled to arrive in an hour. In the case of the frame-adverbial, the timespan indicated by the frame does provide an endpoint. Thus, the data suggests that accomplishments have distinguished points.

- (29) a. Mary walked to the store in an hour.
 b. Mary built a house in a year.
 c. Mary arrives in an hour.
 d. Mary found her wallet in ten minutes.

2.2.2 Distinguished Points and Complementarity

The function of the distinguished point is to separate the occurrent into two distinct parts. From those two event parts, projections onto both temporal and non-temporal domains can be obtained. The distinguished point projects a boundary that bisects the timeline (and other domains) into two distinct and complementary parts. A distinguished point always has a temporal correlate on the timeline. As a result, a distinguished point automatically bisects the timeline into two parts through temporal projection: the portion before its temporal index, and the portion after.

In one sense, the distinguished points *are* boundaries, or transitions, where there is a change of state. A boundary may be characterized as demarcating two distinct parts of the same set, of which one subset has the property x and the other subset does not have the property x . This division into two can be likened to complementarity: once it is known what parts have the property x , the other parts must lack property x . Thus, a distinguished point is the demarcation between two possible values of a predicate, whether it be motional or not; calling the distinguished point a marker for complementation or a boundary amounts to the same thing.

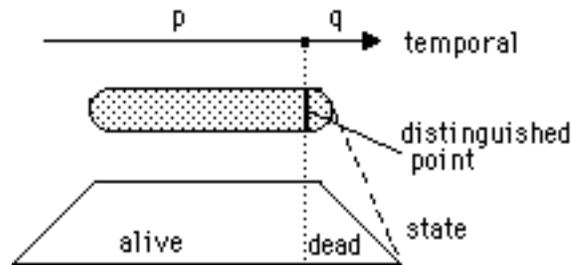
Consider, for instance, the verbs *die* and *enter*. Both are verbs with distinguished points: *die* has a point of transition between the states of *not-dead* (*alive*) and *dead* (30a), and *enter* at the moment when the participant moves from one location across a boundary to another (30b).

- (30) a. The dragon died.
b. The dragon entered the castle.

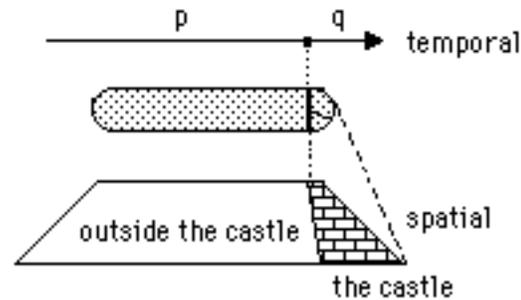
The distinguished point, in addition to dividing the occurrent into parts, also divides the timeline with two distinct projections, labelled as p and q below, where p precedes q in time. We can think of p and q as two temporal intervals closed at one end only. (31a) illustrates the event of dying in (30a). There is a point of death that

bisects the timeline into a period before the distinguished point, labelled p above, and a period after the distinguished point, labelled q .

(31) a.



b.



The same is observed for the event of a dragon entering a castle (30b, 31b), except the distinguished point demarcates the moment of entry. In (31a), the endstate is a predicate $dead(x)$, whereas in (31b) it is $in(x,y)$, where y is location *the castle* and x is the participant *the dragon*. There is a strong correspondence between the temporal projections p and q and the predicate domains, since both the temporal and predicate domains define their projections from the distinguished point, a part of the occurrent.²⁹

A distinguished point is an idealization: it divides the event into two parts: an uptake phase and a result phase, with corresponding spells and spreads. In the utterance of a sentence like (30b), *the dragon entered the castle*, what is relevant is that the castle has in fact been entered by the agent (*the dragon*), not the manner by which that agent entered (*flying, walking, etc.*). Such additional information may be

²⁹Note that the predicate is known to be true only for the spell of the overall occurrent, since conditions might have changed later on: other instances of *enter* may have occurred. For instance, the dragon might have entered the castle in the morning and left later in the day. It does not invalidate the fact that it did enter the castle, and that such an event has occurred.

introduced by the addition of other sentences (32a) and phrases (32b), discourse information and inferences (32c), and adverbs of manner (32d). All unnecessary information is underspecified, so that aspect may be properly calculated from a simplistic system.

- (32)
- a. The dragon entered the castle. It had flown inside.
 - b. The dragon entered the castle by an aerial route.
 - c. The dragon entered the castle. There was now a big hole in the castle wall.
 - d. Aloft, the dragon entered the castle.

One potential concern has to do with the interaction between motion verbs and distinguished points. Motions, on the whole, take longer than a single moment to culminate. For a dragon to enter the castle, it may, for example, need to go across the moat, through the gatehouse, and finally into the courtyard. Yet distinguished points are but single moments. Do we leave out a lot of information by adopting the distinguished point? Yes, much information is left underspecified when we discuss the distinguished point; we leave aside such issues as homogeneity of the uptake process. But does leaving out such information have impact on the validity of our analysis? No; as I have shown in §2.1, underspecification is necessary and expected. I will discuss the treatment of homogeneity in §2.3.4.3.

2.3 Event Mereology and Localism

In this section, I examine several localistic theories, including Gruber (1975) and Verkuyl (1993). I also discuss Landman (1991), which summarizes some key issues in the representation of change.

Recall from Chapter One that one of the ideas of localism is that specific semantic roles appear in a three-place scheme (i.e., <*Source, Path, Goal*>), specific in the sense that they express position in temporal structure. The three-place scheme, specifically spatial in origin, applies to non-locational changes by metaphoric extension. Localism takes spatial concepts such as motion, source, path

and goal and applies them uniformly to all kinds of changes. It was stated that it is difficult to use metaphor to extend a locational theory to non-locational data in the first place, since there is no cogent theory of metaphor.

Please note that this observation about metaphor is different from that observed of metaphor in sense modulation (as discussed in §2.1). The argument against localism using metaphor targets the lexicalization of the three parts of a spatial path in all verbs of change. Localism can only account for non-locational changes by assigning all verbs the same three-part lexical specifications for aspect. That is a use of metaphor distinct from the case of constructional polysemy, where the issue is one of a single sense modulated to be concrete or abstract. In the former, localism imposes a three-part aspectual structure on all change when it is difficult to figure out the Internal Path; in contrast, the latter is compatible with a two-part aspectual structure that is capable of handling all kinds of change.

I look first at the features that make the following theories localistic in nature. Gruber's (1976) analysis qualifies as a localistic theory, because his theory is based on motional phenomena and terms, such as Theme, Source, Goal, and Path.

Gruber (1976) shows that verbs of change operate in at least three domains: Positional, Possessional, and Identificational, all of which are related due to their syntactic behaviour with *from* and *to* (and *into*), or they incorporate the meaning of those prepositions (e.g., *become* incorporates the meaning of *into* in 33c). Examples are given in (33a-c), (34a-c), (35a-c) and (36a-c):

- (33) a. POSITIONAL - *go, travel, come, walk, etc.*
 b. POSSESSIONAL - *inherit, lose, acquire, etc.*
 c. IDENTIFICATIONAL - *change, turn, become, grow, etc.*
- (34) POSITIONAL a. John went to the States.
 b. John traveled to the States.
 c. John came here from the States last week.
- (35) POSSESSIONAL a. John inherited a car from Bill.
 b. John lost his car to Bill.
 c. John acquired a car from Bill.

- (36) IDENTIFICATIONAL
- a. John changed from being generous to being greedy.
 - b. John turned into a greedy man.
 - c. John became a greedy man.

All of these examples show a transition between one state and another, but they do not necessarily involve motion. For example, the verb *inherit* means a transfer of possessions from one person to another, but the item in question does not necessarily move in space (35a). However, even for these non-locational concepts, Gruber adopts the location-based three-part perspective of Source, Goal, and Path.

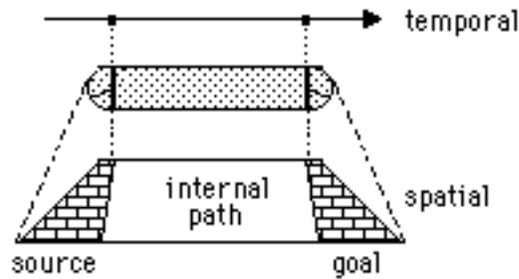
Verkuyl (1993) is also a localistic analysis. Inherent in Verkuyl (1993) is the idea that there is always a Theme that undergoes a continuous change (in increments), and that it begins at a Source and ends at a Goal, progressing through a Path. This idea is, of course, localistic in nature.

The localistic framework also takes the perspective that events are not primitives, as they are used in (neo-)Davidsonian frameworks; rather, the events are construed by language. Verkuyl does not flatly deny that there are such things as events. Rather, he treats events as molecular. That is to say, he looks at the internal structure of the event, in terms of component parts that make up the event.

Using the event terminology from earlier this chapter, let us look at the key elements of localism. Localism divides motion into three parts. For example, the verb *enter* in (37) can be represented with Source, Internal Path, and Goal values as per the A&S analysis presented in Chapter One. An occurrent representing the motion, then, requires three intervals on the timeline. Under the localistic analysis, this suggests two distinguished points, one marking the boundary between Source and Internal Path, the other the boundary between Internal Path and Goal. The corresponding diagram to (37) is shown in (38). Since localism requires three aspectual specifications to account for the change, these distinguished points are obligatory.

(37) Norbert entered the house.

(38)



2.3.1 Dynamic vs. Static Models of Change

A frequent criticism of the Von Wrightian type of analysis of change as two adjacent and opposing values of the same predicate is that it is inadequate in accounting for the Internal Path in motions. Below, I review some of the arguments presented in Landman (1991) against the use of Von Wrightian change, and show how the arguments against the so-called static model of change can be reconciled with the principles of Event Mereology.

The Von Wrightian model, which is similar in spirit to the Event Mereology approach, has been described by some to be a static 'filmstrip' model of change. Kamp (1979b) explains the 'filmstrip' model rather simply. Take a traffic light. One moment it is red, then it is green: the change does not progress through any intermediate stage.³⁰ Clearly a change took place, from red ($\neg p$) to green (p). But *when* did the change occur? Not before the red interval $\neg p$ has ended and not after the green interval p has started. The change must take place between these two states. However, this is incompatible with classical tense logic, which uses bivalent truth values: either the valuation of p is 0 or its valuation is 1. Thus, there is *incompatibility*: at the moment of change, neither p nor $\neg p$ holds. There is no

³⁰The converse, that of instantaneous change cannot be not true for a traffic light turning from red to green: recall that the cycle of traffic lights cycles from green to amber to red to green. The change from red to green is almost always instantaneous, barring measurements in microseconds or flaws in the physical apparatus. However, to go from green to red, a traffic light must pass through the intermediate amber stage.

moment of change, because the model of time is identical to that of a 'filmstrip': the illusion of change comes from distinct states succeeding one another rapidly. This static model of time defines a change as a pair of moments $\langle t, t' \rangle$. The actual *change* or point of change is absent.

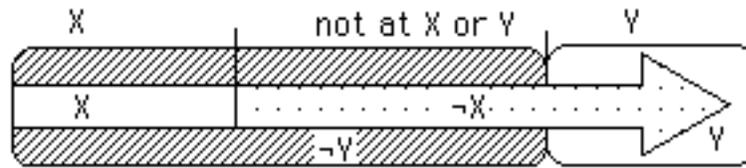
Landman (1991) agrees, as does Verkuyl (1993), that a consequence of the 'filmstrip' theory of change is the impossibility of giving a present tense report of a change. In other words, the point of change cannot occur at this very moment of 'now': there is no point between t and t' that can be coindexed with the present. While we can give a past tense report of the change, it would require *now* to be set at either the point in time t or t' . To do so would make the present tense false, due to the principle of incompatibility. For that reason, Landman and Verkuyl propose that change is dynamic: the temporal structure is 'constructed' or contributed by the verb 'dynamically'. Landman suggests that classical model theory, which reconstructs dynamic notions in terms of static reconstructions, is inadequate. The essential dynamic moment should remain a part of the semantics of change. He cites the example of the instantaneous change: change is characterized in terms of the predicate that holds before and after the moment of change, and the actual moment is absent from the theory. For that reason, Landman discusses Kamp (1979b)'s theory that takes changes as primitives; time becomes a temporal ordering of changes that are experienced.

Event Mereology differs from classical static models, in that it does retain the actual moment of change as part of the event primitive: the dynamic point of change is the distinguished point. With distinguished point, projections onto spatial/non-spatial domains is made possible; it is these projections that correspond to the static components of the classical model theory. The dynamism is preserved in the occurrent, whereas static counterparts can be derived from the dynamic elements in the occurrent.

2.3.2 Deriving Internal Paths

One argument against static models of change deals with the apparent problem of movement: i.e., simple sentences expressing change over the same interval, yet involving different factors that change at different times. For example, if *John walked from X to Y*, then there are two different changes involved: a change from X to $\neg X$, and from $\neg Y$ to Y .

(39)



2.3.2.1 Two BECOME Operators

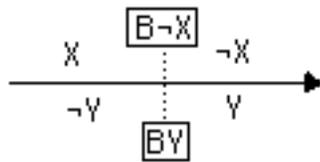
Dowty (1979) points out that a motion like in (40) actually involves two different changes: from *the taxi being at the hotel* to *not the hotel*, and from being *not at the airport* to *at the airport*. He argues that the motion cannot be expressed as just one change or the other, but must involve both changes. He uses the sentence operator B , where Bp means ' p becomes to be the case', i.e., there is a change from $\neg p$ to p . Dowty proposes to represent (40) as $B\neg X \quad BY$, where B is the BECOME operator, X is *at the hotel*, and Y is *at the airport*.

(40) The taxi careened from the hotel to the airport.

Landman, who adopts a tripartite localistic position, claims that the data on spatial motion requires there to be a region of space that is between but not at X and Y . It is argued in Landman (1991) that there must be an Intermediate Path where neither X nor Y are true. He argues that Dowty's B operator cannot adequately express this Intermediate Path. The closest that Dowty's B operator can get is a conjunction of two changes: $B\neg X \ \& \ BY$.

However, Landman (1991) argues that the above solution is unsatisfactory, because the two *B(ECOME)* operators are not temporally ordered. Given Dowty's definitions, the conjunction can only be true at an interval consisting of two moments, forcing the absurd conclusion that the changes are simultaneous and the same point. Without temporal ordering of the points of change, one must assume that the points of change for both $B\neg X$ and BY coincide. The timeline would look like (41) below. It is argued that the only alternative is to adopt a temporal conjunction, *AND*, which will distance the two *Bs* temporally (see Cresswell 1977, van Benthem 1983).

(41)



Landman's observation that there must be an intermediate region is of course physically necessary.³¹ There must be a stretch of time during which Jane was neither at the hotel or at the airport, for sentence (40). However, I believe the same effect as a tripartite path can be achieved with two distinguished points by modifying Dowty's solution.

The primary objection from Landman is that the two *BECOME* operators do not impose a temporal order. It must still be true that in *from X to Y*, that *X* still occurs before *Y*. The prepositional phrases (in this case, *from* and *to*) compositionally determine the meaning, where the state of *from* must be true at the beginning of the change, and the final outcome of the change must be the endstate of *to*; this applies even with abstract changes, such as (42), where the change of possession began with the car in John's mother's possession. However, the nature

³¹An exception is the verb *teleport*, which is a change of location verb that does not involve an intermediate location for motion to occur. *Teleport* (and *beam* from Star Trek) can have the interpretation where there is an intermediate step (e.g., *the pattern buffer* in Star Trek technology mediates the beaming of people from one place to another), it is not necessary that there be such a stage.

and existence of an Internal Path is derived through pragmatics and the type of predicates involved.

(42) John inherited a car from his mom.

2.3.2.2 Two Distinguished Points

The tripartite division is a consequence of the interaction between two distinguished points. For example, the activity verb *drive* does not have a distinguished point in its lexical entry, since it does not come to a distinct point of change; it is a process, not the boundary.³² However, the prepositional phrases *from the hotel* and *to the airport* in (40) above are each associated with a distinguished point on the occurrent (see §3.3 for more details on the semantics of prepositions).

Whether the points of change (the *B* operator for Dowty) may or may not align depends on the pragmatics and the nature of the occurrent in question. In fact, the variability in the (non-)coincidence of distinguished points produces the desired coverage of the empirical data. Consider these three sentences below:

- (43) a. The traffic light changed from green to red.
b. The traffic light changed from red to green.
c. The strip of litmus paper changed from red to blue.

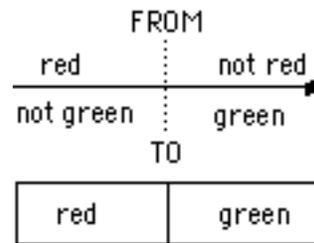
Each sentence above involves two distinguished points associated with the prepositions: the *from*-point and the *to*-point. Only the temporal orderings of these two distinguished points differ in these three sentences. The Landman perspective of a motion is parallel to the sentence in (43a), where the *from*-point precedes the *to*-point, and there is an intermediate stage (when the traffic light is neither green nor red, but amber), illustrated in (44a). The timeline diagrams in (44a-c) illustrate the sentences in (43a-c) respectively.

³²Note that when the past tense morpheme is added, then we provide a distinguished point that terminates the activity. However, that distinguished point is not inherent to the activity verb *drive*. See §4.2.

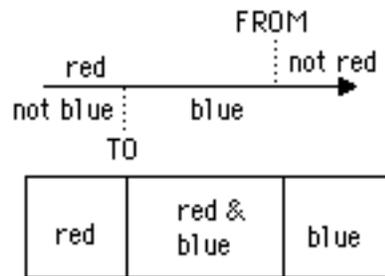
(44) a.



b.



c.



Two other possibilities exist: coincidence of the *from*- and *to*-points (44b), and the *to*-point preceding the *from*-point (44c). The former, that of coincidence, is an instantaneous change with no intermediate stage. Such is the case of a traffic light turning from red to green, with the amber light not being a valid intermediate option. The latter, that where the distinguished point of *to* precedes that of *from*, is a gradual change where an intermediate stage satisfies both predicates simultaneously. A good example is the colour change observed with litmus paper. As a strip of litmus paper reacts with a base, the change from red to blue could be gradual, with both colours being present on the litmus paper at the same time, with intermediate colours also present (45).³³

(45)



Note that we cannot simply say that the *from* distinguished point is always ordered before the *to* distinguished point. We must allow for coincidence of the

³³Litmus paper is used to test the acidity of substances. A strip turns red if placed in acid; it turns blue if placed in base. Often, only one end of a strip of litmus paper is dipped into the substance to be tested, and thus a gradient is produced as the chemical diffuses up the paper strip.

distinguished points in the occurrent, or allow the *to* distinguished point precede the *from* distinguished point. This vagueness in pragmatic ordering of distinguished points is different from the projections from those distinguished points. It still must remain the case that in *from X to Y*, *X* is the beginning attribute and *Y* the final attribute. We still must preclude *Y* from preceding *X*. This ordering can be achieved by defining *from X* as always $B\neg X$, and *to Y* as always BY , if we use Dowty's *B* operator as an example. Then, we always have *X* preceding *Y*.³⁴

Landman (1991) is unsatisfied with the above idea of leaving the points of transition unspecified as to when they take place with respect to each other (i.e., no time indices) and letting the facts of physical space determining the ordering for two reasons: (i) to get the two changes to hold at an interval, the semantics is permitted to be largely unconstrained, and that the distinction between a series of changes and a single change is left unexplored; (ii) the problem is pushed to the pragmatics.

As argued, I differ from Landman in this respect. In fact, it is possible to let the pragmatics control the alignment of the distinguished points. Different factors - such as the object's ability to take simultaneous properties, which domain is involved (e.g., it is impossible to be in two places at once) - do affect how the transition points align, and how many states are derived.

2.3.2.3 *Step and Walk*

Consider the verb *step* below:

(46) Bill stepped from the bathroom into the bedroom.

³⁴The only place where *X* might not precede *Y* is in the case where *X* is considered finite, and the moment of change from $\neg Y$ to *Y* coincides with or precedes the beginning of the *X* interval. Under this scenario the second change would occur before the first state even took place. However, if we view *X* and *Y* as projections off an occurrent, it is possible that the timeline intervals are bounded on one side only, i.e., at the point of change. Then, *X* will not have a beginning, since that edge is left open. A possible objection is that in a motion like *John went from Paris to Rome*, John may not necessarily have been in Paris all his life (no beginning for the state of *being in Paris*). That may be true; but in the calculus of the aspect, such information is irrelevant; for all intents and purposes of the calculation, *being in Paris* is unbounded in the past.

Depending on the construction of the house, there may or may not be an intermediate path. Suppose the bathroom is down the hall from the bedroom: then, Bill's passage through the hall will constitute his path. However, suppose that the bathroom is one accessible directly from the bedroom. It seems ludicrous to insist that there is an intermediate path.

Notice that the following variant of (46) is odd with regard to the scenario in (47):

(47) Bill walked from the bathroom into the bedroom.

The strangeness follows from the lexical knowledge of *walk*. All walking involves taking steps. Taking a single step cannot be called *walking*, although taking a single step is *stepping*. The oddity arises from it being strange to imagine taking more than one step from one room to an immediately adjacent room via an accessible doorway; it should take only a single step. Thus, the single step cannot be an instance of *walking*.

2.3.3 Negation and Complementation

Let us look more in depth at the types of predicates that interact in the *from-to* frame. The nature of the predicates determines the alignment and ordering of the distinguished points. It seems that primary criteria of whether or not two attributes can co-exist in overlap in a *from X to Y* construction are the nature of the object(s) that possess(es) the qualities *X* and *Y*, and whether or not the two qualities *X* and *Y* are mutually exclusive. Thus, it is essential to survey the different kinds of predicates, and the different types of negation that relate these predicates *X* and *Y* together.

2.3.3.1 Contraries

To understand the relationships that can exist between two predicates, and the effect that such relationships may bear upon the interpretation of paths (whether

they are bipartite or tripartite), let us begin by considering Aristotle. Aristotle discusses different sorts of semantic relations that obtain between words: *correlation*, *contrariety*, and *privation*. While contradiction may seem to be another type of negation, note that contradiction applies only to sentences, not to words and their predicates. For instance, (48a) is an affirmative, where as (48b) is a negative, and they contradict each other.

- (48) a. He stole Mary's watch.
 b. He did not steal Mary's watch.

Correlation is a relation between two *relatives*, for instance, *double* versus *half*. There is an interdependence of reference: *A* is the double of *B* iff *B* is the half of *A*.

Contrariety is a relation between two *contraries*, for example, *good* versus *bad*. Two contraries cannot both apply at once to the same object. There are two different types of contraries: *mediate contraries* (49a) and *immediate contraries* (49b).

- (49) a. *mediate contraries*: even - odd, sick - healthy, blind - sighted
 b. *immediate contraries*: white - black, hot - cold, fat - skinny

Immediate contraries are also known as *privation*. Either one or the other (the *privative* or the *positive*) applies to an object, never both, and it has to have one value or the other (if applicable). Thus, a number is either even or odd, and it cannot be the case that a number is both or neither. Aristotle in *Categories* states the following definition for immediate contraries:

- (50) Those contraries which are such that the subjects in which they are naturally present, or of which they are predicated, must necessarily contain either the one or the other of them, and have no intermediate. Thus disease and health are naturally present in the body of an animal, and it is necessary that one or the other should be present in the body of an animal. *Categories 12a 1-7* (p. 7, Horn 1989).

In contrast, *mediate contraries* do have a non-excluded middle. For example, an object need not be *white* or *black*, but it could be a colour which is intermediate (*grey*). These can be further divided into *simple mediate contraries*,

such as *black* versus *red*, and *polar mediate contraries*, such as *black* versus *white*. For mediate contraries to be polar, each contrary cannot have more than one contrary. Thus, they represent extremes along an interval.

Aristotle acknowledges the fact that mediate contraries have an intermediate term which possesses neither of the attributes; this behaviour permits mediate contraries to be viewed from a spatial perspective:

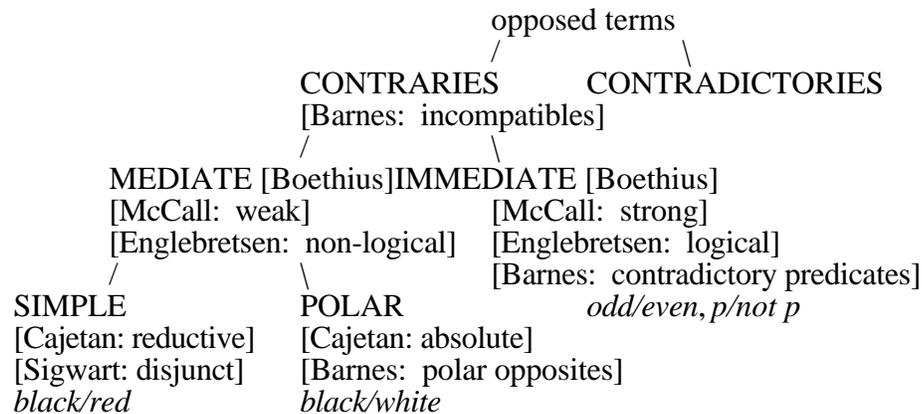
(51) It seems that in defining contraries of every kind men have recourse to a spatial metaphor, for they say that those things are contraries which, within the same class, are separated by the greatest possible distance. (*Categories 6a 15-19*).

For two polar contraries, an object cannot have both attributes. However, the negations of the polar contraries can be possessed simultaneously by an object (leaving aside cases where different parts of the object may have the contraries separately, e.g., an oreo cookie with black and white parts). For instance, an object cannot be totally white (w) and totally black (b) at the same time. However, the object can be totally not white ($\neg w$) and totally not black ($\neg b$) simultaneously, e.g., *gray*. Oesterle (1962) cites the following passage from St. Thomas, lesson 11, which observes the same:

(52) For any two polar contraries which by definition cannot simultaneously inhere in the same thing (e.g., *white* and *black*), their contradictories can (i.e., when something is pallid or yellow). Thus the contradictories of contraries define an intermediate term. (Oesterle 1962: 90)

The division of contraries (Horn 1989:39) is illustrated below, with terminology attributed to the originators of particular terms:

(53)



2.3.3.2 Different Possibilities for *From-To*

On the basis of the classification above, I argue that the existence or absence of an intermediate stage is completely dependent on the kinds of predicates involved.

Let us look at the possibilities for *P* and *Q*:

- (54) a. immediate contraries
P and *Q* are predicates that are complete opposites and cannot be true simultaneously for any object *x* at time *t*, and it is necessary that one of *P* or *Q* be true (e.g., *alive, dead*)
- b. polar mediate contraries
P and *Q* are predicates that are complete opposites, and cannot be true simultaneously for any object *x* at time *t*, but there can be an intermediate where neither *P* nor *Q* are true; there is only one contrary for *P*, and that is *Q*, and vice versa (e.g., *black, white*)
- c. simple mediate contraries
P and *Q* are predicates that cannot be true simultaneously for any object *x* at time *t*, but there can be an intermediate where neither *P* nor *Q* are true (e.g., *black, red*)
- d. synonymy
P and *Q* are the same kind of predicate or synonymous, likely with different connotations or degree (e.g., *late, tardy*)
- e. unrelated predicates
P and *Q* are unrelated predicates that can be true for an object *x* at the same time *t*. (e.g., *cold, old*)

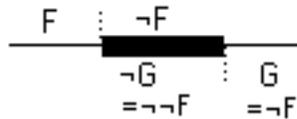
Corresponding examples are given below:

- (55) a. Edward went from being alive to being dead.
b. The computer screen went from being black to being white.
c. The computer screen went from being black to being red.
d. ?Edward went from being cold to being old.
e. Edward went from being tardy to being late.

2.3.3.2.1 When P and Q Are Immediate Contraries

For immediate contraries, these are the cases of instantaneous change. As such, they cause localism the greatest amount of trouble, due to the lack of an intermediate state. The two distinguished points for *from* and *to* must align, since if they do not, we are forced into a structure where the intermediate state has values that conflict with each other. For immediate contraries, it must be the case that G is equivalent to $\neg F$: Yet, if there is an intermediate state where $\neg F$ overlaps $\neg G$ (as in 56), a paradox arises: the highlighted interval must be both $\neg F$ and $\neg\neg F$ simultaneously. That interval cannot exist.

(56)



Localism appears to obey the Law of Contradiction (LC), but not the Law of the Excluded Middle (LEM), since a middle term is permitted. Our idea of complementation fits in with the idea of the Law of Contradiction (57a) together with the Law of the Excluded Middle (57b), and does not permit an intermediate term.

- (57) If any two terms F and G are contradictories, then:
- a. by LC, for any a in the relevant domain, $\neg(Fa \ \ Ga)$
 - b. by LEM, for any a in the relevant domain, $(Fa \ \ Ga)$

2.3.3.2.2 When P and Q Are Polar or Simple Mediate Contraries

Yet even with both LC and LEM both activated, it is still possible to derive a middle state where neither F nor G apply; such is the case for both polar and simple mediate contraries. The mediate contraries permit the possibility by having the *not-F* and *not-G* regions overlap, since there is no requirement for G to be equivalent to

$\neg F$ as for immediate contraries. This configuration, of course, has already been shown several times:

(58)

black	gray	white
bad	neutral	good
sad	so-so	happy
F	⋮	$\neg F$
$\neg G$	⋮	G

In (59a), if John changes from being *generous* to being *greedy*, that is a combination of two changes: *generous* to *not generous*, and *not greedy* to *greedy*. Here, it depends on our conceptions of *generosity* and *greed* whether or not there is coincidence of the two distinguished points. Are *greed* and *generosity* predicates that are exclusive of each other, or can their meanings overlap to some degree on a continuum? The change from being generous to greedy may be instantaneous (59b), or involve an intermediate stage where he is neither greedy nor generous (59c):

- (59)
- a. John changed from generous to greedy.
 - b. John changed from being generous to being greedy in the blink of an eye.
 - c. John changed from being generous to being careful with money, to being greedy.

What of the case where John is both generous and greedy at the same time, like the litmus paper scenario illustrated previously? Unlike a litmus paper, which can have gradients of colour simultaneously, it is harder to reconcile the states of being generous with being greedy. It seems that *greedy* and *generous* are antonyms that prevent them from being descriptive of the subject simultaneously, at least in most contexts. However, if we permit the subject to have different grades of greed and generosity (achievable by having more than one person, for example in 60), then it is possible to have overlap of the two characteristics:

- (60) One by one, these baseball players changed from being generous to being greedy when they went professional.

It seems that the cases where the distinguished point for *to* temporally precedes that of *from* are restricted to two types of constructions: (i) a single object that has parts of whose different parts contrary attributes may apply, and (ii) a collection of items (plurals or mass nouns) whose members do not have such parts, but as a collection its items may be partitioned into subsets classified by the different attributes. The former applies in the case of the litmus paper test; the latter to the case of baseball players. It is also possible to have a mix of the two. For example, a balloon may have red and white parts simultaneously (61a). Yet (61b) is ambiguous: it may be the case that each balloon is entirely white or red, and that there are ten red ones and seven white ones; alternatively, there may be seventeen red-plus-white balloons altogether. We must also allow for a mixture of the two, e.g., five red-plus-white balloons, four reds, and eight whites.

- (61) a. The balloon is red and white.
 b. The seventeen balloons are red and white.

2.3.3.2.3 When *P* and *Q* Are Synonyms

Cases of synonymy, such as *from tardy to late*, work in the *from-to* frame well. Given synonymy, the meanings differ between the words only by connotation and degree. A continuum of, say, lateness, is easily identified and the boundaries determined by *F* and *G*. Since it is a matter of degree between the two words, some sort of intermediate region consisting of intermediate degrees almost always exists. For example, if one can imagine a difference between *wet* and *soaked* (the latter having the connotation of being completely wet), then one is likely to also conceive of an intermediate state between *wet* and *soaked*. Compare (62a) and (62b):

- (62) a. Johan stepped into the pool, and got wet.
 b. Johan fell into the pool, and got soaked.

Naturally, comparatives (63a) and superlatives (63b) also fall into this category:

- (63) a. Johan's jokes went from bad to worse.
 b. Johan's jokes went from being worse than Carlos' to being the worst.

2.3.3.2.4 When P and Q Are Unrelated Predicates

With unrelated predicates, such combinations as *?John went from cold to old* are mildly acceptable. The marginal acceptability arises from a lack of a coherent continuum: meaning of *cold* has nothing to do with the meaning of *old*. It appears that changes in the *from F to G* construction need some semantic element in common between F and G , either contrariety or synonymy.

I have argued that the alignment of the distinguished points relies on factors other than an arbitrary *from (Source)* preceding *to (Goal)* order, as suggested by localism. Instead, alignment is dependent on the nature of the event and its participants. It has been shown that the predicates associated with the occurrent control whether or not there is an intermediate region, and likewise determine the way the distinguished points are aligned.

2.3.4 The Truth Value Gap and Homogeneity

In this section, we look at Dowty (1979), Landman (1991), and Verkuyl (1993) in more detail, focussing on their treatment of potentially problematic issues in their systems of aspect. The issues of homogeneity and the truth value gap will be addressed.

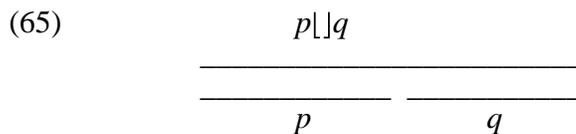
2.3.4.1 The Truth Value Gap

Von Wright (1965)'s transition operator T 'and then' is a good starting point for the discussion of the *truth value gap* problem. Von Wright uses T to link a state s with its negation $\neg s$, and orders them in time: $\neg sTs$. Semanticists are naturally interested in what happens between the two states, $\neg s$ and s (*cf.* Dowty 1979, Landman 1991). Questions arise as to whether there *is* an interval between $\neg s$ and

s ; if so, is the interval between $\neg s$ and s homogeneous; are the subintervals homogeneous; and is there an actual point at which change occurs? If there is an intermediate point or interval, what would be its truth value? In a classical bivalent logic system, either the truth value is *true* or *false*; if s is *true*, then $\neg s$ would be *false*, but that leaves the hypothesized intermediate interval without a possible truth value. A possible out is to leave certain intervals to be underdefined, i.e., a *truth value gap*.

For example, Landman (1991) raises a question about Humberstone's (1979) interval semantics, which uses a classical logic: what is the truth value for a larger interval $p \sqcup q$ (64c) that spans both p (64a) and q (64b), when p and q are contradictory? Furthermore, what happens in between p and q , where the change should be located?

- (64) a. p John is not married.
 b. q John is married.
 c. $p \sqcup q$?



In Landman (1991)'s discussion of Interval Semantics, it is assumed that all atomic formulas express states, and that changes are changes from one state to another. *Downward monotonicity* is imposed as an idealization, to simplify the analysis (where downward monotonicity means that if a state is true at an interval, then all of its subintervals must be true as well). Thus, for the interval $p \sqcup q$ to be true, all of its parts must be true. However, the proposition *John is married* is false at p , so clearly $p \sqcup q$ must be false in the example above (given that downward monotonicity must apply to the interval $p \sqcup q$). However, this does not conform with the intuition that at least part of the $p \sqcup q$ interval contains a true value for the proposition *John is married*.

Landman suggests that the introduction of a monotonic negation operator Fx , x fails to be the case, distinguishes two kinds of negation and avoids the problem above. $\neg x$ is external negation, whereas Fx is internal negation. $\neg x$ means that the predicate x cannot be true for that interval, but does not impose falsehood on all subintervals of that interval; however, the latter (Fx) indicates that the predicate x must be false at all subintervals. Thus, the superinterval $p \sqcup q$ is true for $\neg(\text{John is married})$, and does not impose the restriction that all of its subintervals must have the meaning *John is not married*. In contrast, p means $F(\text{John is married})$, i.e., that he cannot be at any point during that interval be married.

$$(66) \quad \frac{p \sqcup q = \neg(\text{John is married})}{\frac{p = F(\text{John is married}) \quad q = (\text{John is married})}$$

Note that even with this modification, there is a gap between p and q , for which there is no truth value, i.e., a truth value gap. Landman states that classical logic is bivalent: all predicates have either a true valuation or false, nothing in between. However, the principle of *incompatibility* (at the moment of change neither p nor $\neg p$ holds) forces there to be no true moment of change. Even though we know that the change occurs between p and q , classical logic would not permit us to locate a moment (or interval) that corresponds to the moment of change. For instance, for sentence (67), we cannot locate the precise moment of *now*:

(67) It is becoming dark now.

A similar phenomenon appears in Von Wright (1965), where change is represented as an initial state and an end state, correlating to points on a timeline. Von Wright's approach, according to Verkuyl (1991), has a no-man's land between the two. The intuition is that in (68), there is a state when John is not dressed at all ($\neg s$), an interval when he is half-dressed ($?s$), and a final state when he is dressed (s). The problem resides with $?s$. How do we represent the truth value of the period when he is not fully dressed?

(68) John dressed himself.

An alternative for describing the change intermediate between one state and another is to use *vagueness*: leave the interval between the true and false valuations unspecified for a truth value. In other words, the truth value gap is removed with the introduction of three kinds of stability operators: Fp (*fails*), Up (*undefined*), and Pp (*presently/true*). Changes from $\neg p$ to p , then, are constituted of a Fp interval, followed by a Up interval, and a Pp interval. Essentially, the point of change is in the U interval, where p is neither true nor false:

(69) $\frac{Fp}{\text{-----}} \frac{Up}{\text{-----}} \frac{Pp}{\text{-----}}$

The three valued model is not without problems. For instance, $p \wedge \neg p$ is not a contradiction under a three-valued logic. Landman goes on to modify the vagueness analysis with supervaluations to correct for flaws in the vagueness model: supervaluations allow the vague interval in a change to be determined precisely. In essence, making the change precise means filling in the Up interval so that it becomes entirely a two-part change, from Fp to Pp directly. This modification is necessary for cases where the precise moment of change can be located. Rather than going into a rather lengthy discussion of the problems of vagueness already presented in Landman (1991), I refer the reader to that work. Instead, we will return to the Event Mereology treatment of the truth value gap.

2.3.4.2 The Truth Value Gap and Event Mereology

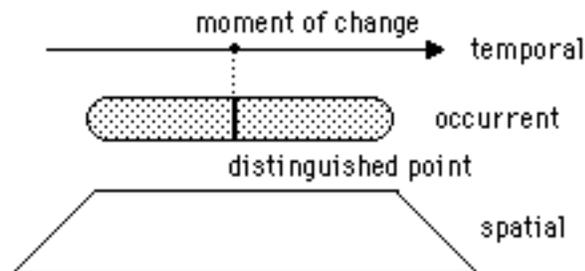
To reiterate, the truth value gap problem arises from the *bivalence* of classical logic and the principle of *incompatibility*: with both factors involved, the moment of change cannot be located on the timeline. Bivalence must assign a value to all moments/intervals, but at the moment of change, clearly neither $\neg p$ nor p apply. The change must apply after $\neg p$ ends, but the change must also take place before p begins. *Incompatibility* does not permit the moment of change to have

either the p or $\neg p$ values. Neither the classical instant tense logic nor an interval semantics permit the change to take place between these two states.

The *bivalent incompatibility* argument, to give it a name, takes as a direct consequence the impossibility of locating the dynamic moment of change at the present moment *now*. But the bivalent incompatibility analysis of change hinges on the representation of change entirely on interval or moment primitives. All elements of the change are assumed to be laid out fundamentally on the timeline.

Event Mereology, however, makes use of the occurrent as the primitive, of which distinguished points are proper parts denoting moments of change. Distinguished points are distinct from moments on the timeline because they are not simply temporal moments, although one can certainly map the distinguished point onto the timeline. Distinguished points also form the boundaries for predicates such as location and states of being. Thus, if necessary, one can locate the exact moment of change by projecting the distinguished point onto the temporal dimension. For the purposes of locating the point of change in time, there is no need to calculate whether the moment is $\neg p$ or p , because the predicate p figures into the aspectual calculation only when there are projections onto the spatial (or other) domains. Thus, for the sentence *The light is changing now*, *now* can refer to the present moment.

(70)



The distinguished point does bisect the timeline into two; the corresponding spells are associated with adjacent spreads that have different valuations for the same predicate. The projected spreads divides their continua into two. For instance, to

enter the store means that the spatial continuum is divided into p , *in(the store)* and $\neg p$, *¬in(the store)*. Each spread and its valuation is linked to the two halves of the timeline, thereby resembling a static 'filmstrip' model of change.

Is the moment of change required to have a valuation? I believe it does not require one. In the bivalent incompatibility model, the ontology requires that every moment be associated with a bivalent value because change is represented solely by temporal parts directly participating in predicates. Event Mereology uses events as ontological objects, and derives the temporal spells and the predicative spreads from the distinguished point. The projections are used for grammatical purposes, fitting into a syntactic frame that makes use of the two valuated predicates. We know that one valuation precedes the other, but there is no need in the aspectual grammatical module to locate the moment of change, which is more likely a function of tense.

Another way to look at it is, tense locates the moment of change without needing to know what is on either side of the change, while aspect acknowledges two distinct and complementary predicate valuations without needing to locate the precise moment of change. While tense and aspect do interact, they are looking at very different kinds of information. The difficulty with the bivalent incompatibility model is made clear: tense phenomena (locating points in time) and aspectual phenomena (attributing predicate values with intervals) are treated ensemble when the modules should be treated as distinct, leading to an avoidable clash of principles. Thus, the problem of the truth value gap is an illusion: there can only be a truth value gap *iff* the moment of change must have a valuation with respect p , and it does not need one on account of the hypothesis that a moment of change is defined on the timeline only during tense calculation, not aspectual calculation.

2.3.4.3 Homogeneity

An issue tied in with the truth value gap problem is that of homogeneity.

Dowty (1979: 57) formulates the *homogeneity* criterion as follows for activity verbs (71), and Verkuyl (1993) offers one possible logical formulation (72):

- (71) *Homogeneity*
If V is an activity verb, then $x V\text{-ed for } y \text{ time}$ entails that at any time x $V\text{-ed}$ was true. If V is an accomplishment verb, then $x V\text{-ed for } y \text{ time}$ does not entail that $x V\text{-ed}$ was true during any time within y at all.
- (72) *Homogeneity*
If the temporal interval I defined by the operator T is taken as a collection I of its subintervals, then for each $i_j, i_k \subseteq I$, if $i_j \subseteq I$ and $i_k \subseteq i_j$, then $i_k \subseteq I$.

Verkuyl (1993) argues against the use of homogeneity to characterize activity verbs. Verkuyl prefers the approach adopted by Gruber (1976), because the question of homogeneity does not arise. Gruber's analysis is additive: it builds up to a structure that has a begin and end point at which $\neg s$ and s hold respectively. Cumulativity (additivity) is definable in terms of closure, which is not the same notion as homogeneity. Homogeneity (closely linked with monotone decreasing structures) and cumulativity (a weaker version of monotone increasing structure) can be defined as follows:

- (73) *Cumulativity*
If the temporal interval I defined by the operator T is taken as a collection I of its subintervals, then for each $i_j, i_k \subseteq I$, if $i_j \subseteq I$ and $i_k \subseteq I$, then $i_j \cup i_k \subseteq I$.
- (74) *Homogeneity*
If the temporal interval I defined by the operator T is taken as a collection I of its subintervals, then for each $i_j, i_k \subseteq I$, if $i_j \subseteq I$ and $i_k \subseteq I$, then $i_j \cap i_k \subseteq I$.

Homogeneity will be shown to be possible only in idealized situations for activities. The problem of homogeneity in the definition of activities is a pragmatic issue, not a linguistic feature. For instance, one might believe the act of running to be homogeneous, yet in fact it is not: running involves two feet in alternating contact

with the floor. When the motion is analyzed in greater detail, it becomes evident that at some point a subpart of running is no longer running (e.g., when one foot is in the air and the other on the ground, which is a *step* but not a *run*), thereby invalidating the homogeneity hypothesis. There may be breaks where the runner stops to catch his or her breath, slows down, etc.

Dowty (1979) discusses a similar example (75): if she stopped before taking three steps (the minimum requirement for a waltz), can she still be said to have been waltzing?

(75) She stopped waltzing.

Verkuyl (1993) points out that there may be a scale to this type of *lexical homogeneity*, where there is a gradient on the homogeneity of verbs (76). For instance, *buy* is less homogeneous than *fall*: He argues that while these examples of lexical homogeneity may be interesting from a philosophical perspective, they are not relevant in event construal.

(76) *fly - fall - polish - walk - dial - buy - discover*

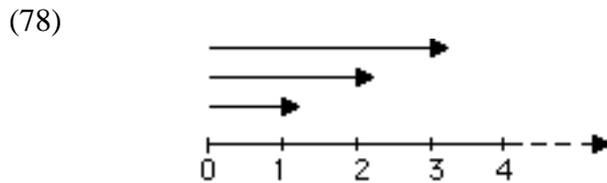
Verkuyl states that the the problem with homogeneity is that entire VPs are being wrongly analyzed as a complex verb; the interaction between object arguments and the verb is being ignored. He proposes instead that the localistic approach is better: building up a structure having a beginning point $\neg s$ and an endpoint s , instead of assigning $\neg s$ and s to the endpoints of an interval and imposing restrictions like homogeneity on its internal structure.

Under Verkuyl, the verb phrase uses its object (77a) (or its subject, for passives and intransitives, 77b, 77c respectively) as a kind of 'space' that the Theme moves through. For example, in (77a), if John ate three sandwiches then John moves through the 'space' created by the three sandwiches. In (77b), the pizza itself is the quantity which is consumed over time, and in (77c), the ice is the quantity that

evaporates over time. I provide additional, abstract examples in (77d-f).

- (77) a. John ate *three sandwiches*.
 b. *The pizza* was eaten.
 c. *The ice* evaporated.
 d. John remembered *his ideas*.
 e. *Love* blossomed.
 f. *Othello's distrust of Desdemona* grew.

By using these 'spaces', Verkuyl is able to treat verb phrases as odometers: he takes the continuous Path that every VP has and quantizes the parts of a Path so that there are smaller path segments, as shown in (78).



Change in a domain of interpretation is conceptualized in terms of a movement along a path from point zero to or towards an endpoint. There are two temporal systems interacting here: one based on the natural numbers \mathbf{N} , like an odometer; the other is based on the real numbers \mathbf{R} , which is unbroken. The presence of the quantized segments allows us to 'jump' in time, like \mathbf{N} , but also like \mathbf{R} , the path is in one sense unbroken. Because the segments are quantized (and are filters, i.e., closed under intersection), the Von Wrightian problem with a truth value gap is avoided.

Verkuyl argues that the problem of homogeneity does not arise in his analysis, because verbs of change are additive or cumulative processes that progress from Source to Goal. If the verb induces a structure with a Path that already connects to a Goal, then we need not worry about homogeneity, because a Path does not need to be (and very often is not) homogeneous. It merely needs to be cumulative.

I suggest that the question is not 'what happens between $\neg s$ and s ', as Verkuyl believes. Verkuyl, by taking a localistic approach, is tied down to the peculiarities of spatial motion, incorporating Source, Internal Path, and Goal; the dangers of doing that have already been pointed out in Chapter One. While homogeneity is not required in Event Mereology either, EM leaves the issue of homogeneous intervals out of the discussion from a different perspective. Since the event is primitive, the occurrent itself contains much information that is left out of the aspectual system. Homogeneity does not cause problems for the system, because the spells are derived from the occurrent: they are expected to be idealizations used in the grammatical system, and thus the projected states can be treated as atomic (see §2.3.4.4). We do not have to concern ourselves with the loss of crucial information, which is still preserved by the presence of the occurrent. The discussions in the next two sections clarify the issue of atomicity in states and processes under Event Mereology.

2.3.4.4 States in Event Mereology

Event Mereology views states as derived parts of an event primitive. States do not include change in their meaning. Thus, state verbs must denote occurrents without a grammaticalized point of change, because no such distinguished point exists during the occurrent. In one sense, the state is atomic from a grammatical point of view: further partitions of the state certainly are possible (e.g., *being sick* may involve stages of nausea, vomiting, and fever), such refinements are not matters for the grammar but rather the ontology. The grammar treats states as indivisible units. Thus, a state is a single, undivided spell projected off the occurrent.

For example, a verb like *love* denotes an occurrent without any grammaticalized transition. *To love someone* (a state which persists) is not equivalent to *coming to love someone* (an act which does have a definite resultant state, and thus a distinguished point of change in the occurrent). Though one might

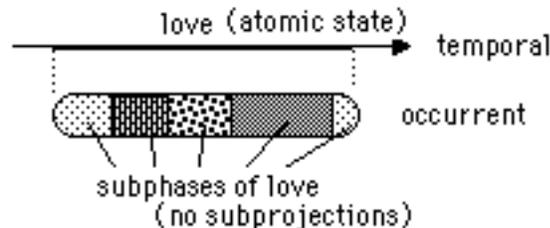
argue that *love* could involve subinstances of *love*, e.g., a fervent period of love is followed by a less fervent period of love, it is only an idiosyncratic property of this occurrent that its subparts may be themselves instances of love. The important point is that the verb *love* treats the spell as atomic, and its lexical entry does not contain a grammaticalized point of change.

Here is an example of atomicity. In (79), we know that John's act of marrying Sue is unlikely a part of his love for Mary. Yet we also know that his love for Mary persisted even through the period of time when he married Sue, though one could argue that the degree of love was diminished during that spell.

(79) Though John married Sue, he really loves Mary.

The state *love*, though it can include subphases where there may be differing degrees of love, ignores the internal changes because the subphases are not involved in the projection of the spell from the main phase of *love* onto the timeline:

(80)



Thus, homogeneity seems to be only applicable in the sense that a state is associated with only one predicate's valuation throughout its length. Homogeneity is inapplicable at the level of the occurrent. As shown by the example of *love* above, an occurrent may contain many subparts that are not homogeneous.

2.3.4.5 Processes in Event Mereology

Dowty (1979) assumes that all subintervals greater than a moment possess the same truth value as their parent intervals. In other words, processes are downwardly closed. In EM, however, we take an alternative view of processes similar to that of states as described in the previous section.

Verbs are subdivided into those verbs which grammaticalize a unique point of change and those that grammaticalize no change at all. Both states and processes fall into the latter category, i.e., there is no distinguished point. States and processes differ in that states are *marked for no change*, while processes are *unmarked for change*. While processes do involve change of a sort (*state of change* - see Chapter Three), the lack of grammaticalization of any internal points of change makes them resemble states in behaviour, which lack any kind of change.

In EM, then, a process occurrent is also like a state in that only a single phase is involved in projecting a single spell onto the timeline. This phase that demarcates the spell for processes (i.e., tells us when the process starts and ends) can be called the *distinguished phase*; however, the distinguished phase appears to be equivalent to the projection of the span of the whole occurrent, if that occurrent has a measurable start and end (as in an activity or accomplishment).³⁵

States are atomic: a state spell has no smaller units. For example, *to know Mary* is a state which is indivisible, in the sense that there are no smaller atoms of *knowing*. In contrast, a process is underspecified for such atomicity. A process may have smaller subunits that are atomic, such as the fact that it takes three steps to comprise a basic unit in a waltz. For an activity or process verb like *waltz*, then, it is divisible into smaller units ontologically, but it plays no part in the aspectual calculus. Aside from the differences in atomicity, processes and states are both processed as *antipartite*, meaning they are intervals associated with a single valued predicate (lacking a distinguished point). Thus, for sentences like (81a) and (81b), during the spells of *owning* and *washing*, those respective predicates have the valuation of *true*.

³⁵Achievement occurrents, for which the start and end points are one and the same (i.e., instantaneous), could only project a spell with length zero if we tried to locate a distinguished phase. Consequently, I assume achievements do not have a distinguished phase in their lexical entries. I discuss this characteristic of achievement verbs and its interaction with the progressive -*ing* (e.g., *he is dying* or *she is winning*) in §4.2.

- (81) a. Mary owned that car.
b. Mary washed that car.

The difference between states and processes parallels that of mass nouns and count nouns. Every stative verb denotes a state (just as every count noun has a countable denotation), while every activity verb may denote either a process or a state (just like every mass noun may denote something which is uncountable or something which is countable). Some mass nouns may have no discernable minimal parts, like *water* (unless one considers H₂O molecules); other mass nouns like *furniture* may have a minimal unit (e.g., a chair or table). Mass nouns are thus like processes in that the minimal part is left underspecified.

Count nouns, on the other hand, are state-like: neither a count noun or state permit smaller units than themselves; even if they do have parts to them. The phases of love example in the previous section exemplifies this property for states. An analogous example for count nouns is observed in the noun *crown*. In the special case of *the Pope's crown*, that particular crown is actually composed of three crowns. However, it is still referred to as the singular and behaves as such grammatically, as shown in the plural agreement facts below. Thus, despite the Pope's crown being underlyingly plural, it is still grammatically singular:

- (82) a. The Pope's crown was stolen.
b. *The Pope's crown were stolen.

2.4 Summary

In this chapter, I have looked at the fundamentals behind Event Mereology. I began with a review of the terms ambiguity and indeterminacy, describing how these factors played out in Event Mereology as sense modulation and underspecification. I presented terminology, diagrams and definitions specific to events (occurents) and mereology. Most importantly, the idea of the distinguished point was introduced, and its relationships to the Vendler aspectual classes explored.

The differences between localistic and event-mereological ontologies were considered, and issues such as dynamic versus static modelling of change, the role of negation and complementarity, the truth value gap, homogeneity (among others), all helped us establish characterizations of transitions, processes, and states.

In the next chapter, I look more closely at Galton (1984)'s distinction between *states of change* and *changes of state*, exploring how those notions complement the ideas developed in this chapter. I account for the different aspectual classes using distinguished points and distinguished processes, and discuss other models of aspect that address the same issue, such as Pustejovsky (1991) and Kamp & Reyle (1993). I will also look at the representation of spatial and non-spatial predicates in verbs and prepositions in Chapter Three.

Chapter Three

Aspect in Event Mereology: Acting on the Hypothesis

3.0 Introduction

This chapter discusses the role of aspect in semantics. There is a vast corpus on aspectual semantics, far too much to cover in depth here and explored in further detail elsewhere. Thus, I will focus on those analyses that are relevant to the Event Mereology being developed, primarily Galton (1984), Pustejovsky (1991) and Kamp & Reyle (1993).

To recap, an Event Mereology (EM) is based on the premise that occurments (including events and states) are primitives, and that one may grammaticalize selected parts of these occurments so that they become valid participants in the aspectual calculus. In particular, points of change (a.k.a. transitions) may be grammaticalized. A verb with a grammaticalized point of change has a definite point of transition which demarcates the boundary of an occurrence. That boundary may be used to project spells and spreads onto the temporal and non-temporal domains respectively.

Certain features of the Event Mereology remain to be addressed, such as the mechanisms underlying the classification of aspectual classes among verbs, and the effects of prepositional phrases and aspectual morphemes on those classes. The interactions between verbs, prepositional phrases and aspectual morphemes changes the aspectual semantics. For example, take the activity verb *ski*. In (1a), *ski* is an activity. An activity does not have a distinguished point (i.e., no natural endpoint). However, the addition of a prepositional phrase can provide an endpoint: *to the village* acts as a distinguished point in (1b). The village is not itself a distinguished point; rather, it is the preposition *to* that provides the initial boundary of Yvan's being in the village.

- (1) a. Yvan skied.
b. Yvan skied to the village.
c. Yvan was skiing.
d. Yvan was skiing to the village.

The issue of coercion by aspectual morphemes, i.e., the differences in reading between the past tense (1a-b) and the past progressive (1c-d), is also illustrated above. In brief, in the past tense, the action was completed and the distinguished point reached (*bounded*; see Depraetere 1995); in the past progressive, the action was still in progress and the distinguished point not reached (*unbounded*). However, coercion will not be dealt with in Chapter Three but in Chapter Four.

This chapter will discuss the interactions between verbs and prepositions. In §3.1, I first summarize Galton (1984)'s distinction between *changes of state* and *states of change*. These concepts are useful in our development of the Event Mereology analysis of the distinguished point and the distinguished process, respectively. I will then present my hypothesis for the Event Mereology aspectual system in §3.2. I discuss the aspectual analyses in Pustejovsky (1991) and Kamp & Reyle (1993), comparing their accounts of the Vendler verb classifications with the system proposed for Event Mereology. Aspects of other analyses will be discussed where relevant. Where appropriate, I explore the EM analysis of each aspectual class in further detail, examining such related phenomena as verbs like *stay* and *keep*, and imperatives.

§3.3 deals with prepositions and prepositional phrases, and their contribution to the calculation of aspect. I discuss non-spatial prepositions and spatial prepositions with abstract uses. Furthermore, I propose a non-tripartite analysis for prepositions like *via*, *past*, *across* and *through*, which have been traditionally labelled as medial prepositions that rely on the localistic idea of a three-part path. In §3.4, I consider the non-locational uses of these prepositions, and propose a treatment of these prepositions that is compatible with Event Mereology.

3.1 Changes of State and States of Change

I begin this discussion of Galton (1984) with the distinction between *state of change* and *change of state*, which correspond to the EM ideas of *distinguished process* and *distinguished point* respectively. I will argue that those two modes are the basic linguistic tools that are used to measure change of all kinds, and thus are essential in Event Mereology. I hypothesize that these two classifications are all that are required; complex aspectual systems fall out of the interactions between these two elements. I will show that these two modes provide two different ways to view change (*activities* and *achievements*), which can be juxtaposed to form a third, synergistic way to view change (*accomplishments*).

Galton (1984) formalizes a difference between the categories of states and events. Events, which are inherently perfective are assigned to a different logical category from states, which are inherently imperfective. In other words, events are treated as unitary wholes with definite beginning and ending points, while states of affairs lack such measurable lengths. He cites the following sentences as exemplifying events (2a) and states (2b), respectively:

- (2) a. Jane had a swim.
b. Jane was swimming.

His conception of the differences between states and events is summarized below:

- (3) a. A state is *dissective*, an event is *unitary*: any timespan correlated with a state may be broken down into a substretch in which the same state obtains; events may be divided into phases but are not of the same type as the original event.
- b. A state *obtains*, an event *occurs*: the dissective property of states permit states to obtain at each moment in its interval; events do not occur at a moment.
- c. States obtain at *moments*, events occur in *intervals*.
- d. Events, but not states, have *individual occurrences*: events are separated into individual occurrences of an event and event-types; states either obtain or they do not - there are no individual occurrences of a state within a state interval.

- e. Occurrences of an event may be *counted*, a state can only be *measured*: states, like *Jane was swimming*, can only be measured for duration, since they do not have occurrences.
- f. A state has a *negation*, an event does not: a state not obtaining is itself a state; an event which is negated means the failure of an event to occur, not that some type of negated event occurred.
- g. States are *homogeneous*, events have *distinct phases*: states, whether they are states of rest or states of change, are in some sense unchanging during each of the moments of that state interval; events essentially involve change, where the truth value of a proposition changes with respect to an object.

Given these differences between states and events, Galton concludes that states and events are quite distinct in nature. To clarify the nature of change, Galton makes a fundamental division between the ways change is recognized: by perceiving it directly, or by observing the results.

For instance, we may perceive change directly when viewing a moving vehicle or a litmus paper changing colours; the same applies to other senses, such as feeling a piece of metal growing hot or hearing a train whistle growing shrill. However, physiological thresholds prevent us from detecting change directly when the change occurs too fast or too slow. Thus, we are unable to see a bullet strike a target, since it is too quick for the eye to follow. However, we can observe the change by seeing the results of the shot. Similarly, the slowness of the hour hand on a clock makes it much harder to detect its motion in comparison with that of a second hand.

Galton draws a parallel between these two modes of perceiving change with the linguistic expression of change. A detectable change in progress can be likened to a progressive: *John is writing the letter*. Alternatively, change may be expressed as its result: *John wrote the letter*. The detectable change in progress is called a *state of change*, while the resultant change is called a *change of state*. Note that the parallelism does not limit the expression of perceptible ongoing change to states of

change, nor imperceptible change to changes of state; they are similar in character, but the linguistic use of changes of state and states of change is flexible enough to apply to both kinds of perceived events in most cases.

Likewise, Galton establishes a correspondence between *states* and *states of change*, and *events* and *changes of state*. Since a state of change obtains at any moment during its interval, it parallels a state. Only processes qualify as states of change; states are classified as the more general *state of affairs*, of which *states of change* are a subset. A change of state, on the other hand, must involve two different times and the facts at those times. Thus, Galton claims that it makes no sense to locate the change of state at a single moment, but more sense for it to occur in an interval, much like an event.

Event Mereology's use of *distinguished point* and *distinguished process* parallels the use of *change of state* and *state of change* in Galton, respectively. The distinguished point projects two spells and spreads, like the change of state does with two distinct points of evaluation. The distinguished process involves a spell during which an action is ongoing; thus, the distinguished process parallels the state of change.

I will argue that the aspectual system needs only the distinction between state of change and change of state to account for the empirical data. Aspectual classes for verbs will be defined on the basis of states of change and changes of state, as are prepositions. Furthermore, the perfective (*-ed/-en*) and the imperfective (progressive *-ing*) morphemes in English will be respectively associated with changes of state and states of change. These issues will be developed in the rest of this chapter.

(the latter being in the subcategory of states of change), and are both marked by a distinguished process.

Achievements are represented in EM as a single distinguished point. In contrast, accomplishments are juxtapositions of both distinguished points and distinguished processes. Distinguished points and distinguished processes are distinct, yet not incompatible with each other; accomplishments, as I will argue in a later subsection, demonstrate properties of both activities (*dP*) and achievements (*dT*).

Compare the EM analysis with Vendler (1967). As pointed out by Galton (1984), Hoeksema (1984), and Verkuyl (1993), Vendler analyses the partition of the four Vendler classes as on equal footing with one another. The matrix below summarizes the Vendler system, using \pm *Process* to distinguish states and achievements (instants, *-Process*) from activities and accomplishments (processes, *+Process*). \pm *Definite* refers to whether or not the entity is unique (*+Definite*) or a non-unique, indefinite temporal entity (*-Definite*):

(5) *Vendler-classes*

	<i>-Process</i>	<i>+Process</i>
<i>-Definite</i>	State	Activity
<i>+Definite</i>	Achievement	Accomplishment

Notice that states of change correspond well to *-Definite* (states and activities), while changes of state correspond to *+Definite* (achievements and accomplishments). Thus, there is a close correspondence between *+Definite* and the presence of a distinguished point, and *-Definite* with the lack thereof. *+Process* indicates the presence of state of change underspecified for minimal parts (i.e., a true process, not a state that is specified for no minimal parts). Accomplishments exhibit both states of change and changes of state.

There are other proposals which are comparable to the Event Mereology analysis; however, there are important differences between EM and these cousins. Below, I review two analyses (Pustejovsky 1991, Kamp & Reyle 1993) which

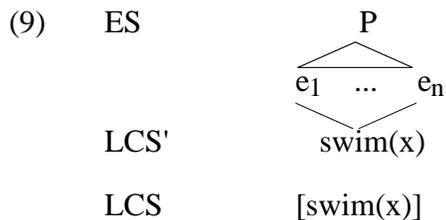
Processes or activities (e.g., *run*, *walk*) are identified by their behaviour, illustrated by the *Imperfective Paradox* discussed in Chapter Two. To recap: if John is running (a process; 7a), then it is an entailment that John has run (7b).

- (7) a. John is running.
b. John ran.

In contrast, the progressive transition does not entail the perfective in English: an accomplishment in the progressive (8a) does not entail that John has completed that action in its entirety (8b). *John is building a house* does not entail that John has built a house:

- (8) a. John is building a house.
b. John built a house.

Processes or activities in ES are considered a series of subevents identifying the same semantic expression (9). Thus, in Pustejovsky's structural representation of Process, *P* dominates a string of identical subevents. Process verbs like *run*, *push* and *drag* make no explicit reference to the culmination of the activity, nor the length of the activity.

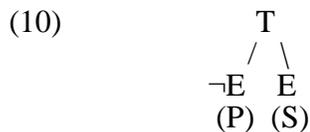


However, the concerns associated with homogeneity as discussed previously in §2.3.4.3 resurface. Pustejovsky follows Dowty (1979) and others in assuming that if a process verb *P* identified with a semantic expression *P'* is true at an interval *I*, then *P'* is true for all subintervals of *I* greater than a moment. In EM, however, we take an alternative view of processes that does not court the homogeneity; distinguished processes do not require their subintervals to be downwardly closed under the subinterval relation, as ES would require.

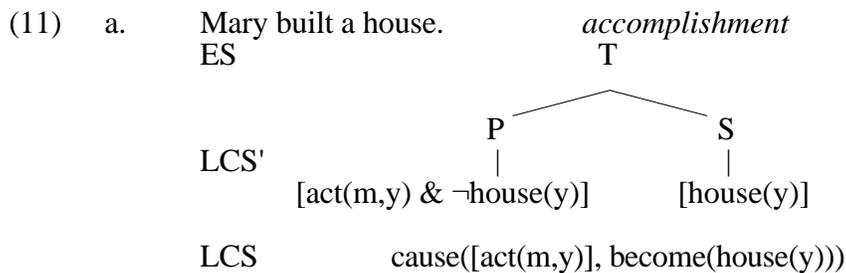
3.2.1.2 Event Structure: Transitions and Agentivity

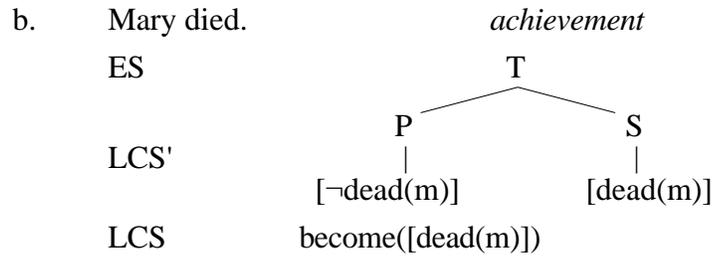
Transitions in ES are events which identify a semantic expression evaluated relative to its opposition (Jackendoff 1972, Lakoff 1970, Von Wright 1963). Examples of verbs with transitions include *give*, *open*, *build* and *destroy*. Pustejovsky subdivides transitions into the Vendler classes of achievements and accomplishments. Examples of achievement verbs are *die*, *find*, and *arrive*, whereas accomplishment verbs include *build*, *destroy*, and *eat*.

Both achievements and accomplishments are structurally represented in ES as a transition (*T*) that dominates *E* and its complement $\neg E$. The earlier event $\neg E$ is treated as a process (*P*) and the later event *E* is treated as an endstate (*S*).



For Pustejovsky, the only difference between accomplishments and achievements is agency. Agency is represented in the LCS' of accomplishments under the P node as the predicate *act(x,y)*. He argues that for verbs like *build* (11a), there is an element of action on Mary's part (the causal agent). In contrast, achievements like *die* (11b) have no causal agents: dying makes no explicit reference to the action being performed.



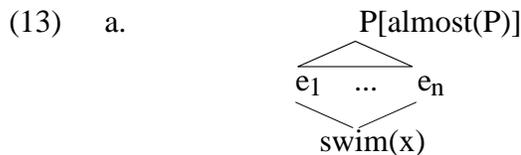


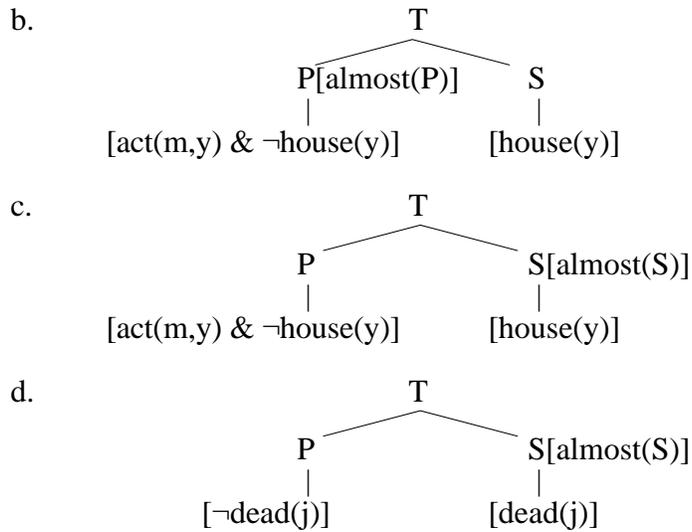
3.2.1.3 Event Structure: *Almost*

The presence or absence of agentivity, claims Pustejovsky, explains the difference between accomplishments and achievements that are modified by the adverb *almost*. The *Almost Test* is well-known (Kac 1972a, Dowty 1979, Pustejovsky 1991; see also Chapter Five), and is used to distinguish accomplishments from other verb classes. Non-accomplishments have a single reading with *almost*; accomplishments have two *almost* readings.

With activities, the addition of the adverb *almost* indicates that the action did not begin at all, but there was intent to perform the activity (12a, 13a). In contrast, accomplishments (12b) modified by *almost* have two possible interpretations: the action did not begin because it was only intended (as with activities), or the action did begin but was not completed. The former has *almost* modifying the intent predicate (13b), whereas the latter denies that a completed object can be asserted to exist (13c). Thus, for (12b), either John almost began to build a house, or he almost finished building a house.

- | | | | |
|------|----|----------------------------|-----------------------|
| (12) | a. | John almost swam. | <i>activity</i> |
| | b. | John almost built a house. | <i>accomplishment</i> |
| | c. | John almost died. | <i>achievement</i> |





For achievements (12c), only the endstate is relevant, because there is only a single predicate and its opposition (13d). The endstate is modified by *almost*, with there being no *act(x,y)* predicate for *almost* to modify. Pustejovsky claims that the only possible reading is the one where something has occurred without the terminus event being achieved. If John almost died, then he could have been on the verge of death from injuries, or he could have just narrowly missed being hit by a truck. In neither case does John actually reach the endpoint of death. As well, for (14), John almost satisfied the criteria for arriving (such as making the effort and almost coming all the way). The reading where he intended to come yet made no effort at all is difficult to get. Neither interpretation of (14) can mean that John did arrive.

(14) John almost arrived.

The ES analysis accounts for the difference above by stating that while both types of transitions permit *almost* to modify the endstate, only accomplishments have the *act(x,y)* agentivity in its LCS' representation that licenses *almost* to modify the incipient process *P*. The presence of agentivity permits the reading where the agent intends but does not make an effort to perform the action.

3.2.1.4 ES vs. EM: Against Agentivity

However, following Mourelatos (1981), it can be shown that agency is not an adequate characteristic to distinguish between accomplishments and achievements, since agency is present in both types of verbs. Instead, Mourelatos classifies punctual transitions as *occurrences*, while transitions with duration are classified as *developments*. Occurrences and developments may or may not have an agent. An agentive occurrence corresponds to an achievement, and an agentive development corresponds to an accomplishment. Examples are given below:

- (15)
- | | | |
|----|-----------------------------|--|
| a. | The balloon burst. | <i>occurrence</i> |
| b. | The balloon deflated. | <i>development</i> |
| c. | Geoff burst the balloon. | <i>agentive occurrence (achievement)</i> |
| d. | Geoff deflated the balloon. | <i>agentive development (accomplishment)</i> |

EM also treats achievements and accomplishments as a unity of opposite states, much like in ES. However, EM diverges from ES with respect to agentivity; EM does not distinguish achievements and accomplishments by agency as does ES. While an accomplishment verb like *build* can have a volitional agent (16a), the simple substitution of a machine for a living agent shows that accomplishment verbs can also have agents lacking in volition (16b). This data casts doubt on the volitional criterion as the deciding factor between accomplishments and achievements.

- (16)
- | | | |
|----|-------------------------|--------------------------------|
| a. | <i>with volition</i> | The carpenter built the house. |
| b. | <i>without volition</i> | The robot built the house. |

How, then, should achievements be distinguished from accomplishments? Event Mereology proposes that achievements are not specified for the uptake process (i.e., the distinguished process) in their lexical representations. The implication is that developments must involve the uptake process, since the gradual process is an essential part of the semantics of accomplishments.

In contrast, occurrences are only marked for the distinguished point; at the grammatical level, an achievement is not specified for a distinguished process. Thus

no specific starting point for a process of change, since the change is instantaneous at the distinguished point. The uptake and the beginning of that uptake are grammatically irrelevant for these kinds of verbs.

In another sense, however, all types of transitions (including achievements and accomplishments) can have uptake processes, i.e., a gradual development which leads up to the resultant state. In accomplishments, the presence of the uptake is a natural part of the action. In contrast, the process must be coaxed out of the achievement through semantic coercion. For example, *building a house* (an accomplishment) involves steps which add to the physical structure of the house. *Dying* (an achievement) involves steps which lead to the eventual demise of the unlucky patient. The difference lies in their grammaticalization of that uptake process, or lack thereof. Achievements, being underspecified for the presence of a distinguished process, can be coerced into the state of change reading with the English aspectual morpheme *-ing*.³⁸

Examples of typical achievements (17a-c) are shown to have non-punctual readings when coerced into the past progressive in (18a-c). For example in (17c), *forget* is a transition from a state of remembering (*r*) to a state of not remembering ($\neg r$). While the simplest way to view this is as an instantaneous change between two states, one may choose to include, say, the ramblings and tangents that his grandmother told in the course of telling her story. There, the act of forgetting can be argued to be an ongoing process. More on the coercion of different aspectual meaning is discussed in Chapter Four.

- (17) a. Old Yeller died.
b. Martin discovered his sexual identity.
c. His grandmother forgot the point of her story.

³⁸Languages may differ as whether it is possible to coerce a distinguished process reading from the achievement. For example, the *te-iru* progressive in Japanese apparently does not allow achievement verbs to be coerced into the distinguished process reading (McClure 1994). See also §4.2.2.2.

- (18) a. Old Yeller was dying.
b. Martin was discovering his sexual identity.
c. His grandmother was forgetting the point of her story.

Under EM, an accomplishment is in fact specified simultaneously for both a distinguished process and a distinguished point; it exhibits both properties of a change of state and a state of change. One can view an accomplishment as a juxtaposition of an achievement and an activity. Thus, the difference between accomplishments and achievements under EM is made clear: an accomplishment is an achievement with a distinguished process, with agentivity not being the distinguishing factor.

3.2.1.5 Event Structure: On Notation

One question about the Event Structure concerns the notation that Pustejovsky uses for his tree diagrams. The tree diagrams are not consistent. Syntactic trees represent the (syntactic) constituency relation, which in turn serve as directives for the computation of meaning of the relevant expression. Clearly, Pustejovsky's diagrams in (6), (9) and (11) are not syntactic trees, nor do they represent syntactic constituency.

Processes, for example, are represented diagrammatically by Pustejovsky as the relation of *being made up of*: the mother node denotes a process which is made up of the subprocesses denoted by its daughter nodes, in (9). Thus, it represents the part-whole relation over processes. However, this interpretation cannot be assigned to the diagrams in (11a,b), achievements and accomplishments. Thus, for example, an achievement is not simply a part-whole relationship with two substates. Rather, it is a point of a change of state. The same may be said of an accomplishment: it is not merely a state with two substates.

Achievements and accomplishments have something in common. Unlike states or processes, they are specified for a change, or a point of transition. As argued above, achievements and accomplishments are distinguished from each other

by the former not being specified for a process, and the latter being specified for a process. Thus, both achievements and accomplishments can be specified by an ordered pair corresponding to the transition.

For instance, for x to *die* can be specified as the ordered pair $\langle x \text{ alive}, x \text{ not alive} \rangle$. In comparison, the transitive for y to *build* x is represented as the ordered pair $\langle x \text{ does not exist}, x \text{ exists} \rangle$ where the ordered pair is specified as resulting from a process in which the subject y has a role. What this process is must largely be underspecified, since one can build a house, website or trust, and since such building need not be brought about by something animate.

3.2.1.6 Accomplishments as Juxtapositions

Event Mereology is able to achieve the same ontological classification as Vendler by using the two possible items in our repertoire: distinguished point (dT) and distinguished phase (dP). A verb of change is specified for one or the other, or both. dP corresponds with activities, and dT with achievements. Accomplishments are complex: they encode both dP and dT . I show this characteristic of accomplishments below.

It has been observed that accomplishments have no unique aspectual properties that justify them as a separate aspectual class (Dowty 1979, McClure 1994). Rather, accomplishments are aspectually ambiguous. All accomplishment predicates are syntactically complex, having activity counterparts that are syntactically simpler.

Accomplishment verbs can be interpreted as activities, yet sometimes they permit achievement interpretations. For example, the predicates *build* and *read*, typically classified as accomplishments, exhibit an achievement/activity ambiguity. They are activities in (19a,b), but in their transitive use *build* demonstrates the semantics of an achievement (20a), and *read* shows a semantic ambiguity between achievement and activity (20b).

- (19) a. John built for an hour (but still hadn't built anything). *activity*
 b. John read for an hour. *activity*
- (20) a. John built a house *for an hour/in an hour. *accomplishment*
 b. John read a book for an hour/in an hour. *activity/accomplishment*

To account for the evidence above, it has been argued that accomplishments are activities syntactically, but achievements semantically (see McClure 1994): accomplishments are in the same syntactic frame as activities, yet they are achievement-like in that they also have the semantics of terminativity. Interesting pairs here are transitive verbs (mostly of creation) which have intransitive counterparts: most of what have been classified as accomplishment verbs may behave as activities (like *read, write, paint, speak, eat, knit, sow, cook*), and usable without a direct object (i.e., as intransitive verbs) (21a-d). However, as transitive verbs they behave like accomplishments. Like (21a), the construction *V and V* can improve the activity reading of these accomplishment verbs, but are not necessary for some accomplishments (21b,c).

- (21) a. John built (and built).
 b. John read.
 c. John ate.
 d. John fell.

What makes these verbs different from activity verbs like *sleep* and *waltz* is that verbs like *read* are able to use a NP direct object in addition to the activity reading to provide the achievement component (22a,b). Other syntactic frames (particles, for example) provide the distinguished point *dT* as well, as in (22c,d):

- (22) a. John built a raft.
 b. John read a magazine.
 c. John ate up.
 d. John fell down.

Note as well that there do not appear to be any monomorphemic accomplishment verbs, in the sense that these accomplishment verbs are activities

unless a direct object NP or a particle are added to provide the endpoint.³⁹ One possible analysis is that syntactically, accomplishments are specified syntactically for a direct object position that can be filled or unfilled. When just the bare verb appears, only the activity reading (*dP*) is accessible. When the direct object position is occupied by a noun phrase or particle capable of providing a distinguished point (*dT*), the endpoint or achievement-like transition becomes accessible as well.⁴⁰ Thus, the verb can act as a standard accomplishment with both the semantics of activities and achievements.

Thus, it is evident that developments or accomplishments have correlated with them both a process and a state. In *Bill built the house*, the process is Bill's activities, while the state is the existence of the house. It is the initial boundary of the state which provides the distinguished point, i.e., the relevant boundary at which the house came into existence. This pairing of process and state can be lexicalized, as with verbs of creation like *build*, or it can be constructable in a phrase, such as with process verbs like *run* followed by certain kinds of prepositional phrases, such as *into the barn*.

Accomplishments involve both processes (*dP*), which may or may not cease, and the initiation of a state. Of course, insofar as there being the initiation of a state, that is equivalent to the existence of a change of state (*dT*). Accomplishments differ from achievements as follows: there is a change of state in the achievement without any commitment to a process, though a process interpretation may be forced through coercion (see Chapter Four). The boundary for the achievement is simply the point of change in state, i.e., *dT*.

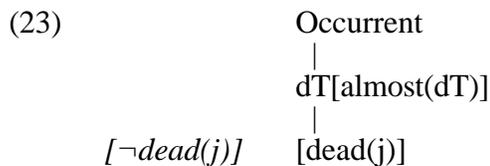
³⁹See Tenny (1987)'s discussion on telicity and delimitedness, which bear upon this topic. A brief discussion is included in Chapter Five.

⁴⁰Matters become more complicated by plurals, which cannot provide a definite endpoint to the action, e.g., *John built houses*. Under Verkuyl (1993)'s analysis, indefinite plurals are [-SQA], or not a specified quantity of *A*. Verkuyl's Plus Principle states that terminativity comes only when all features in a sentence have the + value; having [-SQA] plurals means that the accomplishment cannot be interpreted as a delimited action, and thus there would be no definite endpoint. See also Chapter Four.

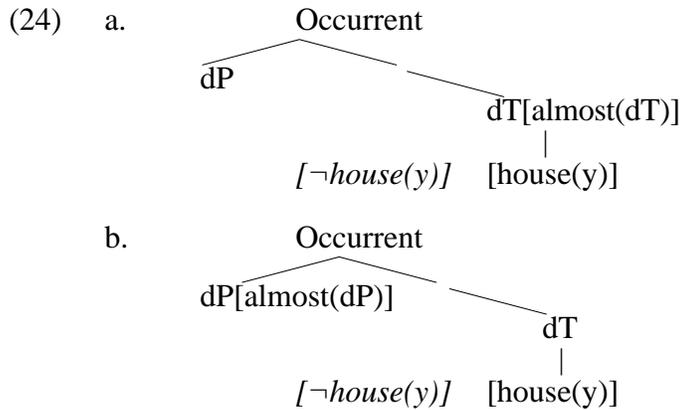
3.2.1.7 Accounting for *Almost*

With this analysis of achievements as grammaticalized for the distinguished point (*dT*), and accomplishments as grammaticalized for both the distinguished point (*dT*) and the distinguished process (*dP*), we are now able to account for the ambiguity in the *almost* sentences involving accomplishments.

Almost can only modify the endstate in the achievement, since it is generated from the *dT*. If *almost* modifies the endstate associated with *dT*, then the meaning is that an event almost reached that distinguished point. For an achievement, where the change is instantaneous, there can only be that single reading. A possible notation is shown in (23). The italics show the derived complementary valuation for the predicate involved:

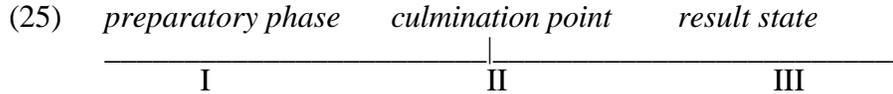


In an accomplishment like *John almost built the house*, *almost* can modify both the endstate associated with the *dT* and the process associated with *dP*, since both *dT* and *dP* have been grammaticalized in the accomplishment. If *almost* applies over the distinguished point, we have the same interpretation as with the achievements, where the action has not completed (24a). If *almost* applies over the entire span of *dP* (i.e., the whole occurrent), then we get the additional 'almost started' reading without resorting to agency. The idea of 'starting' is only possible when there is a distinguished process. This is illustrated in (24b). Note that *dP* and *dT* are not at the same level; this is intentional, to show that these are merely projections of states from the occurrent. *dP* is a projection of the entire length of the occurrent, while *dT* is a projection of two states divided by the distinguished point. Thus, when *dP* is modified by *almost*, it is equivalent to the entire occurrent being modified by *almost*.



3.2.2 Kamp & Reyle (1993)

In Kamp & Reyle (1993) (K&R), it is proposed under their Discourse Representation Theory (DRT) that three different elements are necessary to distinguish between the Vendler classes. The basic schema for accomplishment verbs consists of a *preparatory phase* (I), a *culmination point* (II), and a *result state* (III) (25). This schema will be modified for the schemata of other aspectual verbs:



Thus, for a sentence like (26a), the action of *write* must be completed; otherwise, either (26b) or (26c) must be used to express the incompleteness of that action. The natural culmination point (i.e., the distinguished point) must be reached. The period leading up to but excluding the culmination point is the preparatory phase, and the result state follows the culmination point. Whereas the simple past (26a) refers to both I and II (the actual writing event), and the past progressive (26b) to I (the preparatory phase), the present perfect (26d) refers to III (the result state).

- (26) a. Mary wrote the letter.
 b. Mary was writing the letter (but she did not finish it).
 c. Mary started writing the letter (but she did not finish it).
 d. Mary has written the letter.

3.2.2.1 DRT: Accomplishments and Achievements

Kamp & Reyle declare that these three part-whole relations on the schema are the only relevant aspectual properties involved; they define three mutually exclusive aspectual properties (27a-c). They capture these properties with two binary features, \pm STAT and \pm PERF. +STAT describes a state, while -STAT describes an event. +PERF refer to result states (III), and -PERF refer to other parts of the schema excluding the result state (i.e., I or II). Since result states are always states, +PERF expressions are always +STAT as well.

- (27) *accomplishments*
- | | | | |
|----|--------|------------------|--------------|
| a. | I + II | past tense | -STAT, -PERF |
| b. | I | past progressive | +STAT, -PERF |
| c. | III | present perfect | +STAT, +PERF |

The accomplishment schema has both the preparatory phase (I) and the culmination point (II) in the simple past, as in (28):

- (28) $\frac{\text{I} \quad \text{II} \quad \text{(III)}}{\text{accomplishment}}$

In contrast, the achievement schema under K&R consists of the culmination point (II) only (29), since the simple past tense of these verbs do not include the preparatory phase as part of their meaning (30a,b).

- (29) $\frac{\text{(I)} \quad \text{II} \quad \text{(III)}}{\text{achievement}}$

- (30) a. Mary won the marathon.
b. Mary died.

That the preparatory phase is not included in the meaning of achievement events is demonstrated by their progressive counterparts (31a,b), claim Kamp & Reyle. Their view assumes that if *Mary died at noon*, then *Mary was dying* cannot be true at that time. The progressive of an achievement refers only to the preparatory phase (I) but not the culmination point (II). Essential here is the fact that the past progressive is not ongoing at the same time as the past tense counterpart.

- (31) a. Mary was winning the marathon.
b. Mary was dying.

In contrast, the progressive of an accomplishment is argued to refer to part of the accomplishment schema (I+II), i.e., the preparatory phase (I). Their argument hinges on the fact that accomplishments are marginally acceptable with punctual moments (32a). *At noon* must refer to a short interval surrounding 12:00 p.m. instead of treating the temporal prepositional phrase as a single moment, as is possible with achievements. With the temporal interval interpretation, it becomes possible to say that the progressive sentence, i.e., (32b), is ongoing at the same time as its past tense counterpart (32a).

- (32) a. Mary wrote the letter at noon.
b. Mary was writing the letter at noon.

However, this argument is dependent upon the addition of a punctual temporal adverb. If we leave out the prepositional phrase and merely had (33a), then it is not so clear that at the culmination point whether (33b) is true. If Mary finished writing the letter at noon, at that precise moment one cannot say she was still engaged in writing the letter, anymore than we can say that at the culmination of an achievement like *Mary died*, that Mary was dying at that precise moment. Achievements and accomplishments unmodified by temporal adjuncts are thus parallel in this respect: the progressive form, when we are not dealing with additional elements like temporal adverbs, seems always incompatible with the actual culmination point.

- (33) a. Mary wrote the letter.
b. Mary was writing the letter.

EM has an advantage in producing the three segments in K&R's DRT analysis with a single distinguished point. A distinguished point corresponds the culmination point of Kamp & Reyle's analysis (II) and generates two distinct phases that correspond to K&R's preparatory phase (I) and result state (III). By grammaticalizing this unique point of change, in effect we define the endstate of the

action as a part of the overall occurrent. Furthermore, the relationship between the two phases is not trivial: the valuations of the predicates associated with these two phases will be opposite in value. This insight introduces complementarity between *I* and *II* and increases the utility of DRT's culmination point.

3.2.2.2 DRT: States and Activities

Both statives and activities under K&R lack culmination points. In the past tense, statives like *know* and *trust* come to an end, but here the termination is only an implicature, defeasible by the addition of another clause. K&R contrast statives (34a) with accomplishments (34b) in this respect. States, then, consist of a single interval uninterrupted by a culmination point (35):

- (34) a. Mary trusted John, and for all I know she still does.
 b. ??Mary wrote the letter (this morning) and for all I know she is still writing it.

- (35) _____
 state

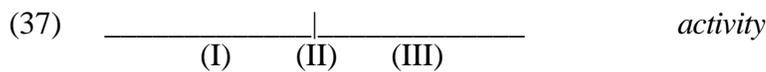
Likewise, activities do not have natural culmination points. However, activities allow the progressive. Kamp & Reyle argue that the progressive is often required. They judge (36a,b) as odd without antecedent context, preferring the progressive as in (36c).⁴¹ For the purposes of DRT, they claim that an activity verb like *walk* cannot introduce a new event in the discourse, only to redescribe events already introduced. The termination point must be introduced by an independently introduced event, such as in (36d), with prepositional phrases (36e), or frame adverbials (36f).

⁴¹Their judgments differ from mine, since I find many examples of activity verbs acceptable without antecedent contexts (i.a-b). Such a difference could be attributed to the goal of DRT versus EM. Whereas DRT aims to account for discourse, and as such it distinguishes between those verb classes which permit the introduction of new discourse events, EM strives to account for the level of the sentence, not the level of discourse. Thus, DRT requires antecedent contexts for activities, whereas EM permits activities as a type of occurrent.

- (i) a. Mary danced.
 b. Mary laughed.

- (36) a. Mary walked.
 b. Yesterday morning at 10 Mary walked.
 c. Yesterday morning at 10 Mary was walking.
 d. Most days Mary got a lift from Fred. But yesterday was different. Yesterday she walked.
 e. Mary walked to the store.
 f. Mary walked for two hours.

Thus, K&R suggest that bare activities are incomplete with respect to being unable to provide a terminating point, as opposed to statives, and must rely on other factors supplied externally. Otherwise, an activity cannot be used in the non-progressive. The simple past representation for activities is shown in (37), showing that past tense forms of activities require an externally-provided culmination point.



3.2.3 EM: Imperatives as Achievements

I will now introduce additional data on imperatives that increases our understanding of achievements. The imperative mood can be used to express commands, which could be taken to include orders, directives, injunctions, instructions and prohibitions, but also to give advice (*ask your doctor about it!*), to make a reproach (*don't ever advise me again!*), to denounce (*go to the devil!*) to make a request for co-operation (*save me!*), and to pray (*give us this day our daily bread!*), as Rescher (1966) points out. Even laws of nature can be formulated as a hypothetical imperative: *If you want water to freeze, cool it to 0°C!* The discussion here is limited to imperatives that are commands.

Every command has an issuing agency and a recipient. Pivotal to the command is also the *mooted action or result*, i.e., 'the possible process of activity or state of affairs which the source enjoins the target to do or achieve or to refrain from doing or achieving.' (Rescher 1966, p.16). Commands are of at least two sorts: the performing of an action (e.g., *look for your glasses*) and the bringing about of a certain result (*find your glasses*). In the former case (an *action-performance*

command), one is asked to initiate a process. In the latter case (a *state-realization/achievement command*), one is asked to act so as to bring about a certain result without any specification as to what activities must be done to achieve the result.

Furthermore, there are positive or negative qualities of a command. A command is positive when it orders a certain action to be performed or a state attained (*open this window!*); it is negative when it prohibits a certain action or attainment of a result (*don't raise your voice!*).

3.2.3.1 The Imperative Test

The *Imperative Test* (Dowty 1979, Pustejovsky 1991), used to distinguish states by the use of imperatives, identifies states by the criterion that states do not appear as imperatives. I will argue that the Imperative Test, while inadequate because it is not the case that states do not appear as imperatives (in fact they do), nevertheless supports our bipartite analysis of changes of state.

The example cited in Pustejovsky from Dowty (1979) is given in (38a): *sick* is a state because it is ill-formed as an imperative. However, (38b-e) show that there are imperatives that are formed from states. The issue involves agency rather than simply statehood; the real difference resides in whether or not a state can be achieved through volitional action:

- (38) a. *Be sick!
b. Get sick!
c. Be good!
d. Believe me!
e. Love me!

As shown, it is possible to initiate states such as belief, love and good behaviour; being intentionally sick (38a) is harder to accomplish, but not impossible. For instance, the issuer of the malevolent command may be mad at the person, wanting him to contract a disease through a volitional act, such as infecting himself. Note that in (38b), the verb *get* has the same meaning as *become*, and definitely

indicates a change of state; the copula *be* does not automatically contribute the meaning of change of state, and thus (38a) is less acceptable than (38b).

Observe that in (38c-e), the verbs behave like achievements, bringing about a change. One is asked to change one's current belief ($\langle \neg b, b \rangle$), or to begin to love someone ($\langle \neg l, l \rangle$), for example. The semantics of the imperative automatically explains why we view imperative states as achievements. Note that an imperative command is a request for some action to be performed. The speaker assumes that the endstate is not true of the hearer at the time of utterance, and desires that the endstate become true of the hearer in the future.

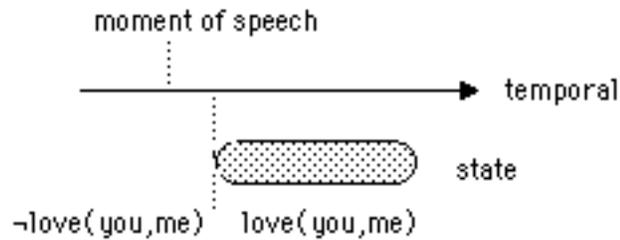
For example, the imperative *Be good!* presupposes that the intended target of the imperative is not good ($\neg g$), and that the desired state is goodness (g). Since in EM, two adjacent temporally ordered states with complementary truth values, such as $\langle \neg g, g \rangle$ constitute an occurrence; there is a distinguished point. The agency requirement mentioned earlier in addition to the criterion for an occurrence makes the imperative interpretable as an achievement (which is equal to an agentive occurrence in Mourelatos' terminology). The EM standpoint is that the imperative command introduces a distinguished point at the initial boundary of an occurrent regardless of its original classification, and thus creates an achievement-like structure (39a-d).

- | | | | |
|------|----|------------------------|------------------|
| (39) | a. | <i>state:</i> | Love me! |
| | b. | <i>activity</i> | Run! |
| | c. | <i>achievement:</i> | Die! |
| | d. | <i>accomplishment:</i> | Build the house! |

The four Vendler classes as imperatives are illustrated below. The distinguished point projects a moment onto the timeline ordered after the moment of speech. Note that the occurrent remains intact in the sense that it retains all the aspectual information it would have in a declarative; only its earlier edge is used to form the distinguished point for the imperative. In (40), the state occurrent begins, but there does not need to be an endpoint to the state, since the declarative

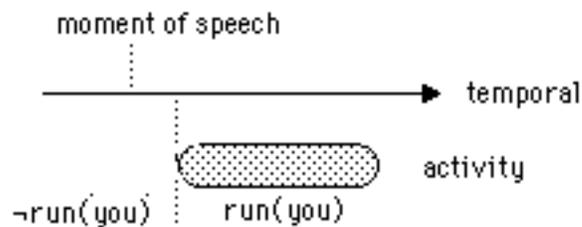
counterpart (*you love me*) requires no such distinguished point, consistent with the properties of states as we have discussed. The declarative version of the occurrent must be reconstructable from the imperative. Thus, the imperative commands that a state of love be established between the speaker and the listener in the future, with no information concerning the state of love have an end.

(40)



Likewise, (41) shows an activity (whose semantics does not require an endpoint); the speaker may intend for the person to keep running without end (limited only by real-world limitations). Here, it is the initiation of a process that is desired, i.e., Rescher's action-performance command. While not a state-realization command, it is achievement-like because there is an abrupt change associated with the beginning of the activity.

(41)

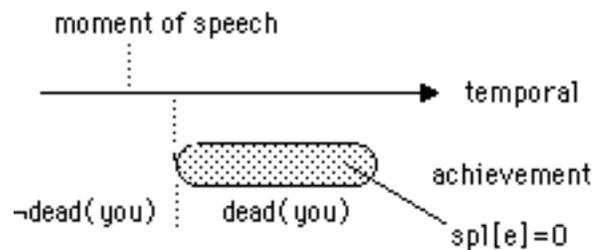


However, consider the case of (42a), where additional prepositional phrases are used to indicate the presence of distinguished points that must be taken into consideration when the hearer interprets the imperative. The declarative version of the imperative is shown in (42b). For such imperatives, the distinguished points provided by the modifying phrases remain accessible. The imperative itself still retains an achievement-like quality, since only its initial point is required:

- (42) a. Run from the laundromat to the supermarket!
 b. You will run from the laundromat to the supermarket.

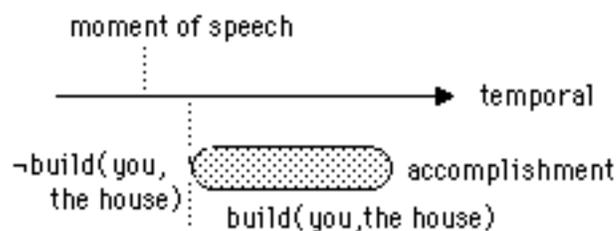
In (43), the achievement verb *die* still is a point-like occurrent with zero length in the temporal dimension: the occurrent retains its structure in its entirety. Thus, the intent of the speaker is to have the hearer perform the instantaneous action in the future. With an achievement, there is no process to initiate: it must be a state-realization command.

(43)



Finally, (44) shows an accomplishment with the information contained in the occurrent intact; a command like *build a house!* implies that the speaker intends for the builder to stop after a house has been constructed, but the actual endpoint is not predetermined by the information contained in the imperative itself. Semantically, we do know that there is one and only one house to be built; the length of time it actually takes to complete it depends on pragmatic factors such as the type of house, the amount of expertise that the builder has, et cetera. In fact, the speaker may not even expect the hearer to complete the accomplishment, merely expecting him to start. Here, the accomplishment has a process, and thus the command is an action-performance command, involving the initiation of the process that leads up to the endpoint.

(44)



Thus, it appears that the imperative creates its achievement-like quality by adjacent yet complementary valuations of some predicate of occurrent existence: at the present time, no such occurrent exists, but it is expected that some action be done to bring about the existence of the desired occurrent. Thus, the imperative is like a future BECOME operator.

Observe that other constructions which involve the irrealis (e.g., future 45a, infinitive 45b) may appear to neutralize some of the differences in aspectual class, but in fact behave like imperatives and keep all aspectual information. The activity of *sleep* remains an activity, but the irrealis property gives these sentences a transition-like quality much like the imperatives, where the contrast is between an unrealized state ($\neg s$) followed the same state realized (s):

- (45) a. Martin will sing.
b. I persuaded Martin to sing.

3.2.3.2 Progressive Imperatives

To support the argument that imperatives are achievement-like, examine such sentences as (46a,b), where the progressive is incorporated into the imperative. Though judgments may vary as to the acceptability of these sentences, it is clear in (46a) that the person issuing the command expects the listener to be engaged in the writing of his thesis, but not necessarily expecting him to finish in a split second.

- (46) a. ?Be writing your thesis, young man!
b. ?Be getting dressed, you!

According to Galton (1984), the distinction between *narrow* and *broad* readings of a progressive verb *V* is the difference between being actively engaged in

strict reading of the activity of *V* (*narrow*) or a looser interpretation of *V*. For instance, if I am drinking a cup of coffee, there could be intervals when I am not actively sipping, and intervals where I am not sipping. If I am actively sipping, that is the narrow interpretation of the progressive *drinking*; if I am in an interval between active sippings, I can be said to be *drinking* in the broad sense of the progressive.

It is clear in (46) that the desired process, *writing*, does not currently obtain in the narrow sense of the progressive. The speaker would not be issuing the command if the young man was actively writing his thesis (writing Chapter Three on his laptop, for instance) at the moment of speech. The same does not apply for the broad sense of the progressive, which includes non-active phases in the writing process as well as the narrow readings of *writing*.

For example, the young man began writing his thesis a year ago and still has a year to go. If he is not currently engaged in the active writing process, say having a coffee break, then (47a) is false on the broad reading, but true on the narrow. In contrast, (47b) would be true on the broad reading, but false on the narrow reading. Note that the broad sense always includes the narrow sense. Thus, the negation of the broad sense also precludes readings of the narrow sense, but the negation of the narrow sense does not preclude the validity of the broad sense.

- (47) a. Tony is not writing his thesis; he is on a coffee break.
b. Tony is writing his thesis; he is on a coffee break.

The imperative in (46a) may only be issued when the speaker desires a narrow reading of the progressive. In (48a), the imperative commands the young man to begin the broad sense of *write* (which may require a phase of the narrow sense of *writing*). In (48b), only the narrow sense is expected to be the final state of the change. In both cases, we have a pair of states that establish the point of transition ($\langle \neg\textit{writing}_{\textit{broad}}, \textit{writing}_{\textit{broad}} \rangle$, $\langle \neg\textit{writing}_{\textit{narrow}}, \textit{writing}_{\textit{narrow}} \rangle$) and

ergo, the achievement-like property. The complementary valuations inherent in Event Mereology produces exactly the right results.

- (48) a. You haven't started your thesis? Be writing your thesis, young man!
b. You are on a coffee break? Be writing your thesis, young man!

3.2.3.3 States and Negated Imperatives

Further insights can be obtained by examining negated imperatives. Negative commands may be asking one to desist from some activity, or to initiate some activity. Compare the negated imperatives in (49a-d) to their unnegated counterparts in (50a-d):

- (49) *Don't S!*
a. Don't be sick!
b. Don't be good!
c. Don't believe me!
d. Don't love me!

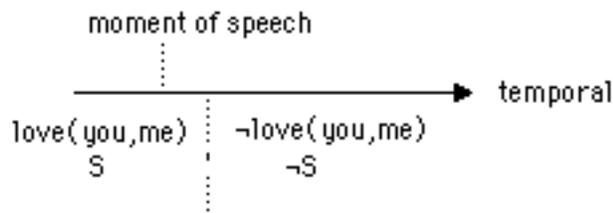
- (50) *S!*
a. Be sick!
b. Be good!
c. Believe me!
d. Love me!

These negative commands in (49) each have two different interpretations. At the moment of speech, the speaker *B* issues a negative command to *A*. Either *A* is in the state *S* or *A* is not in the state *S*. The former is the *desist reading* where the state *S* currently obtains and the speaker desires the hearer to desist from participating in that state; these sentences can be paraphrased as *stop V-ing!* or *don't continue to V!*

For example, *A* is in the state *S*. *B* says to *A*: *don't be in S*. *B* is thus ordering *A* to change from being in *S* to being in *not S*, i.e., to act so as to go from *S* to not *S*, to desist from *S*. Thus, if *A* is running, then if *B* says to *A*, *don't run*, then *B* is requesting or ordering *A* to desist from running. If *A* is sick, then if *B* says to *A*, *don't be sick*, then *B* is requesting or ordering *A* to desist from being sick, i.e., to act as so as to become healthy.

The desist reading is similar to the imperative achievements described above, since there is a change from one state to its negation. The corresponding diagram is illustrated below for (50d), where you love me at the present time, but I want you to stop loving me in the future. The distinguished point that produces the achievement-like result occurs at the end of the occurrent, as opposed to the beginning as for positive commands.

(51)

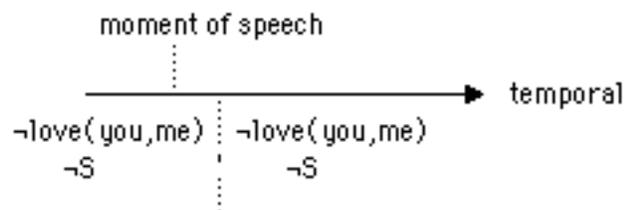


The second possible reading is *cautionary*: the state S does not currently obtain ($\neg S$) and the hearer is warned not to participate in the described state in the future (again, $\neg S$).

Take the case where A is not in the state S . B says to A : *don't be in S* . Thus, B is ordering A to refrain from S , i.e., to act so as not to change from *not S* to S , that is, to refrain from becoming S . Thus, if A is not running, then if B says to A , *don't run*, then B is requesting or ordering A to refrain from running. If A is not sick, then if B says to A , *don't be sick*, then B is requesting or ordering A to refrain from becoming sick (i.e., to act so as to remain healthy).

Under this latter cautionary reading, since the speaker uttering the imperative desires the current state of affairs to remain unchanged, we lack the complementary states required for an achievement in EM. Thus for (50d), you do not love me at the present time, and I want that state to continue. This is shown in (52), where the boundary between the two $\neg S$ states is arbitrary: there is a distinguished point, but it does not split the occurrent into two different phases. In fact, it is unclear if there is an occurrent at all, since the speaker desires that no such occurrent comes into existence.

(52)



Note that only states (53a), activities (53b) and accomplishments (53c) exhibit this duality of meaning with the negative commands, but not achievements (53d). Achievements can only have the cautionary reading. This can be attributed to the lack of a distinguished process in the achievement; states, activities and accomplishments all have in common a non-punctual nature. This property controls whether or not the recipient of the command could be currently engaged in the verb's activity. Achievements, being a point of transition, have no process that the recipient of the command could participate in, since the performance of the achievement takes place in an instant. Thus, the only possibility is that the action currently does not obtain at the time of utterance, and that the recipient is warned not to perform the achievement. Note that momentary activities (§4.2.3) like *jump* (53e), *burp*, *sneeze* and *giggle*, while point-like, are still activities, and may be currently engaged in by the recipient. Thus, momentary activities may have both the cautionary and desist interpretations.

- (53) a. Don't love me!
b. Don't run!
c. Don't read the book!
d. Don't leave!
e. Don't jump!

3.2.3.4 *Remain Verbs and Imperatives*

Examine as well verbs like *stay* and *continue*, also called aspectual verbs (ter Meulen 1997). These verbs have been argued (Gruber 1976) to be distinct from states. Verbs of the *remain* class take into consideration temporal length, i.e., more than a single moment in time. In contrast, *be*-verbs involve only the evaluation of the

predicate at a single moment in time, as demonstrated by the data below (54a,b). The present tense of *be* only involves the current state, regardless of the future and the past status of Roy's doctorhood. In comparison, *remain* in (55a,b) shows that the status of Roy's doctorhood in the past is relevant in the discourse, in addition to the present moment:

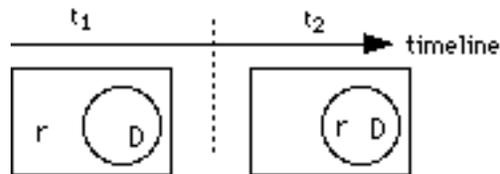
- (54) a. Roy is a doctor.
 b. Roy is not a doctor.
- (55) a. Roy remains a doctor.
 b. Roy does not remain a doctor.

Consider the following sentences:

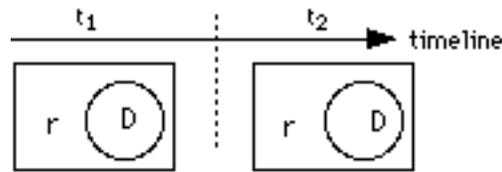
- (56) a. Roy became a doctor.
 b. Roy did not become a doctor.
 c. Roy had not been a doctor.

In (56a), the verb *become* denotes an evident change that Roy undergoes. Note that *to become* in (56a) carries a presupposition that Roy had not been a doctor (56c). When negation applies (56b), Roy remains in the state that he was, i.e., *not a doctor*. The presupposition in (56b) is also (56c), that Roy had not been a doctor. This presupposition is not negated by the introduction of a negation. It is possible that Roy (*r*) did undergo a change and became something other than a doctor; however, the relevant fact is that the state of doctorhood (*D*) is not attained. Thus, at t_1 , Roy is not a doctor, and at t_2 , Roy is not a doctor either. The biphasic change no longer consists of two complementary states (57a); the negation converts it to a two-part non-change (57b):

- (57) a.



b.



Now consider (58a,b). In (58a), *remain* also has a presupposition, that Roy had been a doctor (58c). In (58b), even when negated, the presupposition that Roy had been a doctor remains. Here, as in the *become* examples above, show that the presupposition is not affected by the introduction of a negation:

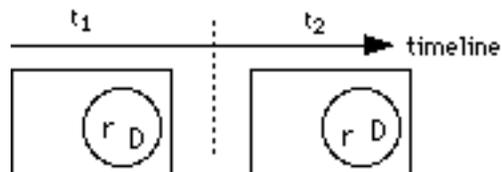
- (58) a. Roy remained a doctor.
 b. Roy did not remain a doctor.
 c. Roy had been a doctor.

One possible analysis of verbs like *remain* and *stay* is that they are composed of two parts that have the same predicate valuation (59a), i.e., no complementation. When negation is applied (59b), they become achievement-like, with the latter valuation becoming its negated counterpart. The same analysis works for the verb *continue* (59c,d).

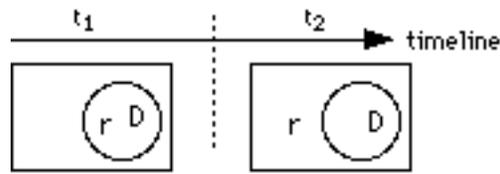
- (59) a. Stay healthy! $\langle h, h \rangle$
 b. Don't stay healthy! $\langle h, \neg h \rangle$
 c. Continue running! $\langle r, r \rangle$
 d. Don't continue running! $\langle r, \neg r \rangle$

With *stay*, there is not a change of state (59a). The same predicate must hold true at t_1 and at t_2 , as shown in (60a), and cannot fluctuate. Yet with the addition of negation (59b), we obtain a situation where a change must occur, as shown in (60b). This set of data shows that verbs like *remain* are exact inverses to verbs like *become*.

(60) a.



b.



With verbs like *stop* and *start*, the unnegated usage is a straightforward transition (61a,c). However, for *stop* in its negated imperative, it is the latter negated state that is converted to a positive (61b), whereas *start* in its negated imperative that the latter positive that is converted to a negative. In both cases, it is the final state that switches value in its negated imperative, never the initial state. We can link this switch in polarity of values with that of *stay* and *continue* from above: all these negated imperatives switch the value of the latter state.

- (61)
- | | | |
|----|----------------------|----------------------------------|
| a. | Stop singing! | $\langle s, \neg s \rangle$ |
| b. | Don't stop singing! | $\langle s, s \rangle$ |
| c. | Start dancing! | $\langle \neg s, s \rangle$ |
| d. | Don't start dancing! | $\langle \neg s, \neg s \rangle$ |

A related issue is whether or not a verb like *stay* is more, less, or just as complex as verbs encoding change of state or state of change. We do not want to use complementation to derive two opposite values for these verbs, since the values are not complementary here. How, then, do we represent these verbs? I suggest that the fact that the negation of *become* and *remain* does not affect the presuppositions indicates that such presuppositions are encoded higher in a syntactic structure than the distinguished points and the distinguished processes, such that the placement of the negation in affecting the process or the point of change does not also negate the presupposition.

It is likely that this presupposition 'slot' is underspecified, except for verbs like *start*, *keep*, *continue*, and *stop*, where the value has been specified. The purpose of the slot is to determine what initial state obtains. For example, the verb *stay* would encode the first state as being positive: the verb action is currently being performed. In contrast, the verb *start* would encode the first state as being negative:

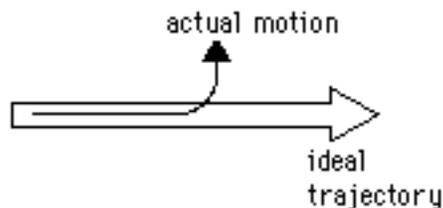
the verb action is not being performed currently. For both *stay* and *start*, the endstate are both specified as positive, that the action will be (or in the case of *stay*, continue to be) performed.

For an achievement verb like *find*, the presupposition is that the endstate is the positive; the distinguished point allows the initial state is derived. When one *finds* something, the object was not discovered initially, but then at the point of change the polarity shifts, so that the object has been discovered. Thus, there need be no presupposition about the initial state. Further investigation into the nature of this hypothetical presupposition slot will elucidate the data on these aspectual verbs, but such a task is outside the scope of the current thesis.

3.2.3.5 Ideal Trajectories

Recall that in Asher & Sablayrolles (1994) that there was a tenth class, *Dévier* 'to deviate', that was omitted from the discussion. This class of verbs involves ideal trajectories and the deviation of the actual action from the ideal, or the intended. The additional element of modality necessitates some changes from A&S's localistic analysis. For a verb like *dévier*, there is some kind of change of location, but the location does not consist of a standard type of spatial location. Asher & Sablayrolles believe that there is an ideal trajectory, and that the actual motion goes from the inside of the ideal trajectory to a near outside of an ideal trajectory, as shown in (62):

(62)



Following the same system used for the other nine verb classes in A&S, the corresponding Source, Internal Path and Goal specifications for *dévier* are

respectively Inner-Halo, Inner-Transit, and Outer-Halo. In this form, it is the same as the *Sortir* 'to go out' class, with the exception that the reference location consists of the ideal trajectory.

If the actual motion deviates from the ideal trajectory, however, we are no longer dealing with purely spatial concepts, but must introduce an element of modality. It appears that the *Dévier*-class does not fit smoothly into A&S's overall system, which deals with strictly spatial zones.

In comparison, Event Mereology easily incorporates the idea of deviations from ideal trajectories into its biphasic schema. The English sentences below (63a-d) show that deviation involves an intention, and a change from doing that original intention (*i*) to not continuing the intention ($\neg i$). There is a distinguished point that separates the participation in performing the original intention and the later switch to a different intention.

- (63) a. Bruce deviated from his path.
b. Bruce deviated from his original plan.
c. Bruce strayed from the ministry.
d. Bruce strayed from the pursuit of his true love.

There is a strong parallel between the semantics of *deviate* and the use of the prepositions *towards* and *for*. (64a) is an acceptable paraphrase of (64b), just as (64c) is for (64d). The data suggests that under Event Mereology, verbs like *deviate* can be represented as $\langle \textit{towards}(x,y), \neg \langle \textit{towards}(x,y) \rangle$ or $\langle \textit{for}(x,y), \neg \langle \textit{for}(x,y) \rangle$. Such an analysis fits in seamlessly with the other verb classes already discussed in Chapter One.

- (64) a. Bruce was heading towards/for the theatre, but now he's not.
b. Bruce deviated from his plan to go to the theatre.
c. Bruce was making passes towards Karen, but now he's not.
d. Bruce deviated from his pursuit of Karen.

3.2.4 Summary of ES and DRT Aspect

In these two sections, I have laid out the aspectual systems of Pustejovsky (1991) and Kamp & Reyle (1993). Both approaches have their merits, and those features have been incorporated into the Event Mereology analysis of aspect. Certain alterations that improve our theoretical understanding of aspect have been noted, as well as the addition of new empirical data. With respect to Pustejovsky, the criterion he uses to distinguish achievements from accomplishments, i.e., agentivity, has been replaced by the following EM hypothesis: achievements and accomplishments both involve a change of state (dT), whereas they differ in that the former associates with it an underspecified activity, and the latter a specified activity (dP). A reanalysis of the *almost* data based on the EM system was provided.

Kamp & Reyle (1993)'s analysis is most similar to that espoused by Event Mereology, except their system is geared towards discourse representations. As well, there appears to be no complementary relationship between their preparatory phase and the result state. I provided additional evidence in support of EM's use of complementarity, looking at imperatives, negation, and verbs like *keep* and *start*. A tenth class from Asher and Sablayrolles (1994), that of *Dévier*, was also shown to fit in well with the complementary valuations approach taken by EM. The next section deals with prepositional phrases, their interaction with verbs, and the treatment of medial prepositions in EM.

3.3 Prepositions

Prepositions and prepositional phrases play important parts in understanding event composition. Aspect is not merely calculated from the semantics of the verbs, but also from interactions with prepositional phrases. As was seen in Asher & Sablayrolles (1993), spatial prepositions are subdivided into *positional*, *initial directional*, *medial positional*, and *final positional* prepositions.

Since Event Mereology opts for a non-localistic analysis, concepts such as *medial positional* require reanalysis. It is also useful to examine non-spatial prepositions, to see if any general patterns emerge, and if so, what modifications (if any) are required to account for them in a system of aspect.

I begin by surveying prepositions, both spatial and non-spatial. Next, I look at the effects of adding prepositional phrases to verbs of change. Finally, I examine medial prepositions such as *via* and *past*, and offer an analysis of these prepositions that does not depend on the localistic notion of *medial*.

3.3.1 General Characteristics of Prepositions

Since we will be using prepositional predicates in the lexical entries of verbs, I will summarize some properties of prepositions that have been hitherto observed (Wood 1967, Emonds 1976, Jackendoff 1977, Vestergaard 1977, Millward 1983, Quirk *et al.* 1985, Cienki 1989, Fries 1991, Froskett 1991, Jolly 1991, König & Kortmann 1991, Rauh 1991). A traditional definition of prepositions is that they are 'words that govern a noun or pronoun and indicate a relation between this and another word, which can be a verb, an adjective, or another noun' (Froskett 1991).

Prepositions may be right-headed (*postpositions*) or left-headed (*prepositions*). Greek has only prepositions, whereas in German, both prepositions and postpositions are common. In English, prepositions occur most often, though there are some prepositions that can be used as postpositions (e.g., 65a) or pure postpositions (65b) (Froskett, 1991):

- (65) a. The world *around*, people want peace.
b. I saw Bill and Ted *together*.

There are some similarities between complementizers and prepositions. Complementizers do not take NP complements, whereas prepositions take NP and gerund complements. Certain prepositions can take finite clauses as complements, just like a complementizer:

(66)		<i>when</i> (C)	<i>after</i> (C,P)	<i>by</i> (P) *
	finite clause (<i>she danced</i>)			
	non-finite/gerund (<i>dancing</i>)			
	NP (<i>the end of the dance</i>)	*		

While the inventory of prepositions is limited, it is not a closed class, contrary to common perception. The class of prepositions admits new additions and constantly changes throughout the history of a language. There are deadjectival (67a), denominal (67b), and deverbal prepositions (67c) in English. Prepositions are classified typically as [-N,-V]. [-N] indicates that the preposition is a case assigner; [-V] means that prepositional phrases may be focused in cleft constructions in English. These features suggest that nouns [+N,-V] and verbs [-N,+V] are more likely sources for new prepositions than adjectives [+N,+V].

(67)	a.	<i>deadjectival</i>	along, near, worth, subsequent to
	b.	<i>denominal</i>	thanks to, in front of, in spite of, by means of, in addition to
	c.	<i>deverbal</i>	barring, excepting, concerning, pending

The frequency of use among prepositions in English is estimated by Quirk *et al.* (1985) to be 45% the use of *of* and *in*. 90% of the prepositions used are limited to thirteen prepositions: *of, in, to, for, with, on, by, at, from, as, into, about, and than*. It is not an unlikely hypothesis that these most frequently appearing prepositions contain the elementary meaning components that are used in the semantics of verbs with distinguished points.

3.3.2 Spatial and Non-Spatial Prepositions

Just as verbs of change are not all verbs of motion, not all prepositions are spatial prepositions. Aside from prepositions of spatial location, there are also prepositions that are temporal, directional, discourse-related, and those which serve other functions. Some spatial prepositions can also have non-spatial uses.

From various sources (Wood 1967, Emonds 1976, Quirk *et al.* 1985, Fries 1991, among many others), two-hundred and eighty-six English 'prepositions' were

collected; these include simple and complex prepositions, particles, directional adverbs, and other elements that have been classified as prepositions by their sources. Not all prepositions need to be discussed here; I will not be analyzing those prepositions which are not prepositions that affect aspectual interpretation. Thus, I exclude prepositions that serve to explain a cause, topicalize, or focalize (e.g., *focal prepositions*, 68), and those that include, exclude, or distribute (*clusion prepositions*, 69).⁴²

(68) *focal prepositions*

according to, as for, as to, because of, concerning, considering, due to, given, granted, in (the) face of, in (the) light of, in (the) process of, in accordance with, in behalf of, in case of, in charge of, in common with, in comparison to, in compliance with, in conformity with, in consequence of, in favour of, in quest of, in regard to, in relation to, in respect of, in respect to, in return for, in search of, in spite of, in view of, on (the) ground(s) of, on account of, on behalf of, on pain of, on the matter of, on the part of, on the strength of, owing, re, regarding, regardless of, respecting, thanks to, touching, with reference to, with regard to, with respect to

(69) *clusion prepositions*

along with, apart from, aside from, bar, barring, besides, but, but for, cum, despite, devoid of, ex, except, except for, excepting, excluding, exclusive of, failing, in addition to, in exchange for, in lieu of, including, instead of, irrespective of, less, minus, notwithstanding, of, outwith, per, plus, sans, save, times, together, together with, void of, with, with the exception of, without

3.3.2.1 Prepositions With Spatial and Temporal Uses

The remaining prepositions are mostly applicable to time and space, and can also be subdivided into different categories. First, directional particles (e.g., *away*, *forwards*) and locational particles (e.g., *far*, *north*, *nowhere*), and other words classified as 'prepositional' by their sources yet do not take direct objects, can be separated (70). (71) shows the prepositions that can be used spatially, and (72) the prepositions that can be used temporally.

⁴²The lists of prepositions are by no means exhaustive or absolute; neither are all the 286 prepositions collected classified, as some are unclear as to their proper classification or are very archaic. Of those listed, there may be better ways to subclassify them.

- (70) *particles*
aft, abroad, afterwards, ago, ahead, aloft, anywhere, apart, ashore, aside, astern, away, back, backward(s), close, down, downhill, downstairs, downstream, downward(s), downwind, east, eastward(s), elsewhere, everywhere, far, forward(s), here, hereabouts, home, indoors, inland, inshore, inward(s), larboard, left, locally, (noun)-wards, nearby, north, nowhere, offshore, outdoors, outside, outward(s), overboard, overhead, overland, overseas, port, right, sideways, skyward(s), somewhere, south, starboard, there, thereabouts, underfoot, underground, uphill, upstairs, upstream, upwards, west
- (71) *spatial prepositions*
('gainst, 'tween, 'twixt,) aboard, about, above, across, adjacent to, after, against, ahead of, along, alongside, amid, amidst, among, amongst, around, as far as, astride, at, athwart, atop, away from, back of, before, behind, below, beneath, beside(s), between, betwixt, beyond, by, close to, from, in, in amongst, in back of, in between, in contact with, in front of, in line with, inside, inside of, into, near, nearer, nearest, near to, nearer to, nearest to, next to, off, off of, on, on to, on top of, onto, opposite, out, out of, outside, outside of, over, past, round, round about, through, throughout, to, to the left of, to the right of, to the side of, toward(s), under, underneath, unto, up, up against, up to, upon, via, within, without
- (72) *temporal prepositions*
('tween,) about, after, around, as of, at, before, between, by, circa, close to, during, ere, following, for, from, in, in between, in consequence of, inside, into, on, outside, over, past, pending, preliminary to, preparatory to, previous to, prior to, pursuant to, since, subsequent to, throughout, till, to, toward(s), under, until, unto, up to, upon, within

Further distinctions among the temporal and spatial prepositions are possible. There is some overlap between temporal and spatial prepositions, as shown in (73). The differences in spatial and temporal usage of these prepositions are illustrated in (74):

- (73) *spatial and temporal prepositions*
('tween,) about, after, around, at, before, between, by, close to, from, in, in between, inside, into, on, outside, over, past, throughout, to, toward(s), under, unto, up to, upon, within
- (74) A a. Anakin Skywalker usually sleeps about the workshop.
 b. Anakin Skywalker usually sleeps (for) about 7 hours.
- B a. Jar-Jar Binks walked in the parade after the droids.
 b. Jar-Jar Binks walked in the parade after dinner.
- C a. Chewbacca waited around the corner for C3PO.
 b. Chewbacca waited (for) around an hour for C3PO.

- D a. Darth Vader landed his spaceship at the spaceport.
b. Darth Vader landed his spaceship at dawn.
- E a. Ewoks only eat before the altar.
b. Ewoks only eat before dusk.
- F a. Boba Fett planted a tree between two rocks.
b. Boba Fett planted a tree between dawn and noon.
- G a. Greedo arrived by the sea route.
b. Greedo arrived by the agreed time.
- H a. Han Solo searched for Luke close to the Rebel Base.
b. Han Solo searched for Luke (for) close to an hour.
- I a. I have watched Star Wars from that balcony.
b. I have watched Star Wars from the first day it opened.
- J a. Jabba the Hutt built a new speeder in his hangar.
b. Jabba the Hutt built a new speeder in December/a day.
- K a. Obi-Wan Kenobi practiced in between the boulders.
b. Obi-Wan Kenobi practiced in between meals.
- L a. Luke Skywalker will freeze to death inside the ice cave.
b. Luke Skywalker will freeze to death inside an hour.
- M a. Darth Maul somersaulted into the cockpit.
b. Darth Maul somersaulted into the late afternoon.
- N a. Boss Nass rested on his throne.
b. Boss Nass rested on Tuesday.
- O a. My speeder will take Bail Organa outside the city to sell.
b. My speeder will take Bail Organa outside an hour to sell.
- P a. Senator Palpatine jumped over the bench.
b. Senator Palpatine jumped (for) over an hour.
- Q a. Qui-Gon Jinn continued running past Yoda.
b. Qui-Gon Jinn continued running past his bedtime.
- R a. R2D2 searched for C3PO throughout the market.
b. R2D2 searched for C3PO throughout the day.
- S a. Sebulba will walk his dog towards the cantina.
b. Sebulba will walk his dog towards five o'clock.
- T a. Threepio can fall asleep under the bed.
b. Threepio can fall asleep (in) under a minute.
- U a. Uncle Owen walked unto the tarmac.
b. ?Uncle Owen walked unto the next day.

- V
 - a. Chancellor Valorum had been creeping up to the podium.
 - b. Chancellor Valorum had been creeping (for) up to five minutes.
- W
 - a. Watto came to assist me upon the barge.
 - b. Watto came to assist me upon hearing my call.
- X
 - a. Yoda died within his cave.
 - b. Yoda died within a minute of Luke's arrival.

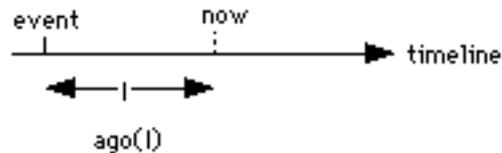
There are, of course, differences between the spatial and temporal uses of these prepositions. The spatial use locates the action within an area, or positions/orients the actor in the area (*a.* examples in 74). Temporal uses (*b.* examples in 74) fall into two basic types: those that modify a stretch of time (74 ACHJLOPSTVX), or positions the action at a specific point (or between two specific points) on the timeline (74 BDEFGIJKMNQRUW). *In* appears to be a member of both classes (74 J).

The first set identified, those that modify a stretch of time (i.e., *about, around, close to, in, inside, outside, over, towards, under, up to, within*), are almost more like quantifiers over a temporal noun phrase than a proper preposition in their temporal usage. In most of these sentences, the addition of *for* or *in* before the PP improves the reading, showing that they do act like modifiers that make the length of time denoted by the prepositional object less rigid. For example, *about an hour, around an hour, and up to an hour* impose fuzzier boundaries on the length of time. If *I* is the timespan, then *about(I), around(I)* and other similar predicates indicate the degree to which the timespan may vary.

Note that the addition of *ago* to some of these sentences turn them into the second type of temporal usage, where a moment is located on the timeline (75a-f). This is the effect of *ago* taking the event and locating it in the past with respect to the present. How far back in the past depends on the timespan *I*; as shown in (76). For instance, if *I* equals *two hours*, then the event happened two days prior to the present moment.

- (75) a. Han Solo searched for Luke (for) close to an hour.
 b. Han Solo searched for Luke (*for) close to an hour ago.
 c. Senator Palpatine jumped (for) over an hour.
 d. Senator Palpatine jumped (*for) over an hour ago.
 e. Chancellor Valorum had been creeping (for) up to five minutes.
 f. Chancellor Valorum had been creeping up to five minutes ago.

(76)



3.3.2.2 Non-Spatial and Non-Temporal Uses

Not only are there spatial and temporal uses of prepositions, but sometimes these prepositions have other abstract uses. For instance, the preposition *for* can be used to denote a length of time as in (77a), or as a goal to aim for (77b,c), or as a desired item (77d). The meanings in (77b,c) are related to that of (77d), except (77b) is a desired temporal moment, (77c) is a desired physical goal, and (77d) is a desired exchange of services. Only (77c) can be construed as a locational use of *for*, and even then its usage as a spatial preposition is uncertain. In an earlier section, we have seen how the predicate *for* can be used in the semantics of *deviate*, making that class of verbs conform to the two-phase analysis of change.

- (77) a. You should wait for an hour.
 b. You should wait for Mary (to come).
 c. He is heading for the theatre.
 d. He will work for food.

As with verbs, the choice of an abstract or concrete NP in the complement of the preposition can control whether that change is abstract or physical. While we have already seen differences between locational and temporal NPs in the complement of PP, here are some additional minimal pairs that do not involve the temporal:

- (78) A a. Arden stayed away from cars.
 b. Arden stayed away from politics.

- B
 - a. Benedict went into the castle.
 - b. Benedict went into business.
- C
 - a. Corwin was near to the bank.
 - b. Corwin was near to a checkmate.
- D
 - a. Deirdre remained within the hotel.
 - b. Deirdre remained within her rights.
- E
 - a. Eric lured Corwin into the tower.
 - b. Eric lured Corwin into a confession.
- F
 - a. Fiona went beyond that tree.
 - b. Fiona went beyond the call of duty.
- G
 - a. Underneath all that rubble was a good man.
 - b. Underneath all his haughtiness was a good man.

3.3.3 Prepositions and Verbal Meaning

3.3.3.1 Prepositions and the Partitioning of Continua

In general, a preposition bisects a continuum into two regions: one of which consists of those denotations that it is true for, the other of those denotations that it is false for. Thus, a spatial preposition delimits two complementary regions in a spatial continuum. For example, the preposition *on* in *on the table* involves the relation $On(x,y,t)$, which defines a two-dimensional surface on y as part of its function.⁴³ The NP *the table* provides the reference required by the spatial relation to partition the spatial domain. There are two spatial parts: the region that qualifies as *on* (where $On(x,y,t)=1$), and the region complementary to that (where $On(x,y,t)=0$).

These regions should not be confused with the actual reference object of the preposition, *the table*. In fact, the region that is defined does not need the reference object to be part of it. For instance in (79a), the phrase *near the table* involves some relation $Near(x,y,t)$ that carves out the space that John stood in using the table only

⁴³Note that the particular surfaces or volumes selected are subject to pragmatic factors, such as the properties of the reference object or the subject. For example, *on the table* defines a flat plane on top of the table, whereas *on the plane* is ambiguous, since *on* can also be used for people who are aboard the plane.

as a reference, not requiring John to be touching the table in any way. In fact, John cannot be standing *on the table* (79b) if he is *near the table*.⁴⁴

- (79) a. John stood near the table.
b. John stood on the table.

It appears to be a property of *near* not to allow the reaching of a distinguished point (80a), as opposed to *on*, which could provide a distinguished point or terminus (80b). The only way John could go near the boat yet still be on its bridge is if the bridge was physically separated from the boat. Prepositions like *on*, *at*, and *in* are only possible if there is a strong degree of closeness with the reference object. Thus, if John stood *near the table*, he was not close enough to have reached it, and remains outside a certain distance from the object. Being able to cross that boundary of closeness is similar to having reached a distinguished point.

- (80) a. *John went near the boat and stood on its bridge.
b. John went on the boat on stood on its bridge.

Likewise, the non-spatial use of *near* prevents the culmination of the reference event (81a). There is an approach towards the event on the timeline, or a temporal proximity to the event (81b-d):

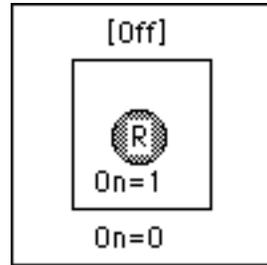
- (81) a. Andrew's essay was near completion.
b. Andrew was near a decision.
c. Andrew was near a crisis.
d. Andrew was near a nervous breakdown.

Thus, the reference object or time guides the granularity or size of the segments by providing a real-world point of reference. In other words, the reference object or time does not take over the grammatical function of the distinguished point and the associated predicates. In a change of state, only the distinguished point bisects the spread of the occurrent and defines two parts with complementary valuations with respect to a predicate like *Near(x,y,t)*, *On(x,y,t)*, or *In(x,y,t)*.

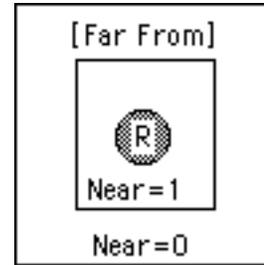
⁴⁴*Near* is both a preposition, as in *he stood near the car*, and also an adjective, as in *John is near*. Typical adjectival word formations are seen in the examples *nearer*, *nearest*, and *nearly*.

In the phrase *on the table*, *on* delimits an area of space using the table as its reference (*R*), leaving behind a complementary region, *off (of) the table* (82a). Likewise, *near the table* demarcates a region using the table as its reference, leaving behind a complementary region that is described by its inverse, *far from the table* (82b).

(82) a.



b.



If we look also at the pairs *in-out (of)* and *at-away from*, it is evident that the positive valuations are always in the region closer to the reference object, and the negative valuations always in the region farther from the reference object. To put it another way, *in*, *at*, *near*, and *on* are more basic than their opposites *out (of)*, *away from*, *far from*, and *off (of)*, and are used to delimit space immediately around the reference object.

This observation bears upon our representation of verbs. For example, if a change-of-state verb involves the predicate $Near(x,y,t)$, then we expect that a change from $\langle Near, \neg Near \rangle$ will distance the subject from the reference object ($\langle Near(x,y,t)=1, Near(x,y,t)=0 \rangle$); that is to say, even though an object cannot technically be *on* and *near* the same thing simultaneously, the region for $Near(x,y,t)=0$ does not intersect with the region $On(x,y,t)=1$. The $Near(x,y,t)=1$ region includes the $On(x,y,t)=1$ region. This configuration of the spatial region prevents a sentence like (83) with the change $\langle Near, \neg Near \rangle$ from being descriptive of the scenario where she was no longer near the stage because she climbed onto the stage.

(83) Anne distanced herself from the stage.

Two points are emphasized. Firstly, all predicates of change distinguish two regions on the continuum, using the reference object to guide the location of the boundary between its binary valuations (matched with the phases of the occurrent bisected by the distinguished point). Secondly, there is a crucial difference between using the reference object as a region in and of itself, and using the reference object as a guide to partition the region. As we will see, the latter method, where the reference object merely acts as a referent, permits Event Mereology to unify medial prepositions with the other kinds of prepositions.

3.3.3.2 Prepositions, States, and Changes of State

Prepositional predicates, as argued, always delimit two regions that correspond to their valuations in a binary logic. Together with other verbs, prepositional phrases may affect the aspectual interpretation of the sentence: such is what is commonly called *event composition* or *aspectual compositionality*. Aspectual compositionality can be understood as the claim that small parts with aspectual influence exist, and that these parts can be put together to form a more complex verb phrase with a resultant aspect that is dependent on the smaller parts.

These prepositional predicates come in two basic kinds: *positional* (e.g., *in*, *on*, *at*, *near*; 84a,b) and *transitional* (e.g., *into*, *onto*, *to*, *until*; 84c,d). Positional prepositions are used to describe a background location (or time) where (or when) the action takes place. Since a positional prepositional phrase is used to describe a property that obtains throughout the event, it is like a state of affairs. Transitional prepositions indicate a definite change of state, and are thus indicative of a distinguished point.

- (84)
- a. Jean-Pierre sat on the porch.
 - b. Jean-Pierre cried on Sunday.
 - c. Jean-Pierre stepped onto the porch.
 - d. Jean-Pierre cried until Sunday.

In a state of affairs, only one predicate valuation is assigned to the span of the occurrent; its complementary value is irrelevant to the internal aspectual structure. In contrast, an occurrent of change is comprised of both complementary valuations of the predicate.

A transitional prepositional phrase can affect the aspect. An activity verb like *run*, normally lacking a distinguished point, can be provided with an endpoint by the addition of a goal phrase headed by a preposition like *to*, *into*, or *out of* (85a-g). We can observe the change caused by the addition of *to the library* to the activity verb *run*: (85a) does not entail (85b), since the addition of the PP endpoint prevents the activity verb from having a subpart that is also an instance of the activity verb. In this way, *run to the library* is accomplishment-like.

- (85) a. Andrew is running to the library.
b. Andrew has run to the library.
c. Andrew ran into the library.
d. Andrew ran into debt.
e. Andrew ran into trouble.
f. Andrew ran out of the library.
g. Andrew ran out of time.

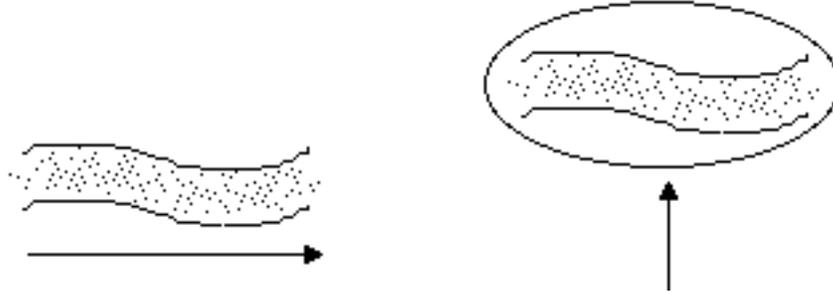
Pustejovsky (1991)'s Event Structure posits that such a PP is a function $\langle P, T \rangle$ from Process to Transition. The preposition *to* is analyzed as a relation between states and processes, such that the result is a Transition. In EM terms, the transitional prepositional phrase introduces a distinguished point. By the addition of a *dT* to an activity verb normally without a *dT*, we introduce a bipartite element to the event complex. Thus, the verb phrase modified by a transitional PP resembles an accomplishment even though the verb itself is an activity verb.

Verkuyl (1993) also discusses similar cases, such as (86a), which contrasts with (86b). He follows Jackendoff & Landau (1992), where the dimensionality of the object is crucial: in (86a), *the river* is assigned the interpretation of an unbounded, one-dimensional object by the preposition *along* (87a). In (86b), *the river* is assigned the interpretation of a bounded zero-dimensional point by the

preposition *to* (87b). Thus, says Verkuyl, the former unbounded *river* permits the durative, whereas the boundedness of the latter requires the terminative.

- (86) a. John ran along the river.
 b. John ran to the river.

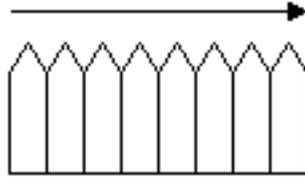
- (87) a. *unbounded* (1-dimensional line) b. *bounded destination* (0-dimensional point)



Verkuyl's terms *unbounded* or *durative* corresponds to the idea of *state of affairs* or *background location*, i.e., no distinguished point; his term *bounded* or *terminative* correlates with the concept of *change of state*, i.e., the existence of a distinguished point. The two variants are illustrated below. (87a) shows that there is no definite endpoint, whereas (87b) shows that the motion stops once the destination is arrived at.

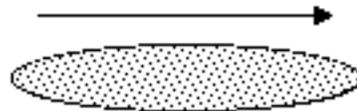
Along and *to* carry the load of the semantic interpretation, not the objects of the preposition. In other words, the prepositions can take all sorts of objects for which it is not evident whether they have a specific dimensionality or boundedness. For instance, we can say (88a) without having to say that the fence is endless. Certainly a fence can be a short, finite segment. It is the fact that we are using *along* that the reference object is interpreted as an unbounded, one-dimensional object. The effect of *along* simply keeps the finite nature of its object, *the fence* in this case, underspecified for a point of change. (88b) illustrates the action in (88a).

- (88) a. John walked along the fence.
b.



That the object's inherent shape and dimensions are not as important as the semantics provided by the preposition can be shown by the examples below. Objects having a long axis (e.g., *road*, *river*, *shore*) have a natural orientation when used in an *along* PP. However, this does not mean that objects without such long axes cannot be used in an *along* PP. We can say (89a), for instance, letting the preposition *along* tell us to interpret the object as having a long axis that can be used as the one-dimensional length, as illustrated in (89b). One might judge (89a) to border on being unacceptable, but that judgment would be based on extra-linguistic knowledge of crop circles. Crop circles do not have a natural long axis, which is why we resist the sentence as being fully acceptable when used with the same preposition:

- (89) a. John walked along the crop circle.
b.



In one sense, the PP provides the specification of change of state, just as the NP complement to an accomplishment verb provides a specification of a change of state (90). Of course, verb phrases of the form *process verb followed by a PP specifying the change* specifies the process which leads to the endstate (91).

- (90) X builds a Y.
The activity of X's building takes place.
The state of Y's existence comes about as a result.
- a. Bill built a house.
b. Bill built a model airplane.
c. Bill built a website.
d. Bill built a financial empire.

- (91) X runs into Y.
 The activity of X's running takes place.
 The state of X's being in Y comes about as a result.
- a. Bill ran into the house.
 - b. Bill ran into the library.
 - c. Bill ran into debt.
 - d. Bill ran into trouble.

Sentences as those in (91) involve entailments. Suppose that (91b) were true. Then, there must be some time at which Bill was not in the library and a subsequent time at which he was in the library. An analogous entailment can be shown to hold for the other sentences in (91). Notice that a sentence such as *Bill ran along the river* carries no such entailment; being *along the river* does not come about as a result of Bill's running.

Into NP specifies a state which some element is in. This element is, in many instances, specified by some other NP in the sentence. In the cases above, it is the subject. However, it could be the object, as shown below:

- (92) a. Bill sent Mary into the house.
 b. Bill sent Mary into the library.
 c. Bill sent Mary into debt.
 d. Bill sent Mary into trouble.

Moreover, it presupposes that the element in the specified state (*in the house* for the sentences 93b-e) was not previously in the specified state (93a):

- (93) a. Bill was not in the house. *previous to when (b) first became true*
 b. Bill ran into the house.
 c. Bill did run into the house.
 d. Did Bill run into the house?
 e. Bill, run into the house!

While similar paradigms can be given for the other sentences in (91) and (92) above, no such change can be specified for the sentences with *along the river*.

3.4 An Analysis of Medial Prepositions

A class of prepositions and their associated verbs that bears closer examination are the medial prepositions. The medial class of prepositions includes

beyond, through, past, over, via and *across*. Their verbal counterparts include *cross, pierce* and *pass*. In the locational use of these medial prepositions and verbs, as in (94a-f) and (95a-c), the reference location appears to describe a segment corresponding to a medial phase of the occurrence of change.

- (94) a. Mike walked *beyond* the mailbox.
b. Jean-Yves crawled *through* the tunnel.
c. Stefan drove *past* the billboard.
d. The plane flew *over* the mountain.
e. The train arrived in Toronto *via* Kingston.
f. The ball rolled *across* the table.
- (95) a. Why did the chicken *cross* the road?
b. Connie *passes* the bookstore every morning.
c. The pencil *pierced* the poster.

A localistic analysis typically claims that in (96), because the forest itself constitutes a segment, and because it appears between the Source and the Goal, it must be a third basic type of segment, the Internal Path (medial).

- (96) Little Red Riding Hood ran from her house through the forest to her Grandmother's house.

Does this kind of evidence support the claim that the tripartite division of localism is necessary in the aspectual system? I believe the answer is no: the label 'medial' should not be misinterpreted as evidence for a third, intermediate phase. Event Mereology's bipartite divisions, the distinguished points, are quite capable of explaining these medial prepositions. Begin first by examining the non-spatial uses of the same prepositions (97a-f) and verbs (98a-c). The standard argument against the medial parameter, that of abstract domains not having intermediate paths, is usable here to a certain degree.

- (97) a. Why Mike did certain things is *beyond* human comprehension.
b. Jean-Yves went *through* law school on a scholarship.
c. Stefan worked *past* five o'clock.
d. Sara spends way *over* her budget.
e. I learned of Quentin's arrival *via* gossip.
f. Brian got his point *across* (to Mary).
- (98) a. Why did Ian's antics *cross* the line?
b. Connie *passed* her exam.
c. The cunning detective *pierced* the deception.

However, certain examples are not so clear, as in (97b), where one can conceive of *law school* as an intermediate stage. The question of being medial or not seems to be part of one's world knowledge, and not necessarily part of the grammar. Consider (99) and (100). The (99a) and (100a) examples may be construed as instantaneous, whereas (99b) and (100b) cannot be instantaneous, given our world knowledge of what constitutes an activity of *walk* (discussed previously) and the time it takes to cross a town (as opposed to a line):

- (99) a. Mike stepped beyond the mailbox.
b. Mike walked beyond the mailbox.
- (100) a. The chicken crossed the line.
b. The chicken crossed the town.

The rest of this section will show how Event Mereology addresses such apparent intermediate stages. I will argue that 'medial' verbs and prepositions like *cross* and *through* also divide continua into two by means of a distinguished point, and fit into the overall aspectual system of verbs like *land*, *enter*, and *leave*, or prepositions like *on*, *into* and *off (of)*. As before, a change of state involves a proposition and its negation (s and $\neg s$), except medials possess an additional axial specification that may apply in certain contexts. I show my analysis below.

3.4.1 Medial Prepositions

I propose that prepositional phrases with medial prepositions should not be treated differently from other prepositions we have examined so far, since medial prepositions also partition their continua into two. The major difference is that the notion of an axis is inherent in medial prepositions, and the effect of having an axis is clearest in the spatial domain. As Jackendoff & Landau (1992) and Talmy (1983) *inter alia* have pointed out, the medial class of spatial descriptions involve an axis and movement from one side of the axis to the other. This axis could be intrinsic to the reference object, such as the vertical axis in the body (101a) or the

center line of a river (101b). An object without an intrinsic axis, e.g., *a crop circle*, could be construed to possess one (101c):

- (101) a. The ant crawled across Mick's chest .
 b. The guard crossed the river.
 c. The farmer drove his tractor across the crop circle.

In Event Mereology, *through* defines two regions based on the meaning of its predicate, like *in* or *near* do. *The forest* in *through the forest* has the exact same function as *the house* does in *near the house*: the reference object provides a source of real-world reference; the two abstract halves of the change of state (*s* and $\neg s$) are mapped onto denotations in the world. For example, the locational use of *through* bisects space into two: a segment *distal* or opposite from the object's original location (e.g., the state of being in a location on the other side of the forest) and a segment *proximal* to the object's original location (i.e., the state of not being in a location on the other side of the forest). In other words, the *Through(x,y,t)* relation can be used by a distinguished point to demarcate two segments. Reconsidering (94a-f), those sentences of change would involve the pairs of states given in (102a-f).

- (102) a. *source* Mike was in the space on one side of the mailbox
goal Mike is in the space on the other side the mailbox
- b. *source* Jean-Yves was in the space on one side of the tunnel
goal Jean-Yves is in the space on the other side of the tunnel
- c. *source* Stefan was in the space on one side of the billboard
goal Stefan is in the space on the other side of the billboard
- d. *source* The plane was in the space on one side of the mountain
goal The plane is in the space on the other side of the mountain
- e. *source* The train was in the space on one side of Kingston
goal The train is in the space on the other side of Kingston
- f. *source* The ball was in the space on one side of the table
goal The ball is in the space on the other side of the table

Of course, it is evident that a certain crucial element is missing from the semantic decomposition above: for these verbs of motion, the manner in which the motion is performed must also be part of the meaning. For example, to go *through the tunnel* means the subject must have been in the tunnel during his motion. *Through* is differentiated from *across*, in that *through* contains information that the trajectory was enclosed in a three-dimensional manner for at least some part of the motion, whereas for *across*, some sort of horizontal two-dimensional planar surface with a central dividing line is involved.

An example is *across the sea*, where the surface of the sea is identified along with a central axis. In (103a-c), it is illustrated that, regardless of whether travel was through the air, on the surface of the ocean, or under the water, the route itself spans two parts of the sea divided down the middle. The idea of horizontality of the plane defined by *across* is supported by the unacceptability of (103c) in the context where the shark swam vertically from the surface of the sea to the ocean floor; *across* cannot describe a vertical descent or ascent.

- (103) a. The airplane flew across the sea.
b. The ocean liner sailed across the sea.
c. The shark swam across the sea.

Thus, medial prepositions are very much like other prepositions discussed earlier. There are always two segments of space delineated by a spatial preposition, and the reference object guides the projection of regions which may or may not overlap the reference object. The 'medial' prepositions in fact do not require a medial phase in their lexical specification, as a tripartite analysis would suggest; spatial medial prepositions perform the standard bisection of space as other spatial prepositions do. However, we do need to look into the role of the axis in more detail below; but first, let us summarize the representations of non-medial prepositions and verbs.

3.4.2 Representing Prepositions and Verbs

3.4.2.1 Representing Prepositions

When representing prepositions that indicate background location or a state that remains throughout the time of the occurrent, the following predicates and their valuations may be assumed for the prepositions chosen as examples in (104a-h).

Below, $v(P)$ returns the binary valuation of the predicate P at time t :

(104)	<i>preposition</i>		
a.	in	$v(\text{In}(x,y,t)) = 1$	He stood in the arena.
b.	on	$v(\text{On}(x,y,t)) = 1$	He stood on the balcony.
c.	at	$v(\text{At}(x,y,t)) = 1$	He stood at the door.
d.	near	$v(\text{Near}(x,y,t)) = 1$	He stood near the door.
e.	outside	$v(\text{In}(x,y,t)) = 0$	He stood outside the arena.
f.	off (of)	$v(\text{On}(x,y,t)) = 0$	He stood off the balcony.
g.	away from	$v(\text{At}(x,y,t)) = 0$	He stood away from the door.
h.	far from	$v(\text{Near}(x,y,t)) = 0$	He stood far from the door.

As (104h) shows, *far from* is the opposite of *near*. Note however that *away from* might also be argued to be the opposite of *near* as well as *at*, there being no significant difference between *not at* and *not near*. I see no appreciable difference. One explanation for *away from* encompassing both specifications could be that *at* and *near* are different only by the quality of proximity: *at* is close enough to indicate terminativity (as are *in* and *on*), whereas *near* cannot provide terminativity. The negated regions of *at* and *near* do not have any impact on terminativity. Lacking this distinction, then, these negated regions are functionally equivalent, and *away from* can be used as the negation of both *near* and *at*.

The prepositions of change, *into*, *onto*, and *to* and their inverses *out of*, *off (of)*, and *from* are linked with the presence of a distinguished point that divides their associated spreads into two portions. Note that the inverses also appear to be usable as states, as was shown above. The cases of *towards* and its inverse *away from* also fit into this general scheme. The corresponding prepositions and predicates, when used to indicate a change of state, are shown in (105).

(105)	<i>preposition</i>	<i>time₁</i>	<i>time₂</i>
a.	into	$v(\text{In}(x,y,t_1)) = 0$	$v(\text{In}(x,y,t_2)) = 1$
b.	onto	$v(\text{On}(x,y,t_1)) = 0$	$v(\text{On}(x,y,t_2)) = 1$
c.	to	$v(\text{At}(x,y,t_1)) = 0$	$v(\text{At}(x,y,t_2)) = 1$
d.	towards	$v(\text{Near}(x,y,t_1)) = 0$	$v(\text{Near}(x,y,t_2)) = 1$
e.	out of	$v(\text{In}(x,y,t_1)) = 1$	$v(\text{In}(x,y,t_2)) = 0$
f.	off (of)	$v(\text{On}(x,y,t_1)) = 1$	$v(\text{On}(x,y,t_2)) = 0$
g.	from	$v(\text{At}(x,y,t_1)) = 1$	$v(\text{At}(x,y,t_2)) = 0$
h.	away from	$v(\text{Near}(x,y,t_1)) = 1$	$v(\text{Near}(x,y,t_2)) = 0$

These prepositions of change are built from the simple predicates $\text{In}(x,y,t)$, $\text{On}(x,y,t)$, and $\text{At}(x,y,t)$. To simplify the representations of these prepositions, we can represent the two temporally ordered valuations with the notations below. The notation $v\langle P \rangle = \langle a,b \rangle$ means that the earlier valuation of P is a , and the later valuation of P is b . Given our assumptions about distinguished points demarcating adjacent and complementary states, it will be the case that a is derived as the negation of b .

(106) a.	$\text{Into}(x,y,t_1,t_2)$:	$v\langle \text{In}(x,y,t) \rangle = \langle 0,1 \rangle$
b.	$\text{Onto}(x,y,t_1,t_2)$:	$v\langle \text{On}(x,y,t) \rangle = \langle 0,1 \rangle$
c.	$\text{To}(x,y,t_1,t_2)$:	$v\langle \text{At}(x,y,t) \rangle = \langle 0,1 \rangle$
d.	$\text{Towards}(x,y,t_1,t_2)$:	$v\langle \text{Near}(x,y,t) \rangle = \langle 0,1 \rangle$
e.	$\text{OutOf}(x,y,t_1,t_2)$:	$v\langle \text{In}(x,y,t) \rangle = \langle 1,0 \rangle$
f.	$\text{OffOf}(x,y,t_1,t_2)$:	$v\langle \text{On}(x,y,t) \rangle = \langle 1,0 \rangle$
g.	$\text{From}(x,y,t_1,t_2)$:	$v\langle \text{At}(x,y,t) \rangle = \langle 1,0 \rangle$
h.	$\text{AwayFrom}(x,y,t_1,t_2)$:	$v\langle \text{Near}(x,y,t) \rangle = \langle 1,0 \rangle$

3.4.2.2 Representing Verbs

Verbs of change are essentially represented in the same way as prepositions of change. (107a-h) show the representations of eight classes identified in A&S. Also based on other observations and hypotheses discussed earlier in this thesis, we can add several new classes. The imperative of a verb S is achievement-like, and looks like (107i). Also, if we use $\text{For}(x,y,t)$ to represent x having intention to do or possess y , then we can capture the meaning of *deviate* as (107j):

(107)	<i>verb</i>	
a.	Enter	$v\langle \text{In}(x,y,t) \rangle = \langle 0,1 \rangle$
b.	Land	$v\langle \text{On}(x,y,t) \rangle = \langle 0,1 \rangle$
c.	Arrive	$v\langle \text{At}(x,y,t) \rangle = \langle 0,1 \rangle$
d.	Approach	$v\langle \text{Near}(x,y,t) \rangle = \langle 0,1 \rangle$
e.	Exit	$v\langle \text{In}(x,y,t) \rangle = \langle 1,0 \rangle$
f.	Take-off	$v\langle \text{On}(x,y,t) \rangle = \langle 1,0 \rangle$
g.	Leave	$v\langle \text{At}(x,y,t) \rangle = \langle 1,0 \rangle$
h.	Distance-from	$v\langle \text{Near}(x,y,t) \rangle = \langle 1,0 \rangle$
i.	verb <i>S</i> as an imperative	$\langle S(x,y,t) \rangle = \langle 0,1 \rangle$
j.	Deviate	$v\langle \text{For}(x,y,t) \rangle = \langle 1,0 \rangle$

3.4.3 Axes and Medial Prepositions

We cannot simply construct the representation of medial prepositions compositionally from contrasting values of spatial relations as we do for *into*, *onto*, and *to* above. Medial prepositions differ from prepositions like *into* and *out of* in that they require an axial component; otherwise, we cannot distinguish a preposition like *into* from *through*, since they both involve the semantics of being *in* and motion. The axial component must be incorporated somehow, while preserving the bipartitioning property of prepositions.

It was shown in §3.4.1 that prepositions like *across* and *through* involve being in one region and change to the opposite region. How should *Through(x,y,t)* and other medial predicates be decomposed into simpler predicates? I propose that *Opposite(x,y,t)* expresses the relation we desire best: *x* is on the opposite side of the axis of *y* at time *t*. In a binary deictic space, the satisfaction of *Opposite(x,y,t)* would situate the object separate from the observer's location or perspective (for a state of affairs) or the object's original location or state (for a change of state). Then, we can represent the medial prepositions and verbs of change partially as follows (108a-i):

(108)	a.	<i>beyond</i>	$v\langle \text{Opposite}(x,y,t) \rangle = \langle 0,1 \rangle$
	b.	<i>through</i>	$v\langle \text{Opposite}(x,y,t) \rangle = \langle 0,1 \rangle$
	c.	<i>past</i>	$v\langle \text{Opposite}(x,y,t) \rangle = \langle 0,1 \rangle$
	d.	<i>over</i>	$v\langle \text{Opposite}(x,y,t) \rangle = \langle 0,1 \rangle$
	e.	<i>via</i>	$v\langle \text{Opposite}(x,y,t) \rangle = \langle 0,1 \rangle$
	f.	<i>across</i>	$v\langle \text{Opposite}(x,y,t) \rangle = \langle 0,1 \rangle$
	g.	<i>cross</i>	$v\langle \text{Opposite}(x,y,t) \rangle = \langle 0,1 \rangle$
	h.	<i>pass</i>	$v\langle \text{Opposite}(x,y,t) \rangle = \langle 0,1 \rangle$
	i.	<i>pierce</i>	$v\langle \text{Opposite}(x,y,t) \rangle = \langle 0,1 \rangle$

But how are these verbs distinguished from one another? It appears that dimensionality plays a significant role in differentiating the various medial prepositions and verbs. We can also decompose *Through(x,y,t)*, a complex predicate, into a combination of simpler predicates, as we did with *Into(x,y,t)* for prepositions of change, but introduce dimensionality as well. Examples will be drawn mostly from spatial data, where the distinctions are most necessary.

We need to situate the axis of the reference object in space: the axis can form a plane that extends through a three-dimensional space (for *through*) or a line on a planar surface (for *across*), for example. The axis must satisfy a spatial relation: for instance, *through* requires motion to be associated with being *in* the reference location (three-dimensional); *across* requires a plane (two-dimensional) to be traversed, and that fits best with the predicate *On*, which defines a surface. *At* indicates a line, with a point acting as an axis. *Near* is similar to *At*, except the line does not pass through reference object, but in the space close to it. (109a-d) lists these predicates and the medial verbs and prepositions most likely to be associated with them.

(109)	a.	In(x,y,t)	through, pierce
	b.	On(x,y,t)	across, cross, over
	c.	At(x,y,t)	via
	d.	Near(x,y,t)	past, pass, beyond

The prepositions *beyond* and *past*, and the verb *pass* have been classified as involving the *Near* predicate, since the data below suggest that the subject need not go through the reference object, but merely close enough. In (110a), it is not required that the bridge be crossed; the bridge only serves as a reference that establishes the axis. (110b) definitely does not allow the reference object to be on the route of the swimming action. While (110c) functions the same as in (110a), (110d) is a case where one might argue that the predicate *At* is involved, since Sam must handle the cookies and so the cookies might be *at* Sam at some point.

However, since *pass* is a cognate of *past*, I am inclined to attribute *pass* with the same semantics as its prepositional counterpart, i.e., involving *Near*.

- (110) a. Sam walked beyond/past the bridge.
b. Sam swam beyond/past the island.
c. Sam passed the bridge.
d. Sam passed the cookies (to Mary).

Let us examine some non-spatial uses of these prepositions. Recall that the distinguished point forms a boundary for a state of change. In (111a), the preposition *at* indicates that *the inescapable conclusion* has come into being, or is confirmed. With medial prepositions, the abstract use also indicates a change: *the evidence* in (111b) has been examined (in part or in whole), just as in (111c) *the book* has had its pages turned (and read) in part or in whole. The objects *the evidence* and *the book* are boundaries here as well, things that must be engaged in some part by the action performed. There can also be a temporal use of these medial prepositions, as shown in (111d,e). *Past* can indicate a point in time that must be passed (111d), or a stretch of time (111e); both are boundaries, and the subject must continue its action (*living*) from one side of the temporal boundary to the other.

- (111) a. Fred arrived at the inescapable conclusion (via logic).
b. Fred went through the evidence.
c. Fred leafed through the book.
d. Fred lived past age eighty.
e. Fred lived through World War II.

3.4.3.1 Internal Axis and Object Axis Readings

The exact nature of the axis needs to be addressed. There are two possibilities: either the internal axis of the object itself is relevant, or the object itself may act as the axis (or a point of reference for establishing the bisecting axis). For example, in (112a), *Mick's chest* has a natural axis, i.e., the central line dividing his chest into a left and right side. The entire motion in this case takes place entirely on the reference location: the ant does not leave Mick's chest. This will be called the

internal axis reading. In contrast, *the river* in (112b) guides the bisection of space into two, say a river's north and south shores, in the case where *the guard* begins and ends his movement on one shore or the other. This is called the *object axis reading*. Of course, in the scenario where he remains in the water the whole way through his motion, the internal axis reading obtains.

- (112) a. The ant crawled across Mick's chest (from the left side to the right).
b. The guard crossed the river (from one shore to the other).

In the internal axis reading, the entire occurrent's spread must be contained within the reference object. In (112a) above, *Mick's chest* must contain the whole of the ant's path of crawling. Thus, if *e* is the occurrent, then for the internal axis reading, *spr[e]* must be a subpart of the spatial extent of the reference object, and the axis is the inner axis of the reference object, and it acts as a distinguished point in a change of state. Another way of saying this is, the distinguished process part of the activity or accomplishment occurs entirely within the reference object.

For the object axis reading, the reference object itself is construed as the axis: it is idealized into a line. In the object axis reading of (112b), *the river* is idealized thusly, and there is no restriction on the spread of the occurrent. A motion is still a binary change, and the distinguished point is the reference object. Notice that the object axis interpretation makes no claim about the spatial relationship between the object and the spread of the occurrent, but only that the object has a role as axis. Thus, Jean does not have to have been in contact with the table in the object axis interpretation below:

- (113) Jean jumped across the table.

Some medial prepositions used with states are given in (114a-d). In these uses, the object axis reading obtains. In (114a), for instance, Jean is not sitting on the table, so the internal axis reading does not obtain. The subject occupies the $v(\text{Opposite}(x,y,t))=1$ side, as illustrated in (115), where the eye represents the

speaker's point of view, and the man indicates the object that occupies the opposite side:

- (114) a. Jean sat across the table.
b. The village is through the forest.
c. Gilbert stood beyond the bed.
d. I live past the pharmacy.

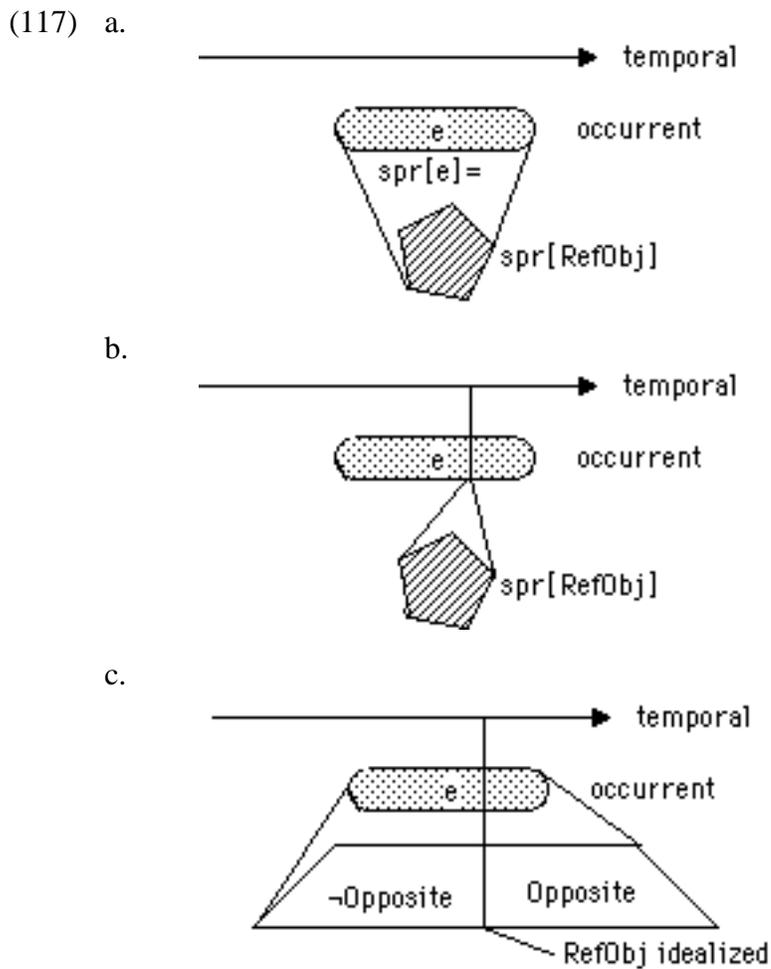
(115)



Certain prepositions in combination with the right verbs do produce states with the internal axis reading. These are states for which an object is in contact with or occupies both sides of a single object at the same time. Examples are given in (116a-c). Note, however, that certain prepositions do not permit both kinds of readings. For example, *athwart* (116c) can only be used when the object occupies both sides of the axis. Contrast it with *beyond* and *past* (116d,e), which do not permit an object to occupy both sides of the axis at the same time; the object must occupy the opposite side, if a state, or be involved in a motion. For an object to be *past* something, the object must occupy the space on the other side of the boundary from its original location (for a state), or end up on the other side (for a change of state). In (116e), the pharmacy divides space into two by acting as an axis, rather than confining the spread of the occurrent to its own spatial extent. The internal axis reading is not permitted: (116e) cannot mean that I live within the pharmacy. It may be the case that prepositions which are neither 2-dimensional nor 3-dimensional (i.e., 0-dimensional medial prepositions like *beyond* and *past*) do not have sufficient internal structure to accommodate an internal axis, and are restricted to an object axis interpretation.

- (116) a. The body lies across the table.
 b. The tunnel runs through the mountain.
 c. I stood athwart the table. (on both sides of the table)
 d. *Gilbert lay beyond the bed. (on both sides of the bed)
 e. *I live past the pharmacy. (on both sides of the pharmacy)

For the internal axis reading, the entire spread of the occurrent, $spr[e]$, must be a part of the spread of the reference object, $spr[RefObj]$, as shown in (117a). The pentagon represents the reference object's spatial extent. For the object axis reading, it is the case that the spatial extent of the reference object is idealized into a boundary with zero length; $spr[RefObj] = 0$, as in (117b). The idealized boundary is then used to divide up the remaining spatial continuum into two parts, *Opposite* and \neg *Opposite* (117c).



I theorize that the internal axis reading and the object axis reading are controlled by two axis specifications, [I-AXIS] and [O-AXIS], respectively. Prepositions may be specified for one or the other, or underspecified for either, depending on whether they allow the internal or object axis readings, or both. (118) summarizes some of the prepositional specifications.

- (118) [I-AXIS] - *athwart*
 [O-AXIS] - *past, beyond, via*
 underspecified - *across, through*

3.4.3.2 Dimensionality and Axes

Dimensionality plays a role in the internal axis and object axis difference. Recall that we have associated the prepositions with certain basic prepositional predicates like $In(x,y,t)$ for *through*. These predicates find their use as follows. In the object axis reading, it need only be true that at some point during the occurrent, the subject be true for the predicate associated with that preposition.

For example, for the object axis reading of (119), at some point t , *John* must satisfy $v(John, the\ tunnel, t)=1$, to signify that he has been in the tunnel for at least a moment. Since John could have been outside the tunnel when he started and when he finished, he does not need to be in the tunnel for the entire spell of the occurrent.

- (119) John walked through the tunnel.

In comparison, the internal axis reading of (119) requires that John be inside the tunnel for the entire spell of the occurrent. For all intervals t , where t is a part of the spell of the occurrent e , *John* must satisfy the predicate $v(John, the\ tunnel, t)=1$, to signify that he has been in the tunnel for the entire event. Let us represent prepositions used in changes as follows:

- (120) a. *through* $v\langle Opposite(x,y,t) \rangle = \langle 0,1 \rangle$
 $\& \{ / t, t \quad spl[e]: v(In(x,y,t)) = 1 \}$
- b. *across* $v\langle Opposite(x,y,t) \rangle = \langle 0,1 \rangle$
 $\& \{ / t, t \quad spl[e]: v(On(x,y,t)) = 1 \}$

- c. *via* [O-Axis] $v\langle\text{Opposite}(x,y,t)\rangle = \langle 0,1\rangle$
& { t, t spl[e]: v(At(x,y,t)) = 1 }
- d. *past* [O-Axis] $v\langle\text{Opposite}(x,y,t)\rangle = \langle 0,1\rangle$
& { t, t spl[e]: v(Near(x,y,t)) = 1 }
- e. *athwart* [I-Axis] $v\langle\text{Opposite}(x,y,t)\rangle = \langle 0,1\rangle$
& { t, t spl[e]: v(On(x,y,t)) = 1 }

3.4.3.2.1 Via

Let us examine a specific preposition (*via*) briefly, to see how well it fits within a biphasic analysis. Bennett (1970) suggested that *via* is the simplest medial preposition (i.e., 0-dimensional), without the dimensional properties that *through* (3-dimensional) and *across* (2-dimensional) have. The reference object of *via* is used as a point on the spread of the occurrent that is intermediate between the two complementary spaces, much like *through* and *across*.

For example, in (121), *Scarborough* helps determine the route of arrival: at first, *Mario* was someplace not here, then he came here, and on his way he passed through Scarborough. His origin must be on the opposite side of Scarborough from his destination. The reference object of *via* is not the entire spread of the occurrent, but is a proper subsegment of the spread, and the subject *Mario* must have been *at Scarborough* at some point during the occurrent, as determined by the semantics of *via* given earlier in (120c).

(121) Mario arrived here via Scarborough.

Via, then, is more flexible than tripartite localistic analyses may lead one to believe. A&S's analysis would assume *via* to be purely medial (Internal Path), i.e., non-overlapping with Source nor Goal. But as (122a,b) illustrate, the medial segment *the backyard* can either be adjacent to the Goal *the house* (122a), or *the kitchen* can be a proper subpart of the Goal *the house* (122b). Clearly, (122b) violates the condition of non-overlap required for the tripartite analysis. Thus, a localistic analysis would need to be modified to account for the *via* data below. In

contrast, Event Mereology's account of *via* in (120c) needs only *at* the reference object to be true at some point during the spell of the occurrent. Both (122a) and (122b) satisfy the given condition, since *Mario* was *at the backyard* and *at the kitchen* during the respective occurrents.

- (122) a. Mario entered the house via the backyard.
b. Mario entered the house via the kitchen.

3.4.3.2.2 Verbs of Extension

A set of data to consider are the *verbs of extension*, which include *extend*, *span*, and *run*. These verbs involve 'virtual change'. Talmy (1983) notes that stationary linear figures that span both sides of the reference object (once the sides are determined by the selection of an axis) are sometimes incompatible with a stationary (non-motional) verb like *lie*. (123a,b) are fine if the intended meaning is total containment of the object in the segment of space beyond the rock (123a), or the segment of space beyond the tube (123b), but they are ill-formed when the whole of the object extends over both segments of space.

- (123) a. *The snake lay past the rock.
b. *The snake lay through the tube. (Talmy 1983, 11d,e.iii)

However, when a motional verb such as *run*, *extend*, or *go* is used, one can consider one edge of the linear object to be the virtual object, which undergoes virtual movement from one end to the other. Those prepositions which cannot be used with static verbs can be used with these kinds of verbs (124a,b). Similarly, for verbs of perception, the focus of one's perception becomes the object and follows the linear object from one end to the other, also feigning motion (124c):

- (124) a. The railway *extends* through the tunnel.
b. That yellow brick road *runs* past the Emerald City.
c. The thief *looked* through the window.

3.4.4 Summary of Prepositions and Verbs

The Event Mereology analysis of change establishes an inviolable connection between the initial and final states through complementarity. I follow Gruber (1976) in assuming that verbs incorporate prepositional (and other) meanings into their own meaning. Under the EM analysis, a single spatial relation S can be used to create at most two verb classes of change: $v\langle S(x,y,t)\rangle = \langle 0, I \rangle$ or $v\langle S(x,y,t)\rangle = \langle I, 0 \rangle$, not including their use with $Opposite(x,y,t)$. Mismatches are no longer an issue, since every spatial relation creates two and only two segments that are correlated to two phases that encode change. Thus, to keep the number of change of location verb classes down to a size that reflects the data, we need only limit the number of spatial relations, since each relation adds a maximum of two verb classes.⁴⁵

Recall that *at*, *on* and *in* are 0-, 2-, and 3-dimensional, respectively. We can represent these as $At(x,y,t)$, $On(x,y,t)$, and $In(x,y,t)$ with valuations of 1, and define *away from*, *off (of)* and *out of* with these same relations, except the valuations are 0. Prepositions of change are also built out of these dimensional prepositions as well: *to/from*, *onto/off (of)*, and *into/out of*. There is also the $Near(x,y,t)$ relation, for *near/far from* and their verbal counterparts, *approach/distance (oneself) from*. Dimensional counterparts of 'medial' prepositions also appear: *via*, *across*, and *through*. Table (125) below shows the correlation between the nine classes used in A&S with their specifications under EM, and the corresponding prepositions in English. (125i) also suggests that three other kinds of verb classes for verbs with medial polarity with different spatial properties exist, and indeed some such verbs (and corresponding prepositions) exist in English and French, and form classes

⁴⁵Other kinds of axes may be relevant as well, such as the vertical axis (for prepositions like *over/under*). How these other axes interact with the biphasic analysis are omitted from the present discussion, since the range of data is quite large. These and other related phenomena, such as *all over* and *(all) throughout*, may be interesting to examine in a future paper.

A&S do not account for (125j-l). I also include the analyses for the imperatives and *deviate*, in (125m-n):

(125) final polarity

- | | | | |
|----|-----------------------------|-------------|---|
| a. | S'Approcher/Approach | <i>near</i> | $v\langle \text{Near}(x,y,t) \rangle = \langle 0,1 \rangle$ |
| b. | Arriver/Arrive | <i>to</i> | $v\langle \text{At}(x,y,t) \rangle = \langle 0,1 \rangle$ |
| c. | Se poser/Land | <i>onto</i> | $v\langle \text{On}(x,y,t) \rangle = \langle 0,1 \rangle$ |
| d. | Entrer/Enter | <i>into</i> | $v\langle \text{In}(x,y,t) \rangle = \langle 0,1 \rangle$ |

initial polarity

- | | | | |
|----|---------------------------------|------------------|---|
| e. | S'éloigner/Distance-from | <i>far from</i> | $v\langle \text{Near}(x,y,t) \rangle = \langle 1,0 \rangle$ |
| f. | Partir/Leave | <i>away from</i> | $v\langle \text{At}(x,y,t) \rangle = \langle 1,0 \rangle$ |
| g. | Décoller/Take-off | <i>off of</i> | $v\langle \text{On}(x,y,t) \rangle = \langle 1,0 \rangle$ |
| h. | Sortir/Exit | <i>out of</i> | $v\langle \text{In}(x,y,t) \rangle = \langle 1,0 \rangle$ |

medial polarity

- | | | | |
|----|---------------------------|-----------------|--|
| i. | Passer (par)/Cross | <i>across</i> | $v\langle \text{Opposite}(x,y,t) \rangle = \langle 0,1 \rangle \ \& \ \{ / \ t, t \ \text{spl}[e]: v(\text{On}(x,y,t))=1 \}$ |
| j. | Côtoyer/Skirt | <i>around</i> | $v\langle \text{Opposite}(x,y,t) \rangle = \langle 0,1 \rangle \ \& \ \{ / \ t, t \ \text{spl}[e]: v(\text{Near}(x,y,t))=1 \}$ |
| k. | Passer/Pass | <i>past, by</i> | $v\langle \text{Opposite}(x,y,t) \rangle = \langle 0,1 \rangle \ \& \ \{ / \ t, t \ \text{spl}[e]: v(\text{At}(x,y,t))=1 \}$ |
| l. | Transpercer/Pierce | <i>through</i> | $v\langle \text{Opposite}(x,y,t) \rangle = \langle 0,1 \rangle \ \& \ \{ / \ t, t \ \text{spl}[e]: v(\text{In}(x,y,t)) = 1 \}$ |

other

- | | | |
|----|--------------------------------|--|
| m. | verb <i>S</i> as an imperative | $v\langle S(x,y,t) \rangle = \langle 0,1 \rangle$ |
| n. | Dévier/Deviate | $v\langle \text{For}(x,y,t) \rangle = \langle 1,0 \rangle$ |

3.4.5 Metarelations

Let us look more closely at the representation of the prepositions, such as *In(x,y)* and *On(x,y)*, and how they can be extrapolated for use in abstract contexts.

Consider the following sentences:

- (126) a. Bill remained in the room.
 b. Bill remained in debt.
 c. Bill remained in love.
 d. Bill remained happy.

The verb *remain* takes a PP complement in (126a-c), and a AP in (126d). In (126a), the preposition *in* takes a concrete NP as its complement, denoting a location *L*, contrasting with (126b,c) where the NP complement is abstract, denoting a state *S*,

like *debt* and *love*. The question arises as to how the physical characteristics associated with the locational use of *in* can be invoked when the complement is concrete, and omitted when the complement is an abstract entity.

In other words, the relevant predicate P involves some subject x in a specific relationship with the NP complement y . Here, y may either a nominal denotation of a state S or a physical object N . For the former, x possesses the state S (for prepositions with a positive polarity, like *in*) or lacks it (prepositions with a negative polarity, like *out of*); for the latter, x does not possess the physical object N , but rather denotes a region of space around the reference location N , as discussed in Chapter One.

Likewise consider the following examples, which show that other locational prepositions also lose their strictly spatial interpretations with abstract NPs denoting a state S . In (127b), Bill is not in a state of self-control; in (127d), Bill is in a state of ease.

- (127) a. Bill is out of the room.
 b. Bill is out of control.
 c. Bill is at the park.
 d. Bill is at ease.

Let us posit that prepositions with locative use are metarelations of the form $R_z(x,y)$, where x is the subject, y is the prepositional object, R is the metarelation for the preposition z (e.g., R_{in} is the metarelation for the preposition *in*). If y is a physical location, the metavariable defaults to the spatial relation indicated by z , e.g., $R_{in}(Bill,the\ room)$ becomes $v(In(Bill,the\ room))=1$. If y is a nominal denotation of the state S , then the metarelation $R_z(x,y)$ is equal to the state $S(x)$, e.g., $R_{in}(Bill,debt)$ becomes $debt(Bill)$. Note that the polarity of the preposition is still determined by the valuation of the predicate; for instance, *out of control* is represented by the relation $R_{out-of}(x,control)$, which is equivalent to $v(R_{in}(x,control))=0$.

The same metarelations are used in the verbal representations as well. Consider *enter*: *Law school* in (128a) is a concrete place, and in (128b) it denotes

the abstract state of being enrolled in a law program. The location-specific properties of *enter* are neutralized; i.e., the lexical entry of *enter* also uses the metarelation $R_{in}(x,y)$ to permit both the locational and abstract interpretations. Thus, all the lexical entries discussed earlier use metarelations (R_{in} , R_{on} , $R_{opposite}$, etc.) instead of bare spatial relations (*In*, *On*, *Opposite*, et al.).

- (128) a. Bill entered the law school building.
b. Bill entered law school.

3.5 Summary

In this chapter, we have argued for the utility of two modes, *change of state* and *state of change*, in the system of aspect. It has been shown that such frameworks as Pustejovsky (1991) that use agentivity to distinguish between accomplishments and achievements cannot capture all the data, and that it is the presence or absence of a distinguished process that differentiates the two aspectual classes. I have also shown that spatial and non-spatial prepositions can be unified under a single aspectual analysis, just as spatial and non-spatial verbs of change can be unified. Medial prepositions were shown to be analyzable without positing an intermediate path element between source and goal, as would be required under a localistic analysis. Instead, medial prepositions are specified for a distinguished point, in addition to an axial element unique to that class of prepositions. Finally, the use of metarelations allows for specifically spatial components of the prepositions to be unactivated in a non-spatial context.

Chapter Four

Compositionality in Event Mereology: Achieving a Unified Analysis

4.0 Introduction

In this chapter, I will consider additional data on aspectual compositionality. I begin with an analysis of resultatives in the Event Mereology framework. Empirical data on the use of negation, *almost*, and the effects of aspectual morphemes like *-ed* and *-ing* in English will be discussed, and followed by a more in-depth look at the interactions of prepositional phrases and verbs.

To reiterate, the basic idea is that simple clauses may express a state, process (activity), occurrence (achievement) or development (accomplishment). This chapter focuses on developments, which are pairings of processes with changes. Simple clauses may express a development either through a simple lexical item (e.g., *build*) or through a syntactically complex structure comprised of a process verb followed by a prepositional or adjectival phrase (e.g., *run into the house*, *wipe clean*, respectively).

I examine a set of spatial phenomena in §4.3, focusing on the application of Event Mereology principles to spatial motion. While our ultimate goal is to unify spatial and non-spatial changes in one theory, it remains important that EM is still able to account for the range of spatial data with the mechanisms available.

4.1 Resultatives

4.1.1 Representing Resultatives: ES vs. EM

In simple terms, a resultative is a process that leads to an endstate. With the resultative, there is a systematic type shifting from a state of change to a change of state. A resultative, like (1), has a process verb *hammer (something)*, as well as an endstate like *flat*.

- (1) Mary hammered the metal flat.

I argue that when used in English resultative constructions, adjectives (e.g., *red, ill, flat*) and prepositional particles (like *up, down, away*; so-called *bounders* in Bybee & Dahl 1989) are analyzed as predicates associated with distinguished points, which are always accomplishment-like in that there is an activity that leads to a resultant state *s*. Any such state *s*, defined by an adjectival or prepositional proposition, can be endstate correlated with a distinguished point on an event. Like any other distinguished point, there are two phases defined on the occurrent, which are correlated with two spreads on the relevant continuum. The spreads are defined by the binary valuations of *s*, with $\neg s$ being derived from the specified *s*. As always, two such complementary and adjacent valuations of the same predicate give us a change of state, represented in EM by *dT*, the distinguished point.

For example, *V+P* and *V+Adj* (2a,b) appear to always have resultative meaning. For example, in (2a), the table began in upright position, but as a result of the pushing action became no longer upright. Likewise in (2b) the table was originally not clean, but then as a result of the wiping action becomes clean. That is a clear example of a change of state, going from a state of being *not clean* to *clean*. The resultative can have an abstract interpretation, as (2c,d) show. However, verbs in the resultative construction are not permitted in English, as (2e-g) illustrate. The exception appears to be in cases of gerunds embedded in a PP, as in (2h), where the gerund is interpreted as a process. Such mediation by prepositional phrases bars such sentences from being classified as true English *V+V* resultatives, being no different from a standard resultative like (2i).

- | | | | |
|-----|----|---|--------------------------|
| (2) | a. | John pushed the table over. | (<i>V+P</i>) |
| | b. | John wiped the table clean. | (<i>V+A</i>) |
| | c. | John pushed Mary around. | |
| | d. | John wiped his record clean. | |
| | e. | *John pushed the table roll/sink. | (<i>V + bare V</i>) |
| | f. | *John pushed the table rolled/sunken. | (<i>V + V-en</i>) |
| | g. | *John pushed the table rolling/sinking. | (<i>V + V-ing</i>) |
| | h. | John pushed Mary into walking. | (<i>V + P + V-ing</i>) |
| | i. | John pushed Mary into the room. | |

In English, the closest a resultative sentence comes to acceptability with a verb in the resultative position is given in (3a,b) and (4a,b).⁴⁶ For the first data set, the verb *make* imposes causativity, and thus the second verb (*ring, scream*) is the result of the action Mary is performing. The first verb is a cause of the second verb's action. The second set of data shows the apparently infinitival *to V* form in the resultative position, but in these cases they are not true resultatives. The *to V* construction here is not the true infinitival, but appears to be an abbreviated form of *in order to V*; the intent to *V* is not the same as a *V* result. (4a) cannot mean that Mary has achieved the endstate of winning.

- (3) a. Mary made the metal ring.
 b. Mary made John scream.
- (4) a. Mary pushed herself (in order) to win.
 b. Mary wiped the table (in order) to impress her guests.

In Pustejovsky (1991), it is claimed that Event Structure predicts why only process verbs undergo the resultative, and why the resultative phrase must be a state: both follow directly from the decomposition of events in ES, where the first phase is always a process (*P*), and the result is always a state (*S*). The ES decomposition of resultatives can be represented as the ordered pair $\langle P, S \rangle$. Obviously, we find no cases like (5) in English, where it means Mary loved John (a state), and as a result John is happy (also a state). In other words, the ordered pair $\langle S_1, S_2 \rangle$ is ruled out because the most complex structure in Event Structure is $\langle P, S \rangle$, where the process obligatorily precedes the endstate. Likewise, Event Structure would rule out $\langle P, P \rangle$ and $\langle S, P \rangle$ orderings, since only a state may occupy the second position of the ordering.

- (5) *Mary loved John happy.

Recall that in EM, states and processes only differ by the attribute that states have no minimal parts (specified for the feature [+atomic]), and processes are

⁴⁶In serial verb languages, such as Èdó, verbs can be in the resultative position to create a serial verb. See Chapter Five for more discussion on this topic.

underspecified for such minimal parts, represented as [0 atomic].⁴⁷ Both states and processes are antipartite, though states do not change, while processes are underspecified for change (see §2.3.4.4 and §2.3.4.5). If there is no other difference, then states and processes should be interchangeable. It appears that EM would allow states that precede processes as results $\langle S, P \rangle$, processes that precede process results $\langle P, P \rangle$, and states that lead up to a different state $\langle S_1, S_2 \rangle$. Should EM allow these classes, then EM must be able to explain the ungrammaticality of sentences like (5) somehow.

The EM response to the above concern is to address the difference between Event Structure and Event Mereology with respect to the components used by each system. The crucial difference between ES and EM here is that ES takes as primitives States (S) and Processes (P), and uses them to build more complex structures like accomplishments. As such, there are different ways to pair up the different values that each phase can take in the ES system, since there are two phases (initial and final), and two possible values for each. In order to avoid generating the classes that do not appear empirically, the distribution of P and S are assigned to the initial and final phases respectively; this restriction seems arbitrary.

In contrast, Event Mereology does not directly use States and Processes, since they are not primitives in EM; EM uses the primitives of distinguished point dT and distinguished process dP . In EM, one primitive is the distinguished point dT , which always produces two complementary states $\langle \neg S, S \rangle$ by projection onto a continuum, rather than taking a state S as a primitive.

With these two primitives dT and dP being unrelated to each other, there are four possibilities: dT is the only specification, dP is the only specification, or dT and dP are present simultaneously. The fourth possibility, where neither dT nor dP are present, does not appear to contain any relevant information that contributes to

⁴⁷For features, [+ feature] and [- feature] indicate specified values, whereas [0 feature] indicates that that feature is underspecified.

the final output of the aspectual calculus, and will not be considered here. To borrow an idea from phonology, one might say that *dT* and *dP* are on separate tiers; the presence of one does not preclude the presence of the other. They are two distinct features that are not competitive, but can co-occur.

Given that *dT* is either present or absent, it follows that either two complementary phases are present or totally absent; also, either *dP* is specified or it is not. There is no need to order the expressions denoting the states and processes to produce different verb classes, since it is only the presence or absence of *dT* and *dP* that differentiates the verb classes. The ordering of the process before the result state is a syntactic phenomenon: it appears that processes are associated with a higher position in the syntactic tree than points of change, and given the headedness of English, the expressions denoting processes are syntactically ordered before those denoting endstates. (See Chapter 5 for more discussion of this topic.)

4.1.2 Processes as Results

Aside from the syntactic output ordering the expressions denoting *dPs* ahead of *dTs* in English, it can be argued that there is no conceptual difficulty in having a process that leads to another process, or a state that leads to another state, or a state that leads to a process. For example, the cutting of a carrot held above the floor (*cut* as a process) causes the pieces to fall due to the pull of gravity (*fall* as a process); a state of being jealous can grow into a state of paranoid delusion, as in the tragedy *Othello*; likewise, a state of love can cause the act of wooing (*woo* as a process). A gerund may also be argued to be a process result, as in *John pushed Mary into walking*.

Despite the fact that we can conceive of these *process-process* and other combinations, there are no simple ways to express them without using multiple verbs or verb phrases. Only the *process-endstate* seems to be a common single-

verb construction in English. There appears to be a very close connection between a single process and a single point of change that forms a natural event unit, provided that the process in some way causes the attainment of the state, or the state is a natural consequence of the process. This is an *s-word* or event as described in Travis (1999), as will be shown in Chapter Five. Serial verb languages likewise recognize the strong connection between a distinguished process and a distinguished point in cases with an element of causativity, as argued in Stewart (1998) and Pi & Stewart (1998).

To understand the causal connection between the distinguished process and the distinguished point, consider the data in (6a-c). As pointed out by Carlson (1997), (6a) is not only the process of cutting the carrot into pieces, but also the implied process of the carrot pieces falling into the bowl as a result of gravity. In contrast, (6b) does not work well with the interpretation where the carrot pieces fly across the room as a result of the cutting action, but better with *across the room* as a locational PP. There appears to be more naturalness to associate *cut* with an implied *fall* than *cut* with an implied *fly*.

The stronger connection between *cut* and *fall* can be said to be an example of *iconicity* (Stewart 1998), i.e., the pragmatic expectation that certain actions have more salient actions that result from their performance. In a serial verb language, iconicity will account for the syntactic differences between the pairs *push* and *fall* (an iconic action; if you push something it might fall) and the pairs *push* and *cook* (non-iconic; one does not push something to cook it).

- (6) a. Greg cut the carrot into the bowl.
b. Greg cut the carrot across the room.

Other examples of verbs that normally are not used as motion verbs but can under certain interpretations are given in (7a-c); non-motional equivalents are given in (7d,e). For non-motional verbs, it is harder to find an iconic pair of actions, but one could make a weak case for iconicity between *complain* and *getting fired*, or *talk*

and *accepting marriage*. Instead of trying to establish such iconicity, for non-motional verbs it seems more likely that the simple process-endstate type of resultative is at work, rather than the process-process type.

- (7) a. Greg grated the cheese/melted the butter onto the spaghetti.
b. Greg froze the strawberries into his jello.
c. Greg shook the dandruff off his head.
d. Greg complained himself out of a job.
e. Greg talked Mary into marriage.

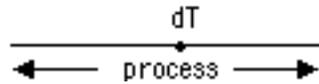
In (6a), the preposition *into* provides a distinguished point for the process of cutting, but is *in the bowl* really the end result of the cutting action itself, or the end result of the implied falling action? The latter is more plausible, since *to cut something into a bowl* is not the same as *to cut into a bowl*, where the knife is assumed to have cut the bowl itself. The transitive use of *cut* makes smaller portions of its direct object as a part of the process; the motion of these pieces *into the bowl* is contributed by the preposition *into*, which provides a definite change of state. It seems that the distinguished process is distinct from the distinguished point, and may actually be a process (*cutting*) succeeded by another type of process (*falling*).⁴⁸

Note also that a distinguished point does not always indicate the endpoint of an action. In fact, a process may be continued past the moment of change associated with a distinguished point. For example, the act of *building a cabin* can involve many different steps, such as sawing down trees, cutting the logs, planning, moving planks, et cetera. At a particular moment of change associated with a *dT*, such as the simple past in (8a), the quantity of a single cabin is the result of the building activity. Yet Abe could be engaging in the same activities even after that point in time has passed, and still be considered to be in the process of building. By no means is it entailed that the process must come to an end, but rather that the process of building *that particular cabin* is complete. Thus, the distinguished point does not need to

⁴⁸ Note as well that the process may be one stretch of the cutting action, but the individual pieces fall independently and successively *into the bowl*. Thus, each instance of a piece falling into the bowl might be considered to be a minimal part to the process of *to cut a carrot into the bowl*.

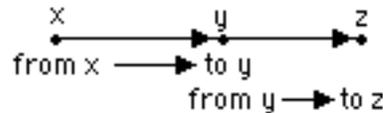
mark the absolute end of the distinguished process, as shown in (8b); only the presence of a *dT* and a *dP* is necessary for the accomplishment.

- (8) a. Abe built a cabin.
b.



Another case that illustrates that the distinguished point need not always be the terminus of the distinguished process is seen in *chained paths* (involving motion or non-motion), such as in (9a,b) (see also Pi 1993). The chained paths involve the construction *from-to-to*, which can be extended indefinitely. The verbs *skateboard* and *drift* are activities, yet there are several different stops along the process that do not constitute the endpoint of the associated activity. In (9a), for instance, *the hotel* is but a reference point pertaining to Henry's route. The distinguished point contributed by *to* in this instance marks a point along the overall process.

- (9) a. Henry skateboarded from the park to the hotel to the courthouse.
b. Henry's career choice drifted from doctor to lawyer to comedian.
c.



These chained paths may be specialized conjunctions of various *from-to* paths: *from x to y to z* is a conflation of *from x to y* and *from y to z*, ordered temporally (9c). Even with this analysis of chained paths as *from-to* conflations, we are still able to argue that the appearance of the distinguished point does not force the verb activity to terminate. The *from-to-to* construction merely demarcate possible subunits of the process.

Furthermore, in (9c), it is always the syntactically final-most transition of the chained path which is the transition of the overall verb action. We may test this claim by checking the entailments. (10a,b) show which statement is true of the outcome of (9a,b) respectively; the checkmark indicates that the endstate is an entailment of the sentence in (9a) or (9b), while the asterisk indicates that it is not.

- (10) a. Henry is: *at the park / *at the hotel / at the courthouse.
 b. Henry's current career choice is: *doctor / *lawyer / comedian.

Since there are two *to* phrases in the examples, both theoretically could constitute the distinguished point of the overall event; however, only the final-most *to* phrase may be thus interpreted. Pi (1993) shows that prepositional phrases in chained paths form a single structure from which PPs cannot topicalize, whereas a non-chained path can have topicalized phrases because the PPs consist of two separate structures. Thus, it seems that the syntax has a tendency to place distinguished points as the deepest embedded in both VPs (resultatives) and PPs (chained paths). In resultatives, processes dominate the transition; in chained paths, the final-most *to* phrase is dominated by the other prepositional phrases. This is further evidence that the syntax maps certain semantic roles to specific structural positions.

- (11) a. Markus ran [from the bar] [to the YMCA].
 b. [From the bar], Markus ran [to the YMCA].
 c. Markus ran [from the bar [to the YMCA [to the bus station]]].
 d. *From the bar, Markus ran to the YMCA to the bus station.

It can be concluded that other possibilities exist aside from *process-endstate* types of accomplishments, but only the *process-endstate* forms a micro-event. The micro-event is representative of a cause-effect relationship between the activity and the ensuing action, and is limited in English to an activity followed by a change of state. This cause-effect relationship is pragmatically determined, since it depends upon what verb actions are most likely associated with which other verb actions in the real world (iconicity; §5.3.1). It has also been shown that a distinguished point is not always restricted to being the endpoint of the overt distinguished process; it can be the endpoint of a different and covert process.

4.2 Coercion

Certain grammatical structures are inherent to certain verb classes. For example, an activity verb has a different syntactic structure from that of an

achievement verb. Yet verbs can be coerced into other meanings, e.g., a process verb like *swim* (12a) can be given an endpoint (i.e., the action is bounded) by putting it into the past tense (12b).⁴⁹

- (12) a. Tony will swim (and it is not known for how long).
b. Tony swam (for an hour).

4.2.1 The Simple Past and the Perfect

According to the Event Mereology treatment of aspect thus far, an achievement is specified by a distinguished point, i.e., there is a change of state (13a). Once an achievement has occurred, it no longer can be true at the present moment that the action is still going on (13b). Likewise, an activity is specified by a distinguished process, i.e., there is a state of change but not a change of state (13c). Whereas the former verb *die* lacks a state of change meaning since the achievement is an instantaneous event, the latter verb *run* does not encode a change of state meaning because there is no specified endpoint associated with the running action.

- (13) a. Jean-François died.
b. *Jean-François died and is still dying.
c. Jean-François ran.

However, (13c) can be interpreted to have an endpoint, by virtue of the fact that it is in the past tense. Any activity verb in the past tense can be considered to have terminated (14a), although this is an implicature, not an entailment, as shown by (14b). Even though a distinguished point is not present in the semantics of the verb *run*, the past tense (and the present perfect and past perfect tenses 14c,d) can *coerce* a change of state interpretation (see also Pustejovsky 1995); that is to say, one is able to claim the presence of a definite change from performing the action (*a*) and not performing the action ($\neg a$) that is like a distinguished point $\langle a, \neg a \rangle$.

⁴⁹The term *coercion* is one invented by Pustejovsky (1995) which covers what has been traditionally called *conversion* (following Quirk *et al.* 1985), and applies not only to verbs, but also phenomena such as shifts between mass-count (e.g., the mass noun *beer* acting as a count noun *a beer, beers*).

- (14) a. Jean-François ran (but is no longer running).
 b. Jean-François ran (and is still running, for all I know).
 c. Jean-François has run.
 d. Jean-François had run.

Likewise, it is possible to coerce a change of state reading with statives with the past tense and the present and past perfects (15a-c). In these cases, the state which obtained (*S*), like the state of love in (15a), can be interpreted as no longer applying in the present (i.e., $\langle S, \neg S \rangle$). Though the coercion of the change of state is possible as a reading (16a), it is not obligatory here either and may continue as a state (16b):

- (15) a. Jean-François loved Marie-Claire.
 b. Jean-François has loved Marie-Claire.
 c. Jean-François had loved Marie-Claire.
- (16) a. Jean-François loved Marie-Claire (but no longer).
 b. Jean-François loved Marie-Claire (and loves her still).

There is no need to coerce a change of state reading in the case of accomplishment verbs (17a) and achievement verbs (17b), for which there are already change of state readings available on account of the distinguished points in the aspectual structure of those verbs. In fact, it is impossible not to have a change of state reading with these verbs in the past tense (17c,d); the distinguished point in the lexical specification of these verbs prevent their event from still continuing after it has already occurred (as indicated by the past tense). Activities and statives do not have *dT* specifications, and thus can be extended past their coerced point of change.

- (17) a. Jean-François ate his apple.
 b. Jean-François arrived.
 c. *Jean-François ate his apple and was still eating it.
 d. *Jean-François arrived and was still arriving.

4.2.2 The Progressive

The other issue is whether a state of change reading can be coerced from verbs without a distinguished process specification. With an achievement verb that normally lacks a state of change reading, it is indeed possible to coerce a state of

change reading out of the achievement verb by putting the verb into the English progressive, as with the verb *die* (18a-c).

- (18) a. Jean-François died.
b. Jean-François was dying.
c. Jean-François is dying.

The progressive *-ing* identifies the distinguished process part of a verb. In an accomplishment with both process and change of state parts, it is the process that becomes the focus of the aspectual interpretation. For example, the inflected verb *ate* (19a) focuses on the point of change, due to the past tense. However, in the present progressive (19b), the present moment is situated in the temporal interval associated with the process leading up to the point of change. In the past progressive (19c), the event occurred in the past, but the focus of the event is still on the process and not the point of change; the actual event has not culminated.

- (19) a. The dog ate my dinner.
b. The dog is eating my dinner.
c. The dog was eating my dinner.

Kamp & Reyle (1993) summarizes the semantic effect of the progressive of a verb *v* as isolating the eventualities that correspond to the 'part of their schema that corresponds to the Aktionsart of *v* that terminates in, but does not include, the culmination point.' Thus, part *I* of their aspectual structures are accessible by the progressive. Achievements do not have part *I* in its past tense specification, but it is possible to use the aspectual operator *-ing* to access the part before the culmination point that constitutes the achievement. In one sense, a process phase is forced onto the achievement structure by the aspectual operator.

K&R's treatment of the progressive also means that states are excluded from taking the progressive, because there is no culmination point present in their aspectual structure. One test using *-ing* to distinguish states and achievements from accomplishments and activities is called the *Continuous Tense Criteria (PROGF)*

(Vendler 1957, Verkuyl 1993), and is based on the premise that states and achievements do not take the progressive:

- (20) a. *I am knowing, she is loving him, he is possessing the house,
he is ruling the country (STATE)
b. He was running, she is swimming, they are pushing the cart
(ACTIVITIES)
c. She is running a mile, he is drawing a circle,
he was eating a sandwich (ACCOMPLISHMENTS)
d. *She was recognizing him, he was reaching the top,
she was winning the race (ACHIEVEMENTS)

Yet there have been many counter-examples cited (Leech 1971, Comrie 1976, Vlach 1981, Mourelatos 1978), where states can be in the continuous tense (the present progressive), as in (21a-d). In these sentences, there is still a state being described, despite the addition of *-ing* (e.g., *living*). It seems, then, that the progressive should be permitted to apply to states as well:

- (21) a. I am living in Amherst.
b. I am assuming you will come tonight.
c. The dead man is hanging there to deter the population.
d. Mr. Smith is standing by the Nile.

It is also strange that the Continuous Tense Criteria would consider data such as (21d) as ungrammatical. Though *she was recognizing him* may seem odd, it is ameliorated by the addition of an adverb that turns the instantaneous meaning into a more prolonged transition, as in (22a,b). In my judgment, there is nothing wrong with either *he was reaching the top* or *she was winning the race*:

- (22) a. She was finally recognizing him.
b. She was slowly recognizing him.

-Ing tells us that the focus should be on the distinguished process portion of the event. However, an achievement verb like *die* does not have a *dP* specification in its lexical entry. We can, however, coerce the *dP* specification because *dP* is underspecified for *die*, and the aspectual marker licenses us to coerce a process part for the verb *die*.

4.2.2.1 The Open and Closed Senses of the Progressive

One effect of *-ing*'s coercion of the process part from an achievement is the denial that the culmination point has been reached and realized at that point in time, but may still be reached. Galton (1984) distinguishes between two types of progressive senses: the *closed sense* and the *open sense*. With the closed sense of the progressive, the action of the verb *V* in *V-ing* is assumed to have begun, is underway, and will be completed. Thus, if *John is writing his book* is taken to have a closed sense of the progressive, then it is assumed that the writing of the book will be completed.

The open sense of the progressive, on the other hand, does not need the event to be completed. Galton cites the case of (23), where events in the future may prevent the house from completely burning down. Yet the open sense does not completely ignore the range of possible futures. Included among the possible futures must be a closed sense of the progressive, where the house will burn down completely.

(23) The house is burning down.

Thus, should the open sense of the progressive be adopted in (24a-d), the sentences do not entail that the top of the mountain was in fact reached, nor that she did or will win the race. That the change might still occur (i.e., the narrow sense of the progressive) remains a possibility. Particularly with the present tense (24c,d), if matters remain the same as they are currently, the point of change will be reached. With the past progressive (24a,b), the past implies that the *V-ing* is no longer true at present. Thus, in *she was winning the race*, it is strongly implied that she is no longer winning the race. Yet it is only an implicature; see (24e).

- (24)
- a. He was reaching the top of the mountain.
 - b. She was winning the race.
 - c. He is reaching the top of the mountain.
 - d. She is winning the race.
 - e. She was winning the race (and is still winning, for all I know).

The open sense of the progressive is applicable only to events with an endpoint, since the fulfillment of the entire event is only left open to interpretation in the cases of accomplishments and activities with an endpoint (supplied by a change-of-state prepositional phrase like in *swim into the bay*). *-Ing*, when applied to a bare activity verb, can have neither the closed or open meaning, since in sentences like (25a,b), there is no endpoint to be achieved.

- (25) a. The firefighter is sleeping.
 b. Jane is swimming.

Thus, the English progressive can coerce an incipient process out of an achievement, despite achievements lacking a distinguished process in their lexical specification.

4.2.2.2 English *-Ing* and Japanese *Te-Iru*

However, not all languages have morphemes that consistently coerce the process reading out of the achievement. For example, following Kindaichi (1950, 1976), McClure (1994) and Uesaka (1996) point out that the *te-iru* construction in Japanese possesses similarities to the English progressive only for some verbs (26a), whereas with other verbs, the *te-iru* form has a perfective meaning (26b). The perfective meaning is always available in a *te-iru* construction, but not the progressive meaning. Other verbs cited by McClure that only have the perfective meaning of the *te-iru* construction include *kuru* 'come', *aku* 'is open', and *wakuru* 'understand'. These verbs are ambiguous as to referring to the change of state (e.g., *not dead to dead*), or to the resulting state, where the subject is already dead. With an accomplishment verb like *read* as in (26c), both the progressive and perfective meanings may obtain simultaneously.

- (26) a. *Ima oyoide-iru*
 Now swimming-be
 '(I) am swimming now.' or '(I) have swum.'
- b. *Ima sinde-iru*
 Now dying-be

'(He) is dead now.' not *(He) is dying now.'

- c. *Hon-o yonde-iru*
book-ACC reading-is
'(I) am reading a book.' or '(I) have (just) read a book.'

To capture the facts under an EM-style analysis, it is likely that the morpheme *te-iru* is capable of yielding the progressive readings only when the state of change reading is already supplied by *dP*. A verb with a *dT* in its lexical entry behaves under the *te-iru* construction as a resultative, since *te-iru* (unlike *-ing* in English) is unable to coerce a process if it is not already present. Since an accomplishment contains both *dT* and *dP* in their specification, and thus *te-iru* may have either interpretation. What about the activity in *te-iru* form, how do we get the resultative reading? We can solve this problem by saying that *te-iru* acts more like the English past (*-ed*) and perfects (*-en*), in that it can coerce a change of state. Thus, the fundamental difference between *te-iru* and *-ing* is that the former can only coerce a change of state reading from verbs without *dT*, and the latter can only coerce a state of change reading from verbs without *dP*.

4.2.2.3 Cambridge States

One point of debate is the issue of whether an event *E*, once having occurred, requires there to be a state of *E having occurred* to persist from thenceforth. In other words, do we want the state of, say, *a house having been built* to be an eternal state? Is the state of having been built required to be true of the house even after the event?

My answer is no: while we want to have the state of *a house having been built* so that we can derive its complement *a house having not yet been built*, these two states are relevant only at the time the event takes place. We only need the moment of change and what surrounds it. It gains us nothing to say that the result state is true of that object forever after the transition; after all, wherever there is a transition, we can point to the timeline and say there is an infinite stretch backward

in time of $\neg E$ (the event having not yet occurred in its entirety), and an infinite stretch forward in time of E (the event having occurred). If we are able to obtain two such infinite timespans with any distinguished point or boundary, then it is a moot point to attribute any special status to these persisting states.

One might call these derived eternal states *Cambridge states*, since they are similar to Cambridge changes. A Cambridge change is often not considered a real change, since a real change is thought to involve an object itself changing. For example, an ice cube melting is a real change under this definition, whereas John becoming a widower is not. The latter is an instance of a property (or relation) that John has that switches in its truth value. It is not John himself that has undergone any change at all; it is the change in his relationship with his wife (her death) that is involved in becoming a widower. Under Event Mereology, Cambridge changes (which would include changes in possession and states) are still a type of change and are thus retained in our analysis of general change.

A Cambridge state, then, is not a real state in the sense that the persisting state is not integral to the actual event, but a derived notion that adds nothing to the characterization of the event. Thus, if one asks, *did John jump?*, the true question is, did such a change (John jumping) occur, not whether the state of John having jumped currently persists.

4.2.3 Activities With Known Minimal Parts

One subset of verbs that require more scrutiny includes *sneeze*, *bounce*, *cough*, *giggle*, *blink*, *laugh*, *hiccup*, *jump*, *clap*, *hop*, *fart*, *wink*, *flash*, and *burp*. These verbs are slightly different from other activity verbs. Contrast *run* with *sneeze* below. A standard activity verb like *run*, in conjunction with a punctual temporal prepositional phrase like *at noon* (27a), must be interpreted as that activity starting at noon, instead of that activity being momentary, as in the case of (27b). In

(27b), the sneeze is short enough an action to have occurred almost punctually, like *die* in (27c):

- (27) a. Scott ran at noon.
b. Scott sneezed at noon.
c. Scott died at noon.

Yet *sneeze* (28b) also behaves like an activity (28a) but not an achievement in (28c) when observed in the context of a *for* phrase:

- (28) a. Scott ran for an hour.
b. Scott sneezed for an hour.
c. *Scott died for an hour.

Also in support of this claim that *sneeze* is activity-like, consider the results of the Imperfect Paradox Test applied to *sneeze*. Observe that (29a) does entail (29b), showing that the verb *sneeze* behaves like the verb *run* in isolation (an activity). Yet *sneeze* is more like the activity *run* (30a,b) than an accomplishment (31a,b) or achievement (32a,b).

- (29) a. Scott is sneezing.
b. *entails* Scott has sneezed.
- (30) a. Scott is running.
b. *entails* Scott has run.
- (31) a. Scott is eating the pie.
b. *does not entail* Scott has eaten the pie.
- (32) a. Scott is arriving.
b. *does not entail* Scott has arrived.

What makes *sneeze* different from standard activity verbs is that these verbs have minimal units that are identifiably punctual: a sneeze, a cough, a burp, or a bounce. Even though they have minimal units, they are unlike states in that these minimal units are themselves momentary events, and may be repeated many times like a process.

So far, we have characterized processes as different from states in that states are atomic, while processes are underspecified for such atomicity. There are no states that one can point to, such that they themselves are comprised of states of the

same kind. For example, the state of owning a car is not comprised of substates of owning a car. In contrast, a process can be comprised of subprocesses. For instance, multiple subprocesses or substretches of coughing may comprise a cough event. However, there is a minimal process beneath which, so to speak, one cannot go: a single cough.

It is necessary to modify this characterization of the process slightly. We will further distinguish between two kinds of activities: those with *momentary minimal units* (*bounce*-type verbs) and those underspecified for such (*waltz*-type verbs). Even though *waltz* has a discernable minimal unit (i.e., three steps), it is not a momentary minimal unit, as supported by (33). Let us represent the momentary minimal unit property as [+momentary].⁵⁰

(33) Bonnie and Clyde waltzed at noon.

These *momentary activities* must be distinguished from achievements, even though they are achievement-like. To see how these momentary processes differ from occurrences, several tests can assist in this task, some of which have already been discussed above. The progressive affects momentary activities differently from achievements, for instance: momentary activities in the progressive (34a,b) can be interpreted to consist of many instances of the same momentary minimal units having occurred, while the progressive achievement (35a,b) is most salient with the interpretation that only a single change of state will occur, at an upcoming point of change.

(34) a. Thelma is sneezing.
b. Thelma is jumping.

(35) a. Thelma is dying.
b. Thelma is arriving.

The addition of a modifier like *just once* also makes more sense with momentary activities, since there are units to be counted. With verbs like *waltz* that

⁵⁰This feature can also be alternately characterized as privative.

have minimal units but which are not momentary, *just once* refers to the entire event and thus may have more than one minimal event (36a). However, momentary events are restricted to a single minimal unit by the addition of *just once* (36b):

- (36) a. Felix waltzed just once (for an hour).
b. Felix sneezed just once (*for an hour).

Furthermore, such processes differ from occurrences. Consider the converse relation to the *is comprised of* relation. No sequence of multiple instances of someone arriving constitutes a case of someone's arriving. However, a sequence of someone coughing (subprocesses) may comprise a coughing event.⁵¹

4.2.4 Medials Interacting With Progressive and Past

Consider medial prepositions and their interactions with verbs of motion in the simple past. These actions are more easily interpreted as being changes of state than states of change. For instance, (37a) has the meaning that John jumped over the line in a single action; the meaning where John was always in a space across the line and jumping on the spot across the line (as an activity) is harder to get. Similarly in (37b), it is easier to interpret the sentence to mean that the coin changed location, rather than spinning in one spot. In (37c), the salient interpretation is that Felix was originally in a place not beyond the park, but ended up past it.

- (37) a. John jumped across the line.
b. The coin spun across the table.
c. Felix ran beyond the park.

Contrast these sentences with their progressive counterparts, which have two possible meanings: a process or state of change. (38a-c) could be the actions in (37a-c) in the open sense of the progressive, where the action is in the process of taking the subjects through a change (with the past progressive suggesting strongly

⁵¹Alternatively, we may treat these verbs as cross-classified, being both occurrence and process verbs, with the *-ing* suffix forcing a category shift, preventing the occurrence reading. Data like (i) and (ii), where verbs like *cough* seem much more natural as a process than verbs like *arrive*, may help settle the issue.

(i) The king coughed to death. (ii) *The king arrived to death.

that the action has been abandoned, but not forcing such an interpretation); alternatively, the action could have the meaning that the entire event occurs on one side of the bisecting axis only (39a-c). The contrast can be viewed syntactically: the first reading has the medial PP as an argument of the verb, so that it is considered a kind of resultative. The second reading treats the medial PP as a locational preposition modifying the location of the verb action.

- (38) a. John was jumping across the line.
b. The coin was spinning across the table.
c. Felix was running beyond the park.
- (39) a. John was jumping (on the spot) across the line (from me).
b. The coin was spinning (on the spot) across the table (from me).
c. Felix was running (in a circle) beyond the park.

The simple past *-ed* can coerce a change of state from activities. Thus, the medial PPs delimit a space which is treated as a goal due to the coercion of the change of state reading. In comparison, it is the association of *-ing* with states of change that permits the readings in (39a-c), since the entire activity can be performed against a single background location. The other reading, where a single action is in the process of occurring, is also possible because *-ing* can represent this other meaning; however, we would need to interpret the medial as a preposition of change, i.e., with a distinguished point associated with it. Thus, it appears that medial prepositions, or at the very least the prepositions *beyond* and *across*, must be able to act as both prepositions of change and prepositions of location in the spatial domain.

What is the source of this ambiguity? We know that certain prepositions are used strictly as prepositions of change-of-state, e.g., *into* and *onto*, and cannot be used as background locations, as the minimal pair (40a,b) demonstrates. The verb *stand* is only locational and not descriptive of a state of change: it is unacceptable for *stand* to co-occur with *into*. This means that *into* must have encoded into its meaning a change-of-state component.

- (40) a. The bull ran into the bullpen.
b. *The bull stood into the bullpen.

Thus, it is plausible that *across* is ambiguous due to the fact that it is underspecified for change-of-state (as *into* does), and consequently is flexible in describing either background location or a goal. Let us represent this property of *into* as [+ vector], meaning that it must contribute an element of change; then *across* is representable as [0 vector] with respect to this feature. It is underspecified for change, meaning that both the presence or the absence of change remain viable options for interpretation. From this underspecification, we obtain ambiguity.

For (38a) and (38b), there is another interpretation that is less available to (38c) without additional adverbs: *John was jumping across the line* can also have the meaning of John being engaged in a series of individual jumps back and forth across the line; the same can be argued for *the coin was spinning across the table*, where the coin was making several circuits across the table. These readings are available to the momentary activities identified earlier this chapter (the class to which *jump* and *spin* belong to), since these activities consist of small point-like minimal parts that could be iterated to be process-like.

4.3 A System of Aspectual Features

In this section, I bring together many of the elements discussed into one aspectual analysis. Much of the data examined will be locational in nature; this is done to show that the domain of space can be captured adequately by the Event Mereology analysis of aspect. Locations involve some properties only available to space, yet the submereology of locations fits in consistently with non-locational sentences. Of course, there remain much more to be done with respect to unifying the spatial and the non-spatial systems, a task that cannot be adequately achieved within the space of this thesis. Therefore, I present this analysis of spatial data as a springboard to unification with other kinds of data, such as possessional.

Note as well that there is a difference in meaning between the inertial change-of-position verb (41b,e) and (43b,e), where a change-of-location (CoL) verb is used. In (41b,e), the reference location must be interpreted as a background location, whereas in (43b,e), the reference location is interpreted as a destination.

- | | | |
|------|------------------------------|------------------|
| (43) | <i>go</i> | <i>CoL verbs</i> |
| a. | *John went on the spot. | |
| b. | John went in the park. | |
| c. | John went into the park. | |
| d. | *John is going on the spot. | |
| e. | John is going in the park. | |
| f. | John is going into the park. | |

Inertial and *vector*ed are applicable as a distinction between verbs as well. *Vector*ed refers to directed changes of state, so in the case of spatial verbs, it refers to directed displacement in space. Such verbs include the CoL verbs, Cpn verbs and Cpr verbs. In contrast, *inertial* verbs include those verbs that lack such a *vector*ed property, i.e., the inertial Cpn verbs. Compare the inertial and *vector*ed distinction to the difference between a line and a ray, the former being undirected and the latter directed.

Let us hypothesize that the total aspectual output of a sentence is either inertial or *vector*ed. Let us also hypothesize that various components that go into the aspectual calculation must not have contradictory values simultaneously. Simultaneous specifications of *inertial* and *vector*ed will result in ungrammaticality. However, components underspecified for either will not clash in the presence of another component with one of those specifications. Let us represent the distinction as the feature [vector] proposed earlier, with [+ vector] meaning *vector*ed, [- vector] meaning inertial, and [0 vector] meaning that it is underspecified for that feature.

Then, inertial Cpn verbs are those verbs which can co-occur with *on the spot* or *sur place*, distinctly inertial prepositional phrases for which there can be no motion off the initial location. Inertial Cpn verbs like *run* are underspecified, represented by [0 vector].

Non-inertial Cpn verbs like *go* cannot co-occur with *sur place*, because they are inherently vectored [+ vector], and under the theory here, the specification of *vectored* [+ vector] is incompatible in combination with *inertial* [-vector].

With Cpr verbs like *lean*, we observe that they have a stative interpretation (44a), where he is located against the window. Stativity seems to be naturally correlated with inertia, suggesting a [- vector] specification. However, as mentioned in Chapter One, (44a) can also sometimes have a change-of-state interpretation as in (44b):

- (44) a. John leaned against the window.
 b. John came to lean against the window.

This ambiguity in the use of *lean* suggests that Cpr verbs should be represented as underspecified for the inertial/vectored distinction, i.e., [0 vector].

More [vector] specifications for prepositions and verbs are proposed in (45):

- | | | | |
|------|----|--|--------------------------|
| (45) | a. | CoL verb (<i>go</i>) | [+ vector] |
| | b. | Cpn verb (<i>meander</i>) | [+ vector] |
| | c. | inertial Cpn verb (<i>run</i>) | [0 vector] |
| | d. | Cpr verb (<i>lean</i>) | [0 vector] |
| | e. | <i>on the spot, without going anywhere</i> | [- vector] ⁵² |
| | f. | <i>in, on, against</i> | [0 vector] |
| | g. | <i>into, onto</i> | [+ vector] |

4.3.2 Predictions and Empirical Data

We can make some predictions based on the interactions of verbs with prepositional phrases and test them against empirical data. Contradictory values (i.e., [+vector] and [-vector] together) will yield an ungrammatical result. For example, the preposition *into* will be incompatible with *on the spot*, as in (46):

- (46) *Bob ran into the pavilion on the spot.

These predictions are borne out in the subsections below. Each possible motional verb subclass and up to two possible PPs are placed in combination, and

⁵²*On the spot* sometimes has a temporal interpretation that means *right then and there*. In the ensuing examples, only the spatial meaning (synonymous to *without leaving that spot, in place*) is used.

the expected output calculated. If there is a clash between simultaneous [- vector] and [+ vector] specifications in the aspectual composition, then the output crashes. Otherwise, a dominant output is obtained (i.e., [0 vector], [+ vector], or [- vector]). In the cases of [0 vector], the sentence remains underspecified for the [vector], and consequently can be interpreted as either a change of state or a state of affairs. [+ vector] means the entire sentence must be interpreted as a change of state, and [- vector] yields the state of affairs reading.

These predicted aspectual behaviours are then checked with empirical data. Note that the data below are all in the simple past, and consequently it is expected that a change-of-state interpretation may be coerced as a result.

4.3.2.1 Inertial Change-of-Position Verbs

Inertial change-of-position verbs are a subclass of activity or process verbs that fall into the spatial domain. These include verbs like *run* and *dance*, and are underspecified for [vector] (i.e., [0 vector]). The EM system predicts the overall aspect of inertial Cpn verbs with different prepositions in (47), and checks the predictions against the evidence in (48). The data confirms the EM predictions.

(47)	Inertial Cpn				
	<u>verb</u>	<u>PP1</u>	<u>PP2</u>	<u>result</u>	
a.	[0 vector]	[0 vector]			= [0 vector]
b.	[0 vector]	[0 vector]	[0 vector]		= [0 vector]
c.	[0 vector]	[0 vector]	[- vector]		= [- vector]
d.	[0 vector]	[0 vector]	[+ vector]		= [+ vector]
e.	[0 vector]	[+ vector]			= [+ vector]
f.	[0 vector]	[+ vector]	[0 vector]		= [+ vector]
g.	[0 vector]	[+ vector]	[- vector]	*	
h.	[0 vector]	[+ vector]	[+ vector]		= [+ vector]
i.	[0 vector]	[- vector]			= [- vector]
j.	[0 vector]	[- vector]	[0 vector]		= [- vector]
k.	[0 vector]	[- vector]	[- vector]		= [- vector]
l.	[0 vector]	[- vector]	[+ vector]	*	

(48)	Inertial Cpn	
a.	[0,0]	Bob ran in the park.
b.	[0,0,0]	Bob ran in the park in the city.
c.	[0,0,-]	Bob ran in the park on the spot.

- | | | |
|----|---------|---|
| d. | [0,0,+] | Bob ran in the park into the pavilion. |
| e. | [0,+] | Bob ran into the pavilion. |
| f. | [0,+,0] | Bob ran into the pavilion in the park. |
| g. | [0,+,-] | *Bob ran into the pavilion on the spot. |
| h. | [0,+,+] | Bob ran into the pavilion onto the stage. |
| i. | [0,-] | Bob ran on the spot. |
| j. | [0,-,0] | Bob ran on the spot in the park. |
| k. | [0,-,-] | Bob ran on the spot without going anywhere. |
| l. | [0,-,+] | *Bob ran on the spot into the pavilion. |

The grammatical sentences are mostly self-explanatory. With (48d), a pause between the two prepositional phrases (or the insertion of *and* in the same place) ameliorates the interpretation, making it more like (48f). The same pause or insertion of *and* also improves (48h). This effect clearly separates the two prepositional phrases so that the latter PP is a modifier of the verb, and not a PP modifier of the prepositional object of the first PP (as in 48f). The NP data below clarifies this point. (49b,d) are ungrammatical noun phrases, unlike (49a,c). Thus, any PPs with these noun phrases will also be ungrammatical. However, separate PPs like in (50a,b) do not have this problem. Refer also to §4.3.2.7 for additional data that bear upon this phenomenon.

- | | | |
|------|----|--------------------------------------|
| (49) | a. | [the park [in the city]] |
| | b. | *[the park [into the pavilion]] |
| | c. | [the pavilion [in the park]] |
| | d. | *[the pavilion [onto the stage]] |
| (50) | a. | [in the park] [into the pavilion] |
| | b. | [into the pavilion] [onto the stage] |

4.3.2.2 Change-of-Posture Verbs

Change-of-posture verbs like *lean* and *kneel* are likewise [0 vector], and pattern with inertial change-of-position verbs when it comes to co-occurrence with prepositions. While these verbs are process-like, the simple past tense of the data below coerces a change-of-state reading. While most of the data seem to confirm the predictions, some of the judgments are not as clear-cut.

(51)	Cpr <u>verb</u>	<u>PP1</u>	<u>PP2</u>	<u>result</u>	
a.	[0 vector]	[0 vector]			= [0 vector]
b.	[0 vector]	[0 vector]	[0 vector]		= [0 vector]
c.	[0 vector]	[0 vector]	[- vector]		= [- vector]
d.	[0 vector]	[0 vector]	[+ vector]		= [+ vector]
e.	[0 vector]	[+ vector]			= [+ vector]
f.	[0 vector]	[+ vector]	[0 vector]		= [+ vector]
g.	[0 vector]	[+ vector]	[- vector]	*	
h.	[0 vector]	[+ vector]	[+ vector]		= [+ vector]
i.	[0 vector]	[- vector]			= [- vector]
j.	[0 vector]	[- vector]	[0 vector]		= [- vector]
k.	[0 vector]	[- vector]	[- vector]		= [- vector]
l.	[0 vector]	[- vector]	[+ vector]	*	

(52)	Cpr	
a.	[0,0]	Bob kneeled (knelt) on the bench.
b.	[0,0,0]	Bob kneeled on the bench in the park.
c.	[0,0,-]	Bob kneeled on the bench on the spot.
d.	[0,0,+]	?!Bob kneeled on the bench onto the cushion.
e.	[0,+]	Bob kneeled onto the cushion.
f.	[0,+,0]	Bob kneeled onto the cushion on the bench.
g.	[0,+,-]	?!Bob kneeled onto the cushion on the spot.
h.	[0,+,+]	Bob kneeled onto the bench onto the cushion.
i.	[0,-]	Bob kneeled on the spot.
j.	[0,-,0]	Bob kneeled on the spot on the bench.
k.	[0,-,-]	Bob kneeled on the spot without moving from there.
l.	[0,-,+]	!Bob kneeled on the spot onto the cushion.

For example, (52d) seems peculiar even with an intonational break. There appears to be a preferred ordering, where goal phrases like *onto the cushion* are better closer to the verb than locational phrases like *on the bench*. This ordering makes sense, an activity delimited by a goal phrase (e.g., *kneel onto the cushion*) could take place entirely against a background location (e.g., *in the church*; 53 below).

(53) Bob kneeled onto the cushion in the church.

As well, the predicted ungrammaticality of (52g,l) do not appear to be absolute. I believe there is a temporal interpretation of *on the spot* which comes into play here. It seems that the change of posture verbs tend to force a temporal reading, in the sense that *on the spot* is interpreted as *right then and there*. This appears to be a consequence of Cpr verbs being descriptive of a spatial posture

without specific reference to locational change. In other words, it is by default already interpreted as a non-CoL and a (non-)inertial Cpn verb: the posture change involves no significant spatial displacement from the entity's current position. Likely, the temporal reading for Cpr verbs is more easily coerced due to a Gricean maxim of quantity, i.e., every component of the utterance is considered maximally informative in the discourse. Cpr verbs already indicate no change in position; to have *on the spot* be interpreted spatially would be as redundant as saying (54).

(54) Jeff sleeps in the nude naked.

In (52h), there is a kind of thematic discontinuity effect (Brunson 1992): notice the strangeness of **Bob kneeled onto the cushion onto the bench*. There is a distinct ordering effect that is dependent upon the size of the reference locations, where the smaller must precede the larger item. I elaborate on thematic discontinuity in a later subsection.

That these verbs are more processes than changes is confirmed by the following progressives (55a-c). Note that it is much harder to get a change-of-state reading out of the progressives of these verbs unless a prepositional phrase like *onto* contributes [+ vector] (55c), since there is no simple past to coerce the change-of-state out of the *dT*-less verb. Instead, the most salient interpretation of these progressive activities is the state-of-affairs (or state-of-change) reading.

- (55) a. Bob is kneeling on the couch.
b. Bob is kneeling on the bench in the park.
c. Bob is kneeling onto the cushion.

4.3.2.3 Change-of-Location Verbs

Change-of-location verbs like *go* are [+ vector]. There is a definite change that occurs with the use of these verbs, and thus they are associated with a distinguished point. Thus, according to EM, they are predicted to be incompatible with [- vector] prepositions. The predictions in (56) match up nicely with the data in (57):

(56)	CoL	<u>verb</u>	<u>PP1</u>	<u>PP2</u>	<u>result</u>
a.		[+ vector]	[0 vector]		= [+ vector]
b.		[+ vector]	[0 vector]	[0 vector]	= [+ vector]
c.		[+ vector]	[0 vector]	[- vector]	*
d.		[+ vector]	[0 vector]	[+ vector]	= [+ vector]
e.		[+ vector]	[+ vector]		= [+ vector]
f.		[+ vector]	[+ vector]	[0 vector]	= [+ vector]
g.		[+ vector]	[+ vector]	[- vector]	*
h.		[+ vector]	[+ vector]	[+ vector]	= [+ vector]
i.		[+ vector]	[- vector]		*
j.		[+ vector]	[- vector]	[0 vector]	*
k.		[+ vector]	[- vector]	[- vector]	*
l.		[+ vector]	[- vector]	[+ vector]	*

(57)	CoL	
a.	[+,0]	Bob went in the park.
b.	[+,0,0]	Bob went in the park in the city.
c.	[+,0,-]	*Bob went in the park on the spot.
d.	[+,0,+]	?Bob went in the park into the pavilion.
e.	[+,+]	Bob went into the park.
f.	[+,+,0]	Bob went into the park in the city.
g.	[+,+,-]	*Bob went into the park on the spot.
h.	[+,+,+]	Bob went into the park onto the roller coaster.
i.	[+,-]	*Bob went on the spot.
j.	[+,-,0]	*Bob went on the spot in the park.
k.	[+,-,-]	*Bob went on the spot without moving.
l.	[+,-,+]	*Bob went on the spot into the park.

Note that there must be actual physical movement into the park in (57a); (57a) is interpreted identically to (57e). Because *in* is underspecified, it does not affect the value of *go*, which is [+ vector]. Thus, the [+ vector] aspect is obtained for that sentence.

4.3.2.4 Change-of-Position Verbs

Change of position verbs like *meander* are treated in EM the same as change-of-location verbs: they are [+vector]. Consequently, we expect Cpn verbs to have the same patterns as CoL verbs.

(58)	Cpn	PP1	PP2	result	
	<u>verb</u>				
a.	[+ vector]	[0 vector]			= [+ vector]
b.	[+ vector]	[0 vector]	[0 vector]		= [+ vector]
c.	[+ vector]	[0 vector]	[- vector]	*	
d.	[+ vector]	[0 vector]	[+ vector]		= [+ vector]
e.	[+ vector]	[+ vector]			= [+ vector]
f.	[+ vector]	[+ vector]	[0 vector]		= [+ vector]
g.	[+ vector]	[+ vector]	[- vector]	*	
h.	[+ vector]	[+ vector]	[+ vector]		= [+ vector]
i.	[+ vector]	[- vector]		*	
j.	[+ vector]	[- vector]	[0 vector]	*	
k.	[+ vector]	[- vector]	[- vector]	*	
l.	[+ vector]	[- vector]	[+ vector]	*	

(59)	Cpn	
a.	[+,0]	Bob meandered in the park.
b.	[+,0,0]	Bob meandered in the park in the city.
c.	[+,0,-]	*Bob meandered in the park on the spot.
d.	[+,0,+]	?Bob meandered in the park into the pavilion.
e.	[+,+]	Bob meandered into the park.
f.	[+,+,0]	Bob meandered into the park in the city.
g.	[+,+,-]	*Bob meandered into the park on the spot.
h.	[+,+,+]	Bob meandered into the park onto the roller coaster.
i.	[+,-]	*Bob meandered on the spot.
j.	[+,-,0]	*Bob meandered on the spot in the park.
k.	[+,-,-]	*Bob meandered on the spot without moving.
l.	[+,-,+]	*Bob meandered on the spot into the park.

The only piece of data above that contradicts our predictions is (58d). Here again we have an odd reading where the goal phrase is not closer to the verb than the locational phrase, as observed earlier.

4.3.2.5 [- Vector] Verbs

A [- vector] verb would mean that there is no dislocation from a particular spot, suggesting that the verbs *stay* and *remain* belong to this class. We predict that [- vector] verbs cannot be used with [+ vector] prepositions like *into*. Our predictions are borne out below:

(60)	[- vector]	<u>verb</u>	<u>PP1</u>	<u>PP2</u>	<u>result</u>
a.		[- vector]	[0 vector]		= [- vector]
b.		[- vector]	[0 vector]	[0 vector]	= [- vector]
c.		[- vector]	[0 vector]	[- vector]	= [- vector]
d.		[- vector]	[0 vector]	[+ vector]	*
e.		[- vector]	[+ vector]		*
f.		[- vector]	[+ vector]	[0 vector]	*
g.		[- vector]	[+ vector]	[- vector]	*
h.		[- vector]	[+ vector]	[+ vector]	*
i.		[- vector]	[- vector]		= [- vector]
j.		[- vector]	[- vector]	[0 vector]	= [- vector]
k.		[- vector]	[- vector]	[- vector]	= [- vector]
l.		[- vector]	[- vector]	[+ vector]	*

(61)	a.	[-,0]	Bob remained in the park.
	b.	[-,0,0]	Bob remained in the park in the city.
	c.	[-,0,-]	Bob remained in the park on the spot.
	d.	[-,0,+]	*Bob remained in the park into the pavilion.
	e.	[-,+]	*Bob remained into the park.
	f.	[-,+,0]	*Bob remained into the park in the city.
	g.	[-,+,-]	*Bob remained into the park on the spot.
	h.	[-,+,+]	*Bob remained into the park onto the roller coaster.
	i.	[-,-]	Bob remained on the spot.
	j.	[-,-,0]	Bob remained on the spot in the park.
	k.	[-,-,-]	Bob remained on the spot without moving.
	l.	[-,-,+]	*Bob remained on the spot into the park.

The verb *remain* as a [- vector] verb generates the correct predictions. Note that we *remain* must be [- vector], not [0 vector]. The latter solution would generate the predicted sentence patterns for inertial Cpn and Cpr verbs, a result that we do not desire.

4.3.2.6 Dialectal Differences With *In*

There is a dialectal difference that needs to be addressed: some people interpret the preposition *in* as only descriptive of background location, while others can interpret *in* as both background and destination location. For some speakers, (62a) could have an additional meaning that is the same as (62b). The other set of speakers cannot interpret (62a) to have the meaning of (62b). How is this difference explained?

- (62) a. Bob ran in the park.
 b. Bob ran into the park.

I will show that the solution does not reside in speakers analyzing *in* differently as [+ vector] or [0 vector], nor does it involve differences in analyzing verbs like *run* as [0 vector] or [- vector]. Both of these analyses lead to wrong predictions. Instead, I will argue that the variation we see with *in* and *on* is a result of clipping, where speakers who have two interpretations for *in* shorten *into* to *in* (and likewise for *on* and *onto*), possibly conditioned by rapid speech.

First let us consider if the treatment of *in* as either [0 vector] or [- vector] will predict two dialects. It is plausible that one dialect only permits a stative interpretation of *in*. We must now test to see if allowing *in* to be [- vector] will invalidate some of our other predictions. A single verb and a single PP are sufficient to test this hypothesis. The various possibilities that are produced are listed below. (63a-c) lists the combinations that do not change, while (64a-c) and (65a-c) constitute the separate dialects.

		verb	preposition	<u>result</u>	
(63)	a.	[0 vector] <i>run</i>	[+ vector] <i>into</i>		= [+ vector]
	b.	[- vector] <i>remain</i>	[+ vector] <i>into</i>	*	
	c.	[+ vector] <i>go</i>	[+ vector] <i>into</i>		= [+ vector]
(64)	a.	[0 vector] <i>run</i>	[0 vector] <i>in</i>		= [0 vector]
	b.	[- vector] <i>remain</i>	[0 vector] <i>in</i>		= [- vector]
	c.	[+ vector] <i>go</i>	[0 vector] <i>in</i>		= [+ vector]
(65)	a.	[0 vector] <i>run</i>	[- vector] <i>in</i>		= [- vector]
	b.	[- vector] <i>remain</i>	[- vector] <i>in</i>		= [- vector]
	c.	[+ vector] <i>go</i>	[- vector] <i>in</i>	*	

(63a-c) remain unchanged by *in* as [- vector], since *into* remains [+ vector] throughout; (64a) is the only combination predicted to be ambiguous. However, if *in* is classified as [- vector], we get an incorrect ungrammaticality prediction in (65c), invalidated by such the common appearance of data such as (66), a very basic grammatical sentence that is not ungrammatical at all.

(66) John went in the room.

Another possibility is have one dialect classify *run* as [- vector]. For the speakers who can only interpret *John ran in the park* as John remains in the park

throughout his running, it appears that *run* may be classified as [- vector] instead of [+ vector]. For these speakers, the inertial Cpn verbs conflate with the *remain*-class of verbs. (67a-d) show the combinations unaffected by this split in the specification of [vector]. (68a,b) and (69a,b) constitute the dialectal differences.

		verb	preposition		
(67)	a.	[- vector] <i>remain</i>	[0 vector] <i>in</i>		= [- vector]
	b.	[- vector] <i>remain</i>	[+ vector] <i>into</i>	*	
	c.	[+ vector] <i>go</i>	[0 vector] <i>in</i>		= [+ vector]
	d.	[+ vector] <i>go</i>	[+ vector] <i>into</i>		= [+ vector]
(68)	a.	[0 vector] <i>run</i>	[0 vector] <i>in</i>		= [0 vector]
	b.	[0 vector] <i>run</i>	[+ vector] <i>into</i>		= [+ vector]
(69)	a.	[- vector] <i>run</i>	[0 vector] <i>in</i>		= [- vector]
	b.	[- vector] <i>run</i>	[+ vector] <i>into</i>	*	

We run into trouble with (69b), which predicts that (70) is ruled out. However, (70) is a perfectly grammatical sentence and rather common construction:

(70) Bob ran into the park.

We cannot specify *in* as [- vector], nor *run* as [- vector]. There is a third alternative: my proposal considers the difference in stress/intonational patterns. (71a) and (72a), when pronounced so that *run* (*jump*) and *in* are pronounced with the same intonation (as opposed to an intonational pattern where there is a pause or change in between the two words), gives the [+ vector] interpretation. Note also that topicalization is possible for the stationary interpretation but not for the change-of-state interpretation, as shown in (71b) and (72b):⁵³

- (71) a. Bob *ran in* the park. = Bob ran into the park.
 b. Bob *ran in* the park. = In the park, Bob ran.
- (72) a. Bob *jumped in* the pool. = Bob jumped into the pool.
 b. Bob *jumped in* the pool. = In the pool, Bob jumped.

With the intonational difference detected above, it is likely that one thing is derived from *run+into* rather than *run+in*. To have a *run-in* with the law means to

⁵³For speakers who do not judge *John ran in the park* as a change of location, another reference location might give a more grammatical sentence that has two interpretations. For example, *John ran in the house* is more acceptable to these same speakers as having ambiguous meaning: both running into a house and running inside a house.

run into the law, not to run inside the law. Thus, in (71a) and (72a), what look to be *in* are actually *into* clipped; likewise for *on/onto*. Note that the converse is never true: you cannot interpret (73a) as bearing the meaning in (73b):

- (73) a. Bob jumped onto the table.
b. On top of the table, Bob jumped.

The verb *jump* (74) is more acceptable in this type of ambiguity than with *run*. This difference may be attributed to the [+momentary] aspect of *jump*. Recall that *jump* is interpretable as either a single event consisting of a single jump or a series of jumps, whereas *run* is interpretable as a single event that consists of a single run, but not a series of separate runs within the same 'run'. *Run* is only atelic if it is habitual, i.e., (62a) means *Bob always runs in the park*: As an activity verb, *run* can only have a change-of-state reading if coerced by the simple past. In contrast, the momentary activity verb *jump* is more achievement-like, and it is easier to coerce the change-of-state reading because momentary activities already resemble change-of-state achievements.

- (74) Bob jumped in the pool.

4.3.2.7 Thematic Discontinuity

Brunson (1992) argues that the effect of *thematic discontinuity* is observed among prepositional phrases that modify verb phrases, affecting syntactic ordering. Compare, for instance, (75a), *Bob remained in the park in the city* to (75b-d). The most natural order is (75a), although (75b,c) are both acceptable, albeit more awkward. However, in the case of (75d), the topicalization is not permitted.

- (75) a. Bob remained in the park in the city.
b. Bob remained in the city in the park.
c. In the city, Bob remained in the park.
d. *In the park, Bob remained in the city.

(75a) has two possible structures, shown in (76a,b). For purposes of thematic discontinuity, Brunson has preferred the second treatment, (76b), where the PPs are separate and the second PP not a modifier of the NP of the first.

- (76) a. [in [the park [in the city]]]
 b. [in the park] [in the city]

The two syntactic structures possible for (75b) are represented in (77a,b). (77a) is strange: it is a structure which has a coarser-grained NP (*the city*) modified by a finer-grained PP (*in the park*). However, normally, parks are smaller than cities and found in cities, rather than the unlikely case where a city is in a park, which is the marked case. The strangeness of (77a) arises from the entailment that a city is contained within a park, which conflicts with pragmatic considerations. In contrast, in the second reading, the adoption of separate PPs accounts for the acceptability of (75b); both PPs independently modify the verb.

- (77) a. ?[in [the city [in the park]]
 b. [in the city] [in the park]

The treatment of the PPs as separate allows each PP to be topicalized, as was shown in (75c) and (75d). To account for the acceptability of (75c) and the ungrammaticality of (75d), Brunson assumes a single location may have different granularities. Multiple PPs that express the same location may appear in the same sentence, so long as they describe different granularities of that location.

Granularity determines the size of the reference object: in the real world, Bob remains in location A, but when we try to describe that location A in words, we have a choice of how fine-grained or coarse-grained to make that location. For example, if Bob is standing on the glass floor on the observation deck of the CN Tower in Toronto, we could describe Bob's location with a PP using a variety of granularities. The following sentences in (78) are arranged in degrees of increasing granularity.

- (78) a. Bob is on the glass floor.
 b. Bob is on the Observation Deck.
 c. Bob is at the CN Tower.
 d. Bob is in Toronto.
 e. Bob is in Ontario.
 f. Bob is in Canada.
 g. Bob is in North America.

Brunson theorized a syntactic constraint called *thematic discontinuity*, whereby these PPs that describe the same location must have a specific ordering. Brunson claims that with such locative PPs, syntactic effects are observed such as was shown in (75a-d), where a finer-grained descriptor of location *A* cannot m-command a coarser-grained descriptor.⁵⁴ This constraint restricts a finer-grained descriptor from being topicalized out of the sentential IP (or base-generated in topic position), if there is a coarser-grained descriptor within that IP.

A similar constraint (*path ordering constraint*) can be imposed upon paths of motion. Here, we have granularity as an operating factor, but it is temporal precedence (or linear precedence in the sentence) which controls the order that the moving object enters the reference locations. Suppose that there is a cushion on a bench. Then, it is plausible to have the coarser-grained PP (*bench*) linearly preceding the finer-grained PP (*cushion*) in the sentence (79a). Note that a pause between the two PPs improves the readings. The ordering is highly dependent on the real world arrangement of the items and the items themselves. (79b) is less acceptable than (79a): it appears that the coarser-grained destination (*onto the bench*) must linearly precede the finer-grained destination (*onto the cushion*). We observe in (79c,d), cases where the first PP is a [0 vector] PP and the second PP [+vector], that the same pattern identical to the one in (75a,b) obtains.

- (79) a. Bob kneeled onto the bench onto the cushion.
 b. ?Bob kneeled onto the cushion onto the bench.
 c. Bob kneeled on the bench onto the cushion.
 d. ?Bob kneeled on the cushion onto the bench.

In (75a-d), the second PP (*onto X*) cannot be a modifier of the noun preceding them (**the bench onto the couch*); [+vector] prepositions are generally ungrammatical as noun phrase modifiers (80a,b), unless the noun they modify is a type of path, gateway or linear structure (80c-e). This subset of nouns, which I will call *pathway nouns*, are either a path that is divisible into two halves (e.g., *the road is*

⁵⁴See Brunson (1993) for her revised definition of m-command.

half *in Avonlea* and half *not in Avonlea*), or a type of access that forms the axis that bisects two spaces, over which a change-of-state may take place (e.g., *the door* is the opening between *in the theatre* and *not in the theatre*). In contrast, one does not use a *desk* or *cushion* to access a *room* or *bench*.

- (80) a. *the cushion onto the bench
 b. *the desk into the room
 c. the road into Avonlea
 d. the door into the theatre
 e. the ramp onto the highway

In comparison, (81a,b) have as the second PP a [0 vector] preposition (*on*). In (81a), the fact that the *on* phrase is permitted to modify non-pathway nouns makes the structure in (82a) possible. Here, pragmatics requires that the bench be placed on a large-enough cushion. If *on* is taken to be a change-of-state due to the clipping effect, then the path ordering constraint permits the (81a) to have the same interpretation as (75a). The path ordering constraint would rule out the *on-as-clipped-onto* reading in (81b), leaving only the possible structure as (82b).

- (81) a. Bob kneeled onto the bench on the cushion.
 b. Bob kneeled onto the cushion on the bench.
- (82) a. [onto [the bench [on the cushion]]
 b. [onto [the cushion [on the bench]]

4.4 Summary

This chapter has dealt with such issues as resultatives, aspectual coercion, and a system of aspectual features for a selected set of locational data. The nature of accomplishments was explored, and it was shown how Event Mereology accounts for spatial data with its event-based primitives. Of course, there still remains much to be explored with respect to aspectual compositionality and the relationship between a local mereology (pertaining to spatial phenomena) and global mereology (pertaining to all change), but the discussions in this chapter are good starting points for further research into these areas.

Chapter Five

Syntax and Event Mereology: Accomplishing An Interface

5.0 Introduction

In this chapter, I will show that Event Mereology concepts are compatible with some current developments in syntax. I examine two related syntactic analyses, specifically that of Travis (1999) and Pi & Stewart (1998).

The idea that a verb can be decomposed into two syntactic parts, that of an uptake process and a point of change, can be traced from McCawley (1968), Morgan (1969), and Kac (1972a), through Dowty (1979), Parsons (1990), Pustejovsky (1991), Travis (1991, 1994), Borer (1994a,b), McClure (1994), to more recent works such as Slabakova (1997) and Travis (1999).⁵⁵ These approaches investigate the hypothesis that there are (at least) two different syntactic components that participate in the calculation of aspect, where a functional category that is related to a DO/CAUSE operator dominates a functional category related to the operator BECOME. It will be shown that the former corresponds to the EM idea of distinguished process, and the latter the distinguished point.

Travis (1999) establishes the current trend towards subeventual structure in syntax that figure into the meaning of aspect, and argues for a structure that makes use of functional projections that correspond to distinguished process and distinguished point; I summarize the findings therein and focus on her concept of eventhood in syntax.

Based on observations in Stewart (1998), which adopts Travis's articulated VP structure, Pi & Stewart (1998) investigates serial verb constructions in Èdó. The serial verb structures provide a good testing ground for Travis's theory. Arguments

⁵⁵Some of these works (Dowty 1979 and Pustejovsky 1991) have already been discussed in earlier chapters (which see). Borer (1994a,b), will not be discussed, since it has been argued elsewhere (Slabakova 1997) that it accounts for the same range of data as Travis (1991), except with some additional stipulations.

based on principles of Event Mereology will be made to explain the two different patterns of serial verb constructions (resultative and consequential) observed by Stewart.

5.1 Travis (1999)

Historically, the internal structure of events (and verbs that denote them) had been considered to belong to the autonomous domain of semantics. Travis (1999) tracks the development of event structure from the early view espoused by McCawley (1968) to the recent trend by syntacticians to account for subeventual structure in syntax. Below, I summarize the analyses which were influences in the development of her theory, highlighting elements and ideas that pertain to Event Mereology. I then outline her key arguments in favour of an Event Phrase and an Aspect Phrase, which are functional categories dominating a VP each, and are associated with the ideas of distinguished processes and distinguished points (transitions), respectively.

5.1.1 McCawley, Morgan, and Kac

Travis looks first at McCawley (1968), which proposed under the Generative Semantics framework that verbs, particularly causative verbs like *kill*, *melt*, and *break*, can be decomposed in prelexical representations into smaller segments of semantic meaning. A verb like *kill* would be composed of such components as CAUSE, BECOME, NOT, and ALIVE, combined into a larger predicate pre-syntactically through predicate raising. Lexical insertion occurs after this semantic composition.

Morgan (1969) and Kac (1972a) further develop McCawley's idea. The sentence in (1) is claimed to be ambiguous in three ways, on account of the scope of the modifier *almost*, as illustrated by the paraphrases in (2a-c) and (3a-c):

- (1) John almost killed Fred.
- (2)
 - a. John almost did something that would have killed Fred.
 - b. John did something that came close to causing Fred to die.
 - c. John did something that brought Fred close to death.
- (3)
 - a. John almost caused Fred to become not alive.
 - b. John caused Fred to almost become not alive.
 - c. John caused Fred to become almost not alive.

Kac argues that the difference between the meanings of (3b) and (3c) is negligible: there is only a difference between *almost* affecting the action (as in 3a) or the result (3b,c): either the action was almost committed or almost achieved. To capture this datum, Kac motivates for the existence of prelexical structures with semantic units smaller than the word. Kac's presentation of this problem of ambiguity with *almost* led to further analyses which adopt the division between action and result for such verbs. (For a more in-depth look at the data on *almost*, see §3.2.1.) However, it was a general consensus at the time by syntacticians from the interpretativist school that these predicates are not syntactically relevant, but should be relegated to the realm of semantics.

5.1.2 Dowty, Parsons and Pustejovsky

Next, Travis considers the re-emergence of the idea that aspectual semantics is handled partly by syntax. Dowty (1979) continues along the same lines in Montague's semantic framework, proposing three different aspectual operators: BECOME, DO, and CAUSE. Under Dowty's classification scheme, all of the Vendler classes are generated from these aspectual operators (or lack thereof): activities are derived through the application of the operator DO; achievements through the operator BECOME; accomplishments are a combination of all three, DO, CAUSE, and BECOME. For accomplishments, DO denotes a process verb that is linked by CAUSE to produce the transition denoted by BECOME. States do

not require operators. However, Dowty does not associate any of these operators with specific syntactic structures.

Parsons (1990) proceeds along the same dichotomy, arguing that English causative transitive verbs may quantify over two sub-events, i.e., the causal event or the result event. In contrast to Dowty, Parsons uses the event *e*, highlighting the accessibility of events to such predicates as CAUSE.

In a causative sentence as in (4a), the transitive event of *fly* is derived from the intransitive *fly* as in (4b), but merged with a component of causation. Thus, the prepositional phrase *behind the library* may modify two different aspects of the sentence in (4c), creating ambiguity. In the first reading, it is the kite that is flying behind the library, whereas Mary may be in front of the library. Under the second reading, it is Mary behind the library and performing the action of kite-flying from that position.

- (4) a. Mary flew the kite.
b. The kite flew.
c. Mary flew the kite behind the library.

The logical notation is given in (5), where *Cul(e)* means the culmination of the event. Note that there are two separate events, *e* and *e'*, such that the first event (that of Mary performing kite-flying actions) causes the second event (that of the kite actually flying). Parson uses the ambiguity of (4c) to argue that there must be subevents, in order for there to be two different interpretations of that sentence. This claim fits with the EM view that there are subparts to events.

- (5) (e)[Agent(e,Mary) & Cul(e) & (e')[Flying(e') & Cul(e')
& Theme(e',kite) & CAUSE(e,e')]]

Pustejovsky (1991), already discussed in much detail in §3.2.1, likewise uses similar predicates as CAUSE and BECOME. The primary difference with Pustejovsky is the introduction of multiple levels: the Lexical Conceptual Structure (LCS), the Event Structure, and an additional LCS (called LCS'). Only aspectual information is extracted, separating it from non-eventual information. Thus, the

trend in syntax is towards the selective encoding of meaning, rather than encoding all meaning in the domain of syntax.

5.1.3 Larson, Hale and Keyser

Travis next argues for the articulation of the internal structure of VP, adopting insights from several sources. Her goal is to show that languages with complex verbal morphology, such as Western Malayo-Polynesian languages (mostly Malagasy and Tagalog), provide clues to the internal structure of events. Morphemes from these languages support a hypothesis that certain components of meaning appear in specific configurations, and that these configurations are products of a general articulated aspectual structure that is applicable cross-linguistically (with variations accounted for by parameterization).

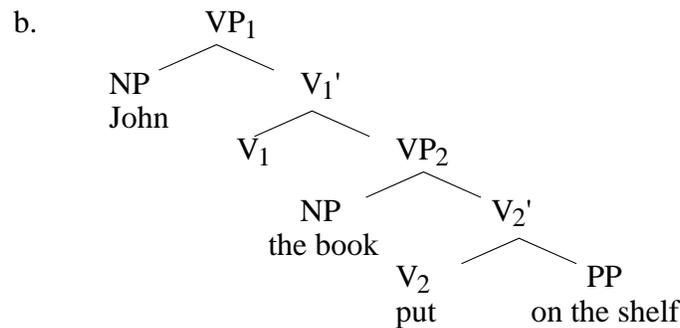
Firstly, following Fukui and Speas (1986) *et al.*, she adopts VP internal subjects, an essential assumption required by the range of Malayo-Polynesian languages to support her syntactic analysis. The Agent (subject or external argument) is base-generated in the specifier position of VP, while internal arguments are dominated by V'. This assumption allows the VP to represent the whole event, including both external and internal arguments. In EM terms, this translates as the fact that agents are indeed participants in the event.

Next, Travis traces the development of the syntactic division between the part of a verb that denotes the uptake process and the part that denotes the distinguished point. Larson (1988) is used to show that a single verb can be represented by not just one VP, but one VP dominating another. Hale & Keyser (1993) is then cited to show that each position or category is associated with a specific semantic function: the upper VP is argued to denote the uptake and the lower VP the transition.

Larson (1988)'s proposal of the Single Complement Hypothesis, which states that a head may only have one argument, introduces the next level of VP

articulation. In effect, each head may only license one element, forcing a binary branching structure. In order for verbs like *put*, which have more than one internal argument, to accommodate all arguments, it is necessary to generate more V heads. Thus, two VPs are required so that in (6a), both *the book* and *on the shelf* will be licensed by a head, as shown in (6b). The verb head in V_2 will undergo head movement to the higher V_1 .

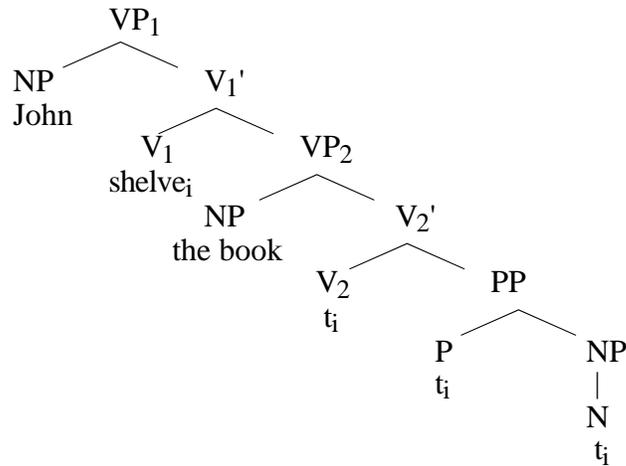
(6) a. John put the mug on the shelf.



The placement of objects is not accidental: a theta-hierarchy (such as proposed by Larson 1988 or Baker 1988) determines where an Agent is base-generated (in the specifier of V_1), where the Theme is base-generated (in the specifier of V_2), etc.

Hale and Keyser (1993) expand upon the Larsonian representation, proposing that syntactic processes like head movement contribute semantics as well. For example, the verb *shelve* is base-generated in the head of N in (7), but moves through the heads P and V_2 to the V_1 node. Its origination in N defines the destination of the endpoint of the action, i.e., *the shelf*. By passing through the P node, a locative meaning (*on*) is picked up. It is further hypothesized that its passage through the V_2 node contributes the meaning of BE/BECOME, and its final target, V_1 , contributes the meaning component CAUSE.

(7)



Principally, the heads of the VPs in the Larsonian shell have been attributed with semantic content. Furthermore, arguments likewise receive specific meanings in specific specifier or complement positions (e.g., Agents are always in the specifier of VP₁). This link between semantics and syntax will allow us to associate the distinguished process with the upper VP, and the distinguished point with the lower VP.

5.1.4 Causatives in Tagalog and Malagasy

Let us examine some Tagalog and Malagasy data. It is shown by Travis that both languages demonstrate a transitive and intransitive alternation, such as for the verb *melt* in English, which can be used either transitively or intransitively. For example, in Tagalog there is the alternation between (8a) and (8b). Note that there is the causative morpheme *pag-* in the transitive form (8b):

- (8) a. *t-um-umba*
X fall down
- b. *m-pag-tumba*
Y knock X down

It is observed that the causative *pag* appears even in verbs without an intransitive form, as shown in (9a,b). Similar behaviour is observed in Malagasy with the causative morpheme *an*. The presence of these morphemes indicates that these verbs have causative meaning despite lacking inchoative counterparts such as (9a).

5.1.5 L-Syntax, S-Syntax, M-Words and S-Words

Travis accounts for the distinction between lexical and productive causatives by considering Hale & Keyser (1993)'s distinction between *l-syntax* and *s-syntax*. Both are parts of the syntactic component. However, *l-syntax* is lexical (permitting idiosyncracies), whereas *s-syntax* is productive. Travis (1999) investigates *l-* and *s-* syntax further, showing that there are two types of causatives in Malagasy (and Tagalog): (i) idiosyncratic lexical causatives formed in the *l-syntax*, which still obey syntactic properties like head movement (cf. the *shelve* example); (ii) syntactic causatives, which are always productive and incur no idiosyncracies. In making the above distinction, Travis also introduces her conception of what constitutes an event (both syntactically and semantically); her notion of event will be linked to Event Mereology and used to explain certain behaviours observed for the Èdó serial verb constructions (investigated later this chapter).

To distinguish between *l-syntax* and *s-syntax*, Travis makes use of the distinction between *m-words* and *s-words*. *M-words*, or morphological words, are units standardly identified as words in a language. A single *m-word* might be *mampanasa* 'make-wash' in Malagasy; *run* in English; *renverser* 'push down' in French, or *dé* 'fall' in Èdó.

S-words are syntactic/semantic words, formed in the *l-syntax*. Travis proposes that *s-words* represent at most one event; an *s-word* is a 'possible word' in the sense of Carter (1976).⁵⁶ It is hypothesized that *s-words* are universal. It is argued that an Event Phrase demarcates the upper limit of the *s-word* in syntax, i.e., the edge of an event and the boundary between *s-syntax* and *l-syntax*. Travis uses Malagasy data to argue for an Event Phrase (EP) immediately above the upper VP, which binds the event argument of the verb, counterpart to the nominal reference *R* (cf. Higginbotham 1985).

⁵⁶See also Chapter Six.

Travis proposes that a "possible" word correlates to a single event, and can at most contain one event, one Cause, one Agent, and two Vs. In English, for example, the word *melt* has the meaning *make melt*, involving a single Cause. However, there is no single word that means *make kill*, which would involve two Causes. She observes that while Malagasy has a word *mampamono* that means 'make kill', it is clearly a s-syntactic causative created from a lexical causative. She makes a comparison between English and Malagasy: what English cannot have in a possible word (due to the double Cause), Malagasy cannot build in an l-syntactic causative.

Note that languages differ in the number of m-words that constitute a single s-word, and the number of s-words that constitute a m-word, due to the morphological/lexical idiosyncracies of the language. For instance, *make wash* involves two causatives, and thus must be two s-words. Expressed in English, it is two separate m-words (*make* and *wash*); in Malagasy, it is *mampanasa* (cause-cause-be.washed), a single m-word. Conversely, *push down* is a single event, and thus a single s-word. However, it is two m-words in English (*push* and *down*), one m-word in French (*renverser*), and two m-words in Èdó (*sùá* 'push' and *dé* 'fall').

Travis defines the s-word independent from morphology, considering an s-word as the structure of one event, with the process syntactically realized by VP₁ and the result by VP₂, linked by causation and involving only a single agent. This concept of the event as an s-word will be explored in further detail later as we examine evidence from serial verb constructions (SVCs), for which Stewart (1998) claims that a distinction must be made between SVCs consisting of one s-word and those consisting of two s-words.

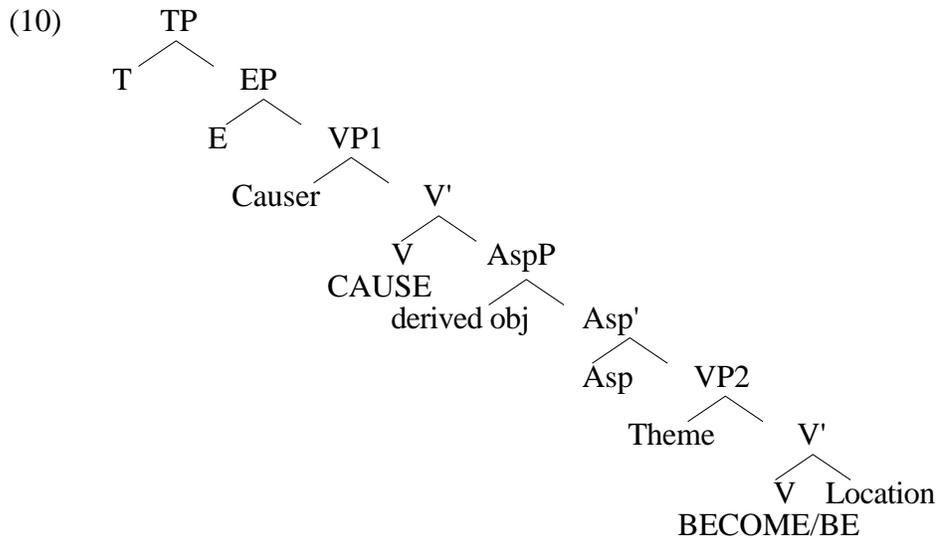
5.1.6 The Articulated VP Structure

As the serial verb analysis in Stewart (1998) adopts Travis's structure, let us complete the picture by discussing Travis's Aspect Phrase. To account for her Malagasy and Tagalog data, Travis also argues for an Aspect Phrase to occupy a position between the two VP layers of a Larsonian VP shell, in addition to motivations from other hypotheses extant in the literature. For example, Mahajan (1990) argued for a functional projection (AgrOP) for object agreement above the VP; Sportiche (1990) proposed that moved objects do not move out of the VP; Johnson (1991) suggested that objects move optionally to the Spec of VP.

Based on these claims, and from parallelisms with dative shift and passive data, Travis (1991, 1994, 1999) places the AspP between the two VPs in the Larsonian VP structure. For Travis, objects move for reasons of case; the specifier position (Spec) of AspP accommodates the object, assigning a completive aspect to the verb phrase. In that position, the Aspect node has syntactic scope over the lower VP, which is the endpoint of the event. Another use for AspP, argues Travis (through a set of intricate interlocking arguments from Malagasy and Tagalog; cf. Travis 1998), is that the non-volitional agents of transitive achievements (e.g., *find*, *reach*) are assigned a theta-role in the specifier of a [+telic] AspP.

Travis incorporates into her structure the sub-event hypothesis, consistent with her analysis of Tagalog and Malagasy: the upper VP (selected by EP) corresponds to CAUSE, whereas the lower VP (selected by AspP) corresponds to BECOME (or the resultant state). The structure is given in (10), and the parts of this structure contribute to the overall (a)telic interpretation of the event, i.e., whether the event is interpreted as having reached an endpoint. Travis argues that AspP is the projection under which telicity and boundedness are calculated, helping to determine the situation aspect (as described in Smith 1991). Telicity, boundedness,

and the effects of plural objects on aspectual interpretation are discussed in the next subsection.



Travis, like several other authors (e.g., Mourelatos 1981, Brinton 1988, Verkuyl 1993, Slabakova 1997), has noted that the operator DO, which is dependent upon volitionality, is not a crucial factor and does not associate DO with a functional node in her tree structure, using CAUSE instead; other authors (e.g., McClure 1994) do retain DO instead of CAUSE, and associate it with a functional node dominating BECOME. Despite this difference, the structural hierarchy remains identical: DO/CAUSE are always structurally higher than BECOME. Processes are associated with the V denoting CAUSE, on the intuition that it is the process which causes the endstate; consequently, processes have syntactic scope over the endstate.

5.2 Telicity, Affectedness, and Boundedness

A discussion of telicity and related topics will clarify what Travis means about telicity being calculated in Aspect Phrase. I examine Tenny (1987), Depraetere (1995), and Verkuyl (1993) below with respect to this question.

5.2.1 Tenny (1987)

Tenny (1987) lends support to the idea that particles, resultatives, and the dative arguments in Double Object constructions all contribute a distinguished point to occurrents (*cf.* Chapter Four). Tenny shows that these three kinds of constructions exhibit similar syntactic behaviour:

- (11) a. All three require a post-verbal accusative object.
- b. All three may appear before or after the accusative object (with the heaviness of the NP a point of consideration).
- c. Each appears singly in a VP: no more than one is allowed.
- d. Each, in conjunction with the verb, select for the accusative object.
- e. All three contribute to the delimiting of the VP event.
- f. The accusative object in the three constructions measure out or delimit the event of the verb.

Tenny (1987) proposes two syntactically relevant properties of aspect: *delimitedness* and *affectedness*, often used in the discussion of aspect, and it would be useful to define them here. *Delimitedness* corresponds to the idea that an event ends; i.e., a distinguished point is reached. For example, there is a difference between depictives (12a-c) and resultatives (12d): in the depictives, the secondary predicate can be either subject-oriented (12a,c), being descriptive of *John*, or object-oriented (12b), where it is descriptive of *the steak*. In contrast, a resultative must be object-oriented: (12c) can only be a depictive, since it cannot have the meaning of the resultative (having a cause-effect relationship) such that John became tired as a result of painting the picture. Since a picture cannot be tired, a resultative interpretation of (12c) is not possible. There are only object-oriented resultatives like (12d).

- (12) a. John ate the steak naked.
- b. John ate the steak rare.
- c. John painted the picture tired.
- d. John painted the picture black.

Tenny's telic and atelic distinction (following Ryle 1949, Kenny 1963, *et al.*) may be thought of in EM terms as the difference between occurrents with a single

distinguished point (the *semelfactive*), and those that do not have a single distinguished point. The former includes all events with a single point of change, while the latter includes both events without an endpoint and those events that are multiple instances of the same event.

Affectedness involves an object that is the target of a change of state. Not only must the affected argument measure out the event, it must also delimit it. Whereas (13a,b) have affected arguments *the steak* and *an aria* (since the steak is consumed and the aria is created word by word), (13c,d) have arguments that are not affected, since *the cart* and *the plane* are not in any way changed by the action, save their spatial location.

- (13) a. Annie ate the steak.
b. Annie sang an aria.
c. Annie pushed the cart.
d. Annie flew the plane.

5.2.2 Boundedness, Telicity, and the Plus Principle

Depraetere (1995) suggests that the telic-atelic distinction is different from the bounded-unbounded distinction. Based on her definitions, telicity is an inherent property of the verb: either a verb has an innate endpoint (e.g., *arrive*) or it does not (e.g., *sing*). In contrast, boundedness determines whether or not the situation has reached a temporal boundary.

These two concepts are separate. Pi, Slabakovka & Uesaka (1997) and Slabakova (1997) explore the distinction between boundedness and telicity in more detail for English, Japanese, and Slavic aspect. Translated into EM terms, telicity is related to whether or not the occurrent has a distinguished point.

Following Verkuyl (1993), the authors above assume that a noun phrase in object position is crucial in determining whether an endpoint to the event may be inferred. Verkuyl (1993)'s goal is to explain aspectual phenomena in terms of a

Plus Principle (with the use of the features SQA and ADD TO), and to capture these ideas (including localism) into a Generalized Quantification Theory.

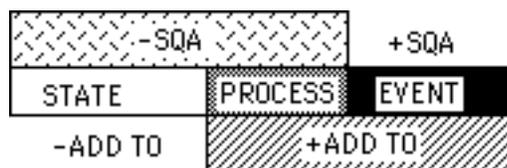
The Plus Principle states that the contributions of SQA and ADD TO elements in the sentence must be all [+feature] in order for the verb action to be interpreted as terminative. The lack of unanimous [+feature]s results in an aspectual leak, and creates a durative interpretation.

[SQA] (*specified quantity of A*) is a trait Verkuyl applies to noun phrases, where [+SQA] means that the object has a fixed bound. [-SQA], which is a characteristic of bare plurals and mass objects, can cause *aspectual leaks*, making a sentence durative. Plural objects make sentences with them atelic.

[ADD TO] is based on Gruber's bipartite division of verbs into change [+ADD TO] and non-change [-ADD TO]. The former includes such verbs as *walk, play, eat*. If a verb is [+ADD TO], then it involves an additive or cumulative process, and must have temporal structure. [-ADD TO] verbs are stative.

Verkuyl states that there is a tripartite ontological classification: STATES vs. PROCESSES vs. EVENTS. This contrasts with Vendler's quadripartite division, which Verkuyl views as an ontological distinction that is relevant at the level of lexical information, rather than at a linguistic level. [SQA] is a structural distinction, where [-SQA] applies to STATES and PROCESSES and [+SQA] applies to EVENTS (which Verkuyl assumes to be those sentences which are terminative). [-ADD TO] applies only to STATES, and [+ADD TO] to both PROCESSES and EVENTS. He states that [ADD TO] is a lexical distinction. This classification is illustrated in (14):

(14)



An essential concept is that the verb phrase uses its object (15a) (or its subject, for passives and intransitives, 15b, 15c respectively) as a kind of 'space' that the Theme moves through. This property correlates with Tenny's affectedness attribute.

- (15) a. John ate *sandwiches*.
b. *The pizza* was eaten.
c. *The ice* evaporated.

For example, in (15a), if John ate sandwiches then John moves through the 'space' created by the sandwiches. In (15b), the pizza itself is the quantity which is consumed over time, and in (15c), the ice is the quantity that evaporates over time. Verkuyl is able to predict which kinds of structures have durative interpretations. For (15a), because *sandwiches* is a bare plural (therefore [-SQA]), the sentence cannot be terminative. For (15b), there is only a single pizza (therefore [+SQA]), and the sentence is terminative. Likewise, in (15c) the ice is a specified quantity, and thus is [+SQA] and terminative.

Under Pi, Slabakova & Uesaka (1997) and Slabakova (1998)'s analyses, verb phrases take into consideration both the [ADD TO] and [SQA] to derive the overall telicity. We assume that bare plurals in object position cannot provide a telic endpoint, since bare plurals are unspecified quantities and thus are [-SQA]. VPs with bare plural objects are thus analyzed as [-telic], on account of the [-SQA] feature.

It is also argued in Pi, Slabakova & Uesaka (1997) that *-ing* indicates an unbounded event, and *-ed/-en* indicates a bounded event. This view is similar to Smith (1991), where the difference is characterized as aspectual viewpoint or temporal perspective. With regards to Event Mereology, boundedness correlates with the concept of coercion: either a change of state reading (*-ed*) can be coerced, or a state of change reading coerced (*-ing*). There are, then, four different distinctions as shown in (16):

English can serve as a springboard for us to look at languages as different from it as serial verb languages, and see how other complex verbal structures can be broken down into such parts as distinguished points and distinguished processes. It has also been claimed that (Mandarin) Chinese is a SVC (Craig & Hale 1988); I will also consider briefly some data from Chinese below. In the end, I hope to show that the idea of the *s-word* arises naturally from the two possible ways of viewing change, as was discussed by Galton (1984) and expanded upon here.

5.3.1 Data on Serial Verb Constructions

I intend to extend the EM theory of aspect developed for English, a non-serial verb language, to true serial verb languages. In Pi & Stewart (1998), an aspectual account of two patterns of SVCs (serial verb constructions) in Èdó, a Kwa language spoken in Nigeria, was proposed. I expand upon the analysis in that paper below, incorporating additional insights and data from Event Mereology and Mandarin Chinese.⁵⁷

There are different structures in Èdó that have usually been lumped into a class called SVCs, but upon closer scrutiny require further refinement in classification. Covert Coordinations (CCs) as in (18a,b) are distinct from true SVCs as in (19a,b) and (20a,b): there is no object sharing in a CC. Each verb in a Covert Coordination has a separate, overt object which receives its own independent internal thematic role, besides other factors pointed out in Baker (1989) and Collins (1997), among others.⁵⁸ The pattern observed for Covert Coordinations may be abbreviated as [Subj V NP1 V NP2].⁵⁹

⁵⁷I aim for a more descriptive explanation of the Èdó data here; for a detailed syntactic analysis, see Pi & Stewart (1998) and Stewart (1998).

⁵⁸In the transcription system adopted for the Èdó data, lax vowels are indicated with an underscore, e.g., [ó].

⁵⁹But see also §5.3.6.1, where the Covert Coordination has a pattern similar to standard SVCs but differentiated by an intonational break.

- (18) a. *Òzọ gbòó ívìn b̀lọ́ ọ̀kà*
 Ozo plant coconut peel corn
 'Ozo planted coconut and [he] peeled corn.'
- b. *Òzọ lé ízè rrí ọ̀rè*
 Ozo cook rice eat it
 'Ozo cooked rice and [he] ate it.'
- (19) a. *Òzọ k̀kó àdésúwà m̀sè*
 Ozo raise Adesuwa be-beautiful
 'Ozo raised Adesuwa to be beautiful.'⁶⁰
- b. *Òzọ gbé úkpù gùghó*
 Ozo hit cup break
 'Ozo hit the cup and it broke.'
- (20) a. *Òzọ lé èvbàré ré*
 Ozo cook food eat
 'Ozo cooked the food and ate it.'
- b. *Òzọ dé èbé tié*
 Ozo buy book read
 'Ozo bought the book and read it.'

In contrast, the two verbs in a SVC share a single surface object, having the pattern [Subj V NP V]. This internal argument sharing criterion defines the term *object sharing*. Each verb assigns their internal thematic roles to a single surface object. Following Stewart (1998), SVCs are defined as those constructions in which the subject must set about the plan of one event which may be resultative or consequential, i.e., the agent intends a single plan of action that is expressed linguistically by two verbs.

A *plan* in this context is an action that could be two actions connected by causation or logical consequence. Stewart also calls this *iconicity*. An example of causation linking two actions is the instance of something breaking as a result of falling. An example of logical consequence is the instance of someone cooking food in order to eat it after, i.e., the two actions may be considered as phases of a single event, since there is a logical connection between the two, based on real world

⁶⁰There is no clear distinction between verbs and adjectives in Èdó.

expectations. In contrast, the sequence of kicking a ball and then washing it are two unrelated actions, and thus cannot be iconic.

Stewart also claims that in Mandarin, two verbs expressing resultative meaning always occur as V-V compounds (21a,b), whereas those that are simply two transitive verbs sharing a single surface object do not occur as V-V compounds (21c,d):

- (21) a. *wo da-si Zhangsan*
 I hit-die Zhangsan
 'I struck Zhangsan dead.'
- b. **wo da Zhangsan si*
 I hit Zhangsan dead
- c. **wo gie-mai rou*
 I cut-sell meat
- d. *wo gie rou mai*
 I cut meat sell
 'I cut the meat and sold it.'

Typical iconic pairs include the following from Èdó and Mandarin. There are clear similarities across the two languages among their iconic pairs:

- (22) a. Èdó
sùá-dé 'push-fall', *dé-wú* 'fall-die', *gbé-guòghó* 'hit-break',
kó!kó-mó!sé 'raise-be beautiful'
- b. Mandarin
tui-dao 'push-fall', *die-si* 'fall-die', *da-puo* 'hit-break',
da-si 'hit-die', *tang-ping* 'iron-flat'

From this description, it appears that the iconicity described by Stewart is closely related to the s-word described by Travis. There are two actions related by causation. However, additional data will show that there are two kinds of SVCs, of which only one (the resultative SVC) can qualify as s-words.

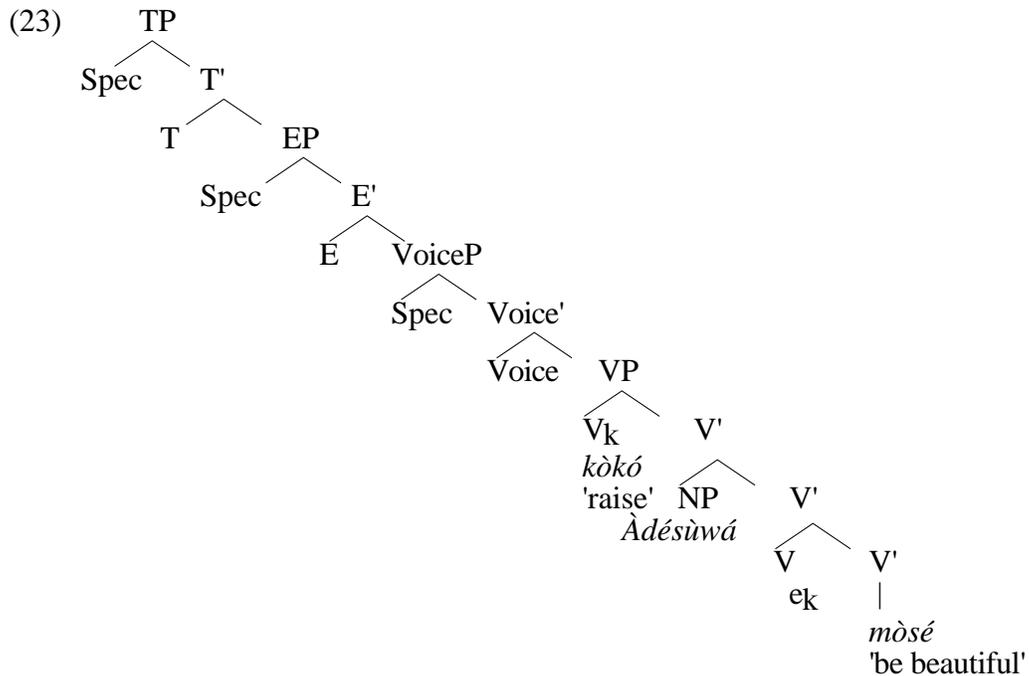
5.3.2 Previous Analyses of SVCs

There are at least two views in syntax on the internal argument sharing criterion, where a single surface object receives distinct internal thematic roles from

two different verbs. It is problematic for most theories of theta-role assignment for an object to receive two different thematic roles. Baker (1989) posits a double-headed VP structure wherein the verbs directly theta-mark a single object NP position without an empty category post-V2, for all SVCs. In contrast, Collins (1997) posits that all SVC object sharing is mediated by an empty category, *pro*, so there would be no true internal object sharing as in Baker.

Stewart (1998) challenges these two views, arguing that there is not a single, unified class as assumed by the aforementioned analyses, but that in fact there are two kinds of SVCs with distinct syntactic structures (modifications of Travis's structure).

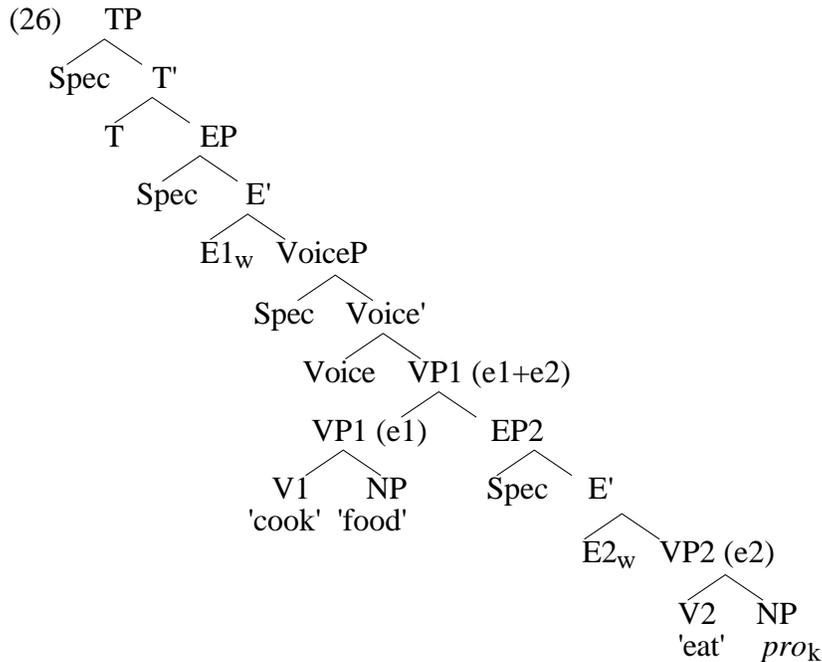
Under Stewart's theory, resultative SVCs, shown earlier in (19a,b), have the structure in (23) and the properties in (24a-d). Note the use of a single Event Phrase.



- (24) a. V2 is always unaccusative.⁶¹
 b. There is a single object NP (true object sharing; no empty category).
 c. There is one event (one s-word): both verbs express a single event that is existentially quantified-over by a single event operator, head of EP (Event Phrase).
 d. The two verbs form a co-headed VP (both verbs are non-distinct).

Consequential SVCs, shown in (20a,b), have the properties in (25a-e) and the structure in (26). There are two Event Phrases:

- (25) a. Both V1 and V2 must be transitive.
 b. There are two events (2 s-words): each verb heads a separate VP and expresses an unique event ($e1, e2$).
 c. Each event is licensed by a separate event operator, head of EP.
 d. The two (functional) E heads are asymmetric (E1 quantifies over the two events, $e1$ and $e2$, and binds E2).
 e. Object sharing is mediated by an empty category, *pro*.



Thus, the key difference between a resultative and a consequential SVC in terms of event structure is that the former is a single event (or s-word), whereas the latter is two events (or s-words). In terms of the data, they are distinguished by the following patterns. Resultative SVCs (27) have the [NP₁ V₁ NP₂ V₂] pattern where NP₁ is the subject of the transitive V₁, and NP₂ is the object of V₁ and the subject of the intransitive V₂. In contrast, consequential SVCs (28) have the same [NP₁ V₁

⁶¹Unaccusative verbs in Èdó include stative verbs (Baker & Stewart 1997).

NP₂ V₂] pattern but NP₁ acts as the subject for both V₁ and V₂, just as NP₂ acts as the object for both verbs.

(27) resultative SVC [Subj₁ trans-V₁ obj₁/subj₂ intrans-V₂]

(28) consequential SVC [Subj_{1,2} trans-V₁ obj_{1,2} trans-V₂]

5.3.3 Syntactic Tests for SVCs

Let us look at his evidence for making this dichotomy. Previous analyses of SVCs distinguish between resultatives and consequentials by intuition rather than systematically. Stewart (1998) is an exception, claiming that a resultative SVC consists of a single event, whereas a consequential SVC consists of multiple events.

He uses the following syntactic tests, among others:

- (29) a. the anaphoric particle *tòbòrè*
 b. INFL-type adverbs, like *gìégìé*
 c. the iterative morpheme *ghá*
 d. predicate clefts

With the *tòbòrè* particle test in (29a), Stewart observes that that adverbial particle has anaphoric properties, semantically being much like *herself* in the English sentence *She made the dress herself*. The adverb may also be viewed as a type of intensifier.

It is observed in the resultative SVC (30a) that it is ungrammatical for this particle to appear after the unaccusative V₂. In contrast, in the consequential SVC (30b), there is no problem for *tòbòrè* to appear after a transitive V₂.

- (30) a. *Òzó sùá ògók dé tòbòrè_k
 Ozo push bottle fall itself
 b. Òzó dé ìyán_k dùnmwún tòbòrè_k
 Ozo buy yam pound itself
 'Ozo bought the yam and pounded it (itself).'

Stewart hypothesizes that the anaphoric adverbial particle *tòbòrè* can only right-adjoin to an NP or an empty category *pro* that is its antecedent. Stewart uses this evidence to argue that there is no empty category after the second verb in

resultative SVCs, whereas in consequential SVCs there is an empty category (*pro*) after the second verb, to which the particle can right-adjoin. In a simple sentence with an unaccusative verb as in (31a), the *tòbòrè* particle may appear after the unaccusative verb, taking the trace of the object of an unaccusative verb as its antecedent. In (31b), *tòbòrè* can also be licensed by the object of the verb *dùnmwún*.

- (31) a. *ògók dé t_k tòbòrè_k*
 bottle fall itself
 'The bottle fell, itself (alone).'
- b. *Òzó dùnmwún ìyán_k tòbòrè_k*
 Ozo pound yam itself
 'Ozo pounded the yam, itself.'

For the test in (29b), Stewart shows that the INFL-type adverb *giégié*, which means 'quickly', cannot appear before V₂, as shown in the resultative SVC in (32a). However, consequential SVCs can have a pre-V₂ INFL-type adverb as in (32b).

- (32) a. **Òzó sùá Àdésúwà gié!gié dé.*
 Ozo push Adesuwa quickly fall
 'Ozo pushed Adesuwa down quickly.'
- b. *Òzó dùnmwún èmà gié!gié khién.*
 Ozo pound yam quickly sell
 'Ozo pounded the yam and quickly sold it.'

Stewart assumes that INFL-type adverbs are licensed as left-adjuncts to the head of EP. Since the EP is taken to represent an event (s-word) in the syntax, the distribution of INFL-type adverbs will match up with the number of EPs to reflect one (resultative) or two events (consequential). Thus, Stewart predicts that there is a single event in resultative SVCs but two in consequential SVCs.

Evidence presented in Stewart (1998) shows that the iterative morpheme *ghá* likewise cannot appear before the V₂ of a resultative SVC, whereas it is permissible for *ghá* to appear pre-V₂ in a consequential SVC.

Finally, Stewart shows that the predicate clefts are likewise indicative of the structural difference between consequential and resultative SVCs. It is

ungrammatical to cleft either of the verbs in a resultative SVC. In contrast, either of the verbs in a consequential SVC may be clefted. Stewart argues that this observation supports the claim that the two verbs in a resultative SVC act as a single unit, whereas the two verbs in a consequential SVC are not as closely linked. For details of these last two tests, see Stewart (1998).

5.3.4 Serial Verb Constructions and Micro-Events

To connect Event Mereology with the analysis of resultative and consequential SVCs, we take as a starting point several ideas that have their origins in Dowty (1979) and were further developed in subsequent works (e.g., McClure 1994), extending the scope of their analyses of accomplishments in non-SVC languages to serial verb languages.

Recall that the idea of the *s*-word leads to an event being minimally a distinguished process or a distinguished point, as in (33a) and (33b), and maximally a combination of both, as in (33c). This minimal event of change is the *s*-word (*s*). The diagrams below show which the event parts *s* is specified for.

- (33) a. $\begin{array}{l} s \\ | \\ \text{dP} \end{array}$ activities
(transitives)
- b. $\begin{array}{l} s \\ | \\ \text{dT} \end{array}$ achievements
(unaccusatives)
- c. $\begin{array}{l} s \\ \swarrow \quad \searrow \\ \text{dP} \quad \text{dT} \end{array}$ accomplishments
(properties of both transitives/unaccusatives)
most complex s-word possible

It has been observed that not all languages exhibit the same freedom in transitivity alternations as English. However, the verb *tìé* 'read' in Èdó behaves like its English counterpart, as seen in the parallelism between (34a) and (34b) with (35a) and (35b), respectively. Thus, it is assumed that accomplishments are complex in Èdó as in English.

- (34) a. *Òzọ̀ tíèrè là áwá ọ̀kpá*
 Ozo read for hour one
 'Ozo read for an hour.'
- b. *Òzọ̀ tíé èbé là /vbè áwá ọ̀kpá*
 Ozo read book for / in hour one
 'Ozo read a book for an hour/in an hour.'
- (35) a. John read for an hour.
 b. John read a book for an hour/in an hour.

McClure (1994) claims that there are two kinds of transitive verbs: those derived from unaccusatives (36a,b) and unergatives (37a,b):

- (36) a. The bottle broke. *break*: unaccusative
 b. John broke the bottle.
- (37) a. John baked. *bake*: unergative
 b. John baked a cake.

There is a semantic motivation for the split between unaccusatives and unergatives. I adopt the analysis that only states and achievements are unaccusative. Conversely, all activities must be unergative. Since Event Mereology classifies achievements as those that contain distinguished points, we predict achievements to be unaccusatives canonically. States behave achievement-like in resultatives, providing the boundary for the newly obtained state. Thus, under those circumstances, states likewise involve a distinguished point.

However, following Hale & Keyser (1993), unergatives are analyzed here as underlying transitives with a covert cognate object. Instead of assuming that activities are all unergative, the Èdó SVC data shows that the canonical activity is transitive.

To summarize, *distinguished points (dT)* are linked to *achievements*, which are *unaccusatives* syntactically. In contrast, *distinguished processes (dP)* are linked to *activities*, which are *transitives* syntactically.

5.3.5 Resultative and Consequential SVCs

I show below that a resultative SVC consists of a single s-word, and pattern very much like English resultatives. A resultative SVC in Èdó exhibits a distinguished process part and a distinguished point part, just as an English resultative also has *dP* and *dT* components. It has been argued already that accomplishments and resultatives are juxtapositions of *dT* with *dP*: this combination is the only possibility for a complex s-word permitted by the assumptions given thus far. It is this highly constrained event structure which yields the differences between resultative and consequential SVCs. A consequential SVC does not have a cause-effect relationship as a resultative SVC does, and is not accomplishment-like.

Like English, Èdó allows *V+Adj* and *V+P* combinations (resultatives and verb-particle compounds), which compositionally define a single event. Yet serial verb languages differ from English in one crucial respect: two verbs may compositionally define a single event, because in Èdó, a V2 is present. Whereas adjectives and prepositions are predicates that can be used to delimit two complementary states, as described in the previous chapters, and are naturally associated with distinguished points, the verb in V2 position can have a lexically-independent aspectual specification of *dP* or *dT*, i.e., a process or a transition. This variability increases the number of combinations predicted to four possible classes, since both V1 and V2 could have two independent values (*dP* or *dT*).

In a resultative SVC, the two verbs are causally related. Stewart (1998) proposes that this causal relation is a characteristic that obtains only in the case where the two verbs can be interpreted as a single s-word. This causal relationship is shown in (38a,b).

- (38) a. Òzò sùá Uyi dé
 Ozo push Uyi fall
 'Ozo pushed Uyi and made him fall.'

- b. *Òzọ gbé èmá!tón pèrhé*
 Ozo hammer metal flat
 'Ozo hammered the metal flat.'

A resultative SVC (*rSVC*) exhibits the following characteristics:

- (39) a. the V1 of an *rSVC* must be an activity verb and never a stative, achievement or accomplishment verb;
 b. it can only have one event delimiter;
 c. just like accomplishment verbs, it can only be modified by *in an hour*, not *for an hour*.

These facts are shown respectively in (40a-c):

- (40) a. **Òzọ bọ òwá mósé*
 Ozo build house be-beautiful
 'Ozo built the house to be beautiful.'
- b. **Òzọ má úkpù zèzè guòghó*
 Ozo mould cup hard break
 'Ozo moulded the cup so hard that it broke.'
- c. *Òzọ kòkó àdésúwà mósé vbè ùkpó isén/ *là ùkpó isén*
 Ozo raise Adesuwa be-beautiful in year five/*for year five
 'Ozo raised Adesuwa to be beautiful in five years/*for five years.'

In contrast, in a consequential SVC, the verbs exhibit temporal ordering rather than causation. There are also no such rigid aspectual constraints as those cited in (39) which require the two verbs in a consequential SVC to be interpreted as a single event as opposed to two separate events, as the data in (41) show.

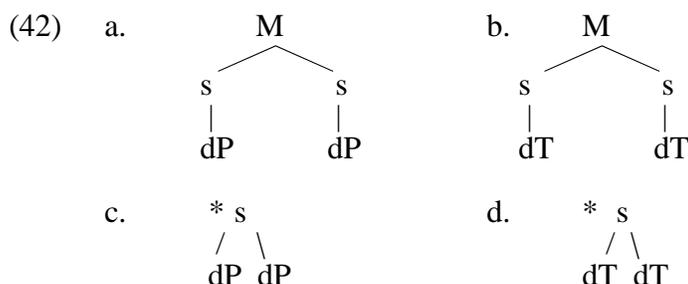
- (41) a. *Òzọ bọ òwá khién*
 Ozo build house sell
 'Ozo built the house and sold it.'
- b. *Òzọ mién úkpù dé khién*
 Ozo see cup buy sell
 'Ozo saw the cup, bought it and sold it.'
- c. *Òzọ dé ékpò ízè lé là ùkpó isén/vbè ùkpó isén*
 Ozo buy bag rice eat for year five/in year five
 'Ozo bought a bag of rice and ate it for five years/in five years.'

Pi & Stewart (1998) propose that the lack of a causal relationship between a consequential SVC's V1 and V2 is predicted by their inability as two transitives (i.e., two *dPs*) to juxtapose in a single s-word (which only permits a *dT* and *dP* pairing). V1 and V2 in a consequential SVC must therefore belong to separate s-words that

are arranged in a manner closer than that of simple coordination, since consequential SVCs are quite distinct from Covert Coordinations syntactically and semantically.

If the two verbs in a consequential SVC cannot belong to the same s-word, then they must belong to two distinct s-words. These two s-words form a *macro-event* instead, in which the temporal ordering relation is dominant. Covert Coordinations, which conjoin multiple Event Phrases, are similar to conjoined macro-events. Covert Coordinations appear to be asyndetic conjunctions. The structure of Covert Coordinations and their behaviour are too complicated to go into here: only the difference between the two SVCs are discussed in detail.⁶²

A *macro-event* (*M*) is compositionally built from multiple s-words, as shown in (42a,b). Theoretically, two distinguished processes (42a) or two distinguished points (42b) can occur as a single macro-event (42a,b) but not as a single s-word (42c,d).



The EM proposal accounts for these three observations about resultative SVCs in Èdó, summarized in (43a-c):

- (43) a. V1 is always a process and V2 is always an endstate or achievement verb, because of syntactic constraints on the realizations of the two components of the resultative
- b. a rSVC only has one event delimiter because an s-word has just one distinguished point
- c. a rSVC behaves like an accomplishment because the event structure of the resultative SVC is the same as that of an accomplishment.

⁶²See Stewart (1998) for a discussion on Covert Coordinations.

Thus, the Èdó data thus far supports the analysis that resultative SVCs have the same internal event structure as accomplishments, and that a unified eventive analysis of accomplishments in both SVC and non-SVC languages should be ultimately possible. However, in the next section it will be shown that Èdó double unaccusatives (*dT* + *dT*) exhibit properties of resultative SVCs. While in English, such two-*dT* combinations (as in 42b) cannot be *s*-words, the Èdó SVC data on double unaccusatives seems to contradict that constraint. I will discuss possible solutions to this difference between English and Èdó next.

5.3.6 Four Possible Patterns

Below, the four predicted V1 and V2 combinations are examined separately. (44a-d) summarizes what the four possible patterns with *dP* and *dT* are. Data on the members of these classes are given in the ensuing subsections. The problematic case is seen in (44d).

(44)	V1	V2	Predicted	Data
a.	<i>dP</i> (<i>transitive</i>)	<i>dT</i> (<i>unacc</i>)	rSVC	rSVC, CC
b.	<i>dT</i>	<i>dP</i>	CC	CC
c.	<i>dP</i>	<i>dP</i>	cSVC	cSVC
d.	<i>dT</i>	<i>dT</i>	cSVC	<u>rSVC</u>

5.3.6.1 Distinguished Point With Distinguished Process

In (44a), that of a distinguished process in V1 followed by a distinguished point in V2, is exactly what the theory predicts would yield a single *s*-word, as shown in (45).

(45)	$\begin{array}{c} s \\ / \quad \backslash \\ dP \quad dT \end{array}$	<i>single s-word</i>
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Its counterpart is shown in (44b), where the order of *dP* and *dT* is reversed: V1 accommodates the *dT* while V2 accommodates the *dP*. The sole difference in word order yields two very different structures: while the $\langle dP, dT \rangle$ yields a

resultative SVC, $\langle dT, dP \rangle$ has to be a case of two events conjoined by parataxis, i.e., Covert Coordination as in (46). Covert Coordinations are very free in their structure, since many different kinds of VPs or events may be conjoined. A clear intonational break signals the divide between the two events of a $\langle dT, dP \rangle$ Covert Coordination (as indicated by the comma).

- (46) *Òzó dé, lé èvbàré*
 Ozo fall cook food
 'Ozo fell, and (he) cooked food.'

An intonational break can also signal the presence of a Covert Coordination with a $\langle dP, dT \rangle$ order. (47) has a $\langle dP, dT \rangle$ order that resembles a resultative SVC on first glance, but there can be a clear intonational break between the two events (again shown by the comma). Note that in (47) there is no object sharing; it is the subject *Ozo* that participates in the second action. Here as well the pause indicates the presence of a Covert Coordination, thereby distinguishing it from a resultative SVC.

- (47) *Òzó sùá Uyi, dé*
 Ozo push Uyi fall
 'Ozo pushed Uyi, and Ozo fell.'

Given that the $\langle dP, dT \rangle$ ordering can be either a resultative SVC or a Covert Coordination (given the presence of an intonational break), it stands to reason that some factor aside from simple word order determines the difference between rSVCs and CCs. Covert Coordinations, which lack object sharing, likely are conjunctions of events with separate and full syntactic structures, as opposed to resultative SVCs, which are able to form a single s-word within a single EP. However, the properties of Covert Coordinations are too complex to give a full analysis here. Tentatively, it is sufficient to assume that Covert Coordinations of the sequence $\langle dT, dP \rangle$ are structurally either macro-events conjoining two s-words, as in (48a), or conjunctions of two macro-events as in (48b), setting them aside from s-words. Likewise, for

CCs of the sequence $\langle dP, dT \rangle$, the same structures are suggested, *mutatis mutandis*.

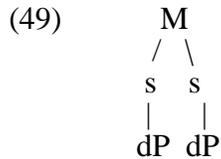


If word order does not determine the difference between resultative SVCs and CCs, then it is reasonable to suppose that the word order $\langle dP, dT \rangle$ of a rSVC is a consequence of the verbs being ordered that way by a different mechanism. Like the analysis proposed for English resultatives in Chapter Four, the process precedes the transition due to the hierarchy of syntactic nodes: following Dowty (1979), the CAUSE operator (linked with dP) is structurally higher than the BECOME operator (linked with dT). Processes cannot be licensed in the lower V2 position, but must be higher structurally in V1, adjacent to the CAUSE operator. Stewart (1998) and Travis (1994, 1999) likewise support this structural ordering. We then expect that a rSVC s-word's set of $\{dP, dT\}$ components must always be linearized with the order, dP verb preceding the verb dT verb; that is to say, a rSVC that places its dT in V1 and dP in V2 will be ruled out because the respective verbs are not licensed to occupy those positions, given their lexical specifications.

5.3.6.2 Two Distinguished Processes

The $\langle dP, dP \rangle$ ordering in (44c) is a case where there is object sharing (cf. Déchaine 1993, Baker 1989, Collins 1997, *et al.*), but it is neither a resultative SVC syntactically nor semantically. As the constraint on s-word composition predicts, two distinguished processes cannot form a single s-word. Instead, each dP must belong in a separate s-word. A SVC that contains two s-words is instead a macro-event, as in (49). If the surface string of a macro-event shows apparent object

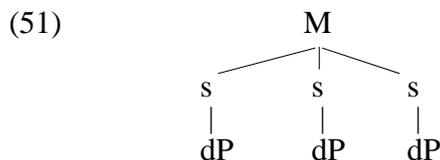
sharing, distinguishing it from a Covert Coordination, then that SVC is a consequential.



Note that a consequential SVC is capable of accommodating more than two verbs, as in (50a), but a resultative SVC can only accommodate two verbs at most (50b):

- (50) a. *Òzó dé iyán lé ré* (cSVC)
 Ozo buy yam cook eat
 'Ozo bought the yam, cooked it, and ate it.'
- b. **Òzó gbé àkhé ghuòghó kànmwán* (rSVC)
 Ozo hit pot break be.short
 'Ozo broke the pot into small pieces.'

The stacking of additional verbs is only permissible in a consequential SVC, since cSVCs deal with temporal ordering rather than causation, and temporal ordering is not as limited as the cause-effect phenomenon. Unlike resultative SVC s-words, which can only be composed of one *dP* and one *dT*, consequential SVCs are composed of several s-words that chain together to form a macro-event, as shown in (51). There is no restriction on the internal structure of macro-events that parallel the constraint on the internal structure of s-words. Covert Coordinations are of course rather free in conjoining multiple entities, and likewise permit such stacking.



Furthermore, it is observed that consequential SVCs always involve transitive verbs in both V1 and V2 position; this phenomenon is predicted by the theory. Recall that Stewart (1998) argues that *pro* is present in the consequential SVC

structure, rather than having true object sharing as resultative SVCs do. Recall Hale & Keyser (1993)'s analysis of unergatives, where unergatives at d-structure have underlying cognate object. In a consequential SVC where only the first verb is overtly transitive, Hale & Keyser (1993) would analyze the object position of V2 as being filled by an empty category that acts as the underlying cognate object. This empty category corresponds to the *pro* as proposed in Collins (1997), Baker & Stewart (1997), and Stewart (1998). The presence of this empty category provides the conditions for *tòbòrè* to right adjoin, accounting for the difference observed previously between resultative and consequential SVCs.

5.3.6.3 Double Unaccusative SVCs

Lastly, we examine (44d), where two *dTs* appear simultaneously in the SVC. According to the theory, it is predicted that such $\langle dT, dT \rangle$ SVCs cannot be s-words and must be macro-events (or, if there is no object sharing, Covert Coordinations). However, the *double unaccusative SVCs* data in (52a,b) suggest that these SVCs are s-word resultative SVCs, since there is a strong causative component in the semantics of these constructions.

- (52) a. ògó dé guòghó
 bottle fall break
 'The bottle fell (and as a result of the falling it) broke.'
- b. Òzọ dé wú
 Ozo fall die
 'Ozo fell (and as a result of the falling he) died.'

To understand where the prediction goes wrong with these double unaccusatives, let us consider some possible ways for these $\langle dT, dT \rangle$ combinations to constitute resultative SVCs. There are two kinds of solutions: maintaining *dP* and *dT* as the only possible structure for s-words, or changing our concept of the s-word. I consider both kinds below.

5.3.6.3.1 Keeping the Internal Structure of the S-Word

Let us first consider the cases where the s-word remains a juxtaposition of *dP* with *dT*. We observe that the class of double unaccusative SVCs is rather limited; there are only a few examples of these SVCs, where the V1 is usually *dé* 'fall' or *guòghó* 'break'. It could be that these resultative SVCs are exceptions, created by the lexical properties of the first verb. These verbs that seem to be achievements (unaccusatives) are lexically specified to permit a process reading whenever they appear in V1 position.

Alternatively, we can argue that the verbs of this limited class are misclassified as *dT* verbs, and should be *dP* verbs. Such a hypothesis works for *dé* 'fall'. The semantics of *fall* is such that an object may fall for a duration without reaching a distinguished point; landing is an implicature, not an entailment. Consider, for instance, the following datum from English (53), showing that falling does not involve a distinguished point (except as coerced by the past tense morpheme):

- (53) Alice fell for five days in that damned rabbit hole, and is still falling,
for all I know.

Unfortunately, the same cannot be claimed for *guòghó* 'break' (54), which is an achievement verb, and consequently must have a *dT* specification. However, note that there is a fundamental difference between the double unaccusative rSVCs involving 'fall' and 'break': the former type can take an actual *dT* verb in V2 position, whereas the latter type takes an adjectival predicate as V2. The second type is akin to resultatives in English, where the secondary predicate is adjectival. It is possible that the adjectival nature of the second predicate permits the violation of the constraint on the internal structure of s-words.

- (54) *àkhé guòghó khànmwán*
pot break be-short
'The pot broke into small pieces.'

Yet there is an inherent flaw to classifying *dé* 'fall' as *dP*: In 'push-fall' resultative SVCs, that classification for *dé* would render a $\langle dP, dP \rangle$ s-word, again not a desirable result for our theory.

Another possibility along these lines is that the proximity of the CAUSE operator to V1 changes an unaccusative verb (*dT*) in that position into a transitive verb (*dP*). The appeal of this hypothesis is that it does not require us to reassign the *dT* value of verbs like *guòghó* 'break'. However, this explanation would not explain why the class of double unaccusative SVCs is so limited. Why is it that more *dT* verbs do not take on the properties of a distinguished process in V1 position? Is there a reason why the change is not very productive, without resorting to a lexical solution as mentioned earlier? There does not appear to be a solution that accommodates this hypothesis that does not involve some sort of lexical idiosyncrasy pertaining to the verb, and the limited class of such verbs remains an issue in all the hypotheses presented here.

It is possible that this type of coercion, based on the idiosyncrasies of the verb appearing in V1, is workable. Recall that iconicity plays a part: two actions are so closely related by cause and effect that a resultative SVC structure is chosen. The first verb, though initially a transition, is coerced to yield an activity reading. It is likely that verbs like *dé* 'fall' or *guòghó* 'break' are well-suited semantically for such coercion, based on a strong causative meaning component inherent in the verbs.

Finally, let us consider the possibility that verbs like *dé* 'fall' or *guòghó* 'break' are underspecified for both *dP* and *dT*. By so classifying these verbs, there would be no conflict between having *dé* 'fall' be coerced into *dP* in V1 and *dT* in V2. However, this solution does not work well for *guòghó* 'break', since a distinguished point reading seems to be core to its meaning.

It appears, then, that the direction for further research utilizing this set of solutions should focus on collecting more Èdó data on these unaccusative SVC

constructions, to better determine whether there is any basis for reclassifying the verbs. Such a task would bring us outside the scope of the present thesis, and thus I leave the project for future exploration.

5.3.6.3.2 Altering the Internal Structure of the S-Word

The other type of modifications to our assumptions is to change the definition of the s-word itself. In general, this type of solution weakens the hypothesis maintained by Event Mereology, that a single event of change has only two modes of perception and grammaticalization (change of state and state of change).

One modification of this type is to permit SVC s-words to have two *dTs*, permitted because these languages possess two V heads in a single VP projection. Such a difference may be parametrized for. A parallelism might be drawn between the double unaccusative problem and colour classification, discussed previously. Recall that for some languages, the single colour term *grue* covers two focal colours (*green* and *blue*). If distinguished points are similar to focal colours, it may be the case that SVC languages single s-words can have bifocal distinguished points (i.e., two *dTs*), just as single-word colour terms with bifocal colours exist. Whereas English events permit only a single change of state (*dT*) to be encoded by the verbs, Èdó might treat events as naturally permitting two changes of states.

The problem with this approach is that its adoption might open up a new can of worms: why not allow two *dPs*, or more than two of any specification, in an s-word? The constraint on s-word structure, which limits the amount of possibilities simply by stating that at most both kinds of perception of change (*dP* and *dT*) can be specified in an event, becomes an arbitrary claim with this line of thought.

Another possibility is that there is a tripartite instead of a bipartite division of s-words, where the s-word is subdivided into distinguished point (*dT*), distinguished process (*dP*), and distinguished result (*dR*). The distinguished result can be similar

to a *dT* as well. So, in (52a), *dé* 'fall' is a transition and *guòghó* 'break' is the result of that transition.

While this solution would provide for richer variations in the verb classes, it would require drastic re-evaluations of the other Event Mereology hypotheses. For instance, this alteration would have to account for the non-appearance of s-words with all three components simultaneously, since at most a resultative SVC has two verbs and cannot be stacked (as demonstrated earlier). Also, such a theory would have to account for the impossibility of $\langle dT, dP \rangle$ s-words.

Another possibility is that the V2 in these apparent $\langle dT, dT \rangle$ resultative SVCs is actually emphatic, much in the way of sentences like (55a,b), pointed out by Levin (1993).

- (55) a. The river froze.
b. The river froze solid.

In these sentences, the verb *freeze* already implies a resultant state of solidity, since *the river froze solid* is roughly synonymous to the sentence *the river froze*. The addition of the adjective *solid* to (55a) does not render the sentence ungrammatical. Note, however, that there is a difference between (55a) and (55b). In (55a), the river does not have to be completely frozen, whereas in (55b), there is a sense of complete solidity. The adjective in (55b) contributes an emphatic sense, extending the implicature of solidity associated with *freeze* to an entailment of solidity.

In the same vein, perhaps the apparent $\langle dT, dT \rangle$ construction is in fact an s-word consisting of a single *dT*, and the V2 is a kind of emphatic modifying the end result of the V1 distinguished point; it is not an independent distinguished point, but is in actuality a clarification of the effect of the distinguished point.

Consider (52a,b) again: in these sentences, the verb *dé* 'fall' has an implicature of damage. Falling is an action that more often than not causes some other action or result upon hitting a surface. Verbs like *guòghó* 'break' and *wú* 'die'

provide entailments of damage much in the same way that *freeze* and *solid* are related to one another. Yet, note that the parallelism is not exact: whereas it is more conceivable to have *solid* be a semantic subcomponent of *freeze* (in the sense that for something to freeze, it must become to some extent solid), it is harder to justify *break* as a semantic subcomponent of *fall* (i.e., for something that has fallen, it is not an entailment that it must also be broken). The second verb contains much more information than a secondary adjectival predicate. The connection may be too tenuous to be of any use.

At present, I do not find any one solution to be superior to the others, although it seems necessary in all cases to restrict the class of unaccusative verbs that participate in double unaccusatives by means of lexical specification. Since double unaccusatives remain a problem for most current analyses of SVCs and not very well understood, more can be said about this peculiar construction once more data on double unaccusative SVCs have been investigated.

5.4 Summary

In summary, Travis (1999) has been examined and shown to accommodate such concepts as distinguished points and distinguished processes. It is hypothesized that accomplishments are s-words composed of maximally a distinguished point and a distinguished process. Resultative SVCs in Èdó are shown to be s-words. By having a distinction between s-words and macro-events, we are able to account for the differences between resultative and consequential SVCs.

Hopefully, the analysis above will encourage further cross-linguistic comparisons of accomplishment constructions in non-serial verb languages with resultatives and consequentials in serial verb languages from an EM perspective.

Chapter Six

Summary and Directions for Future Research

6.0 Summary

The aim of this thesis was to present in detail arguments against location-based accounts of the representation of change, in favour of an event-based analysis. Two main objectives in the development of the Event Mereology system of aspect were the unification of motional and non-motional change, and the unification of verbal and prepositional representations of change.

In pursuit of an analysis that unified motional and non-motional change, it was shown that a tripartite *source-internal path-goal* division to encode change in verbal and prepositional lexical entries was inadequate: it overgenerated the number of verb classes, and required the use of metaphor to extend motion-specific ideas to verbs of change-of-state. I argued that an account of change based on event primitives addressed the nature of changes more directly and more generally.

It was shown that two types of event parts, the distinguished point and the distinguished process, were more useful and economical than locational approaches in accounting for change and aspect. Differences between using an ontology of locations versus an ontology of events were discussed, and such notions as state, process, and point of change from various analyses were examined in detail and improved. For example, the *comprised of* relation was argued to be superior to homogeneity as a characterization of states and processes: states do not consist of substates, whereas processes may be comprised of subprocesses.

It was proposed that various combinations of distinguished points and distinguished processes accounted for Vendler aspectual classes: an achievement consisted of a single distinguished point; an activity, a single distinguished process; and an accomplishment, both a distinguished point and a distinguished process.

Some types of information were shown to be irrelevant in the calculus of aspect, and thus not encoded lexically; for instance, while an act of arrival likely involved a motion preceding the actual transition, that uptake process was underspecified for the verb *arrive*. Significant in the simplification of representation was the use of the distinguished point as a boundary between two complementary valuations of a single predicate. It was also demonstrated how other phenomena, such as imperatives and verbs like *deviate*, behave like achievements, due to some type of transition between two complementary states. Resultatives were shown to be standard accomplishments, and coercion was argued to account for shifts in verbal interpretation incurred by morphemes such as *-ed* and *-ing*.

A key argument against localism was the demonstration that internal paths were not primitives, but derived. Internal paths were epiphenomena of two distinguished points interacting, and their form was dependent on pragmatic factors. 'Medial' prepositions were shown to be insufficient grounds for positing an internal path primitive, as they could be accounted for via a distinguished point and an axial specification.

Prepositions like *in* which could take either a concrete entity (*in the plane*) or an abstract state (*in shock*) as a prepositional complement were analyzed as incorporating metarelations, whose spatial components activated only when their reference object was physical.

It remained necessary for the developed general theory of change to account for locational data. To this end, a system using distinguished points and processes was proposed to account for a set of strictly motional data involving verbal and prepositional composition.

Finally, the Event Mereology analysis of aspect was shown to be compatible with a specific syntactic analysis, and may be used to account for two serial verb constructions in Èdó.

6.1 Directions for Future Research

Aside from pursuing further the topics discussed herein (e.g., event composition), there remain many different avenues for future research into Event Mereology, including (i) other phenomena which use a *dT* to demarcate two states, (e.g, the comparative *-er*); (ii) deixis; (iii) the connection between word complexity and event mereological entities like *dT*s via an *Aspectual Load Hypothesis (ALH)*. I sketch out these possible directions for investigation below.

6.1.1 The Comparative

The comparative suffix *-er* compares two things *x* and *y* with respect to the predicate *S*. When used with qualities, the modified adjectives behave like phrases describing states of affairs (1a-c). In (1d,e), there are definite changes in degrees of the associated adjectival predicate. The adjectival predicate can be spatial (1d), but need not be (1e). As long as the predicate *S* can have degrees, *-er* can modify it. Even predicates that appear ungradable, like *alone* or *pregnant*, can be interpreted as gradable on special readings: *John felt more alone every year; Mary became more pregnant by the month.*

- (1) a. David stood closer than everyone else.
- b. David is wiser than Mary.
- c. David is faster at typing than Bill.
- d. David came closer.
- e. David became wiser.
- f. David became wiser than Mary.

For instance in (1b), *David* is more *wise* than *Mary*, evaluated at the present moment. In (1f), *David* attains the *more wise* state after a *less wise* state, where *Mary* sets the standard to which David's wisdom is compared. Should the standard be absent, then the standard is by default the same predicate with the same subject evaluated at an earlier time. Thus, in (1e) David became wiser than he used to be.

These *-er* predicates established continua: e.g., the degree of proximity (1d) or wisdom (1e). These continua are divided into two, arising from a distinguished

point contributed by *-er*: a *less S* and a *more S* segment (2), i.e., $\langle \neg \text{More } S, \text{More } S \rangle$. Thus, they are achievement-like. Further investigation into adjectives, comparatives and superlatives may contribute to our current understanding of distinguished points.

(2)



6.1.2 Binary Contrasts in Other Linguistic Domains

Binary partitions are common in linguistics and important in all aspects of language, being a natural way to divide and classify sets, and are not limited to prepositions and verbs. There is much additional evidence that such complementary relations play a significant role in language. Leech (1974) states:

(3) "...language strongly predisposes us to make binary distinctions, and so to impose a simplistic structure on our experiences." (Leech 1974, p.39)

Horn (1989) claims that negation is a language universal, citing Spinoza and Hegel's views that all linguistic expressions involve negation directly or indirectly. Likewise, lexical antonyms are as common among adjectives as prepositions. According to Jackendoff & Landau's (1993) Design of Language Hypothesis, (non-linguistic, perceptual) spatial representations may encode highly complex information concerning an object, but linguistic representations filter out much of the information, leaving the information underspecified. They suggest that a set of complex distinctions in any system must be collapsed into a finite set of elements, in order for the language faculty to process them, and thus a binary partition is naturally expected. Landau & Gleitman (1985) supported this claim, showing that size, an analog property, is digitalized into two contrasting terms in language: *tall/short*, *big/small*, *huge/tiny*. These binary relative contrasts are characteristic of adjectives for many languages.

Further evidence includes American Sign Language studies (Newport 1988, Supalla 1990): while expressing analog ideas with analog signing (e.g., expressing speed by hand motions of similar velocity) is certainly plausible given the manual mode of expression, such gradients are not used in ASL. ASL parallels spoken languages in having two distinct signs for such concepts, suggesting that a binary partition of concepts is intuitive in natural language, and adopted as a convention even in artificial languages. Ternary structures, while rarer, have the third being a property between the two extremes, and may be recharacterized as the result of overlap between two binary structures, as *from-to* structures were analyzed.

Deictic evidence also suggests that binary partitions are common. Romance languages have binary systems of deixis, with the exceptions of Spanish and Portuguese, having been analyzed as tripartite (Hottenroth 1982). The binary deictic systems differentiate between proximity between the observer and the reference object (*proximal*) and its counterpart, non-proximity (*distal*) (cf. Fillmore 1971, Schiffrin 1987). *Ici* and *là* in French is an example of this binary deixis.⁶³

Tripartite deictic systems are reanalyzable as bipartite deictic systems. Deictic systems that are 'ternary', like Spanish (Hottenroth 1982), may be reanalyzed as the overlap of a binary speaker deixis and a binary hearer deixis, creating the apparent tripartite deictic system. Ehrich (1982) likewise argued for a bipartite analysis for an apparently tripartite deictic system in German, namely the difference between the spatial deixis terms *hier*, *da* and *dort* (*here*, *there₁* and *there₂* in English). Ehrich showed that *da* is a more neutral spatial anaphor, whereas *hier* and *dort* are always used deictically as binary opposites.

By extrapolation, it may be possible to reanalyze other tripartite deictic systems as bipartite, with one element being a neutral anaphor, unspecified for

⁶³The binary deictic systems in modern French and Italian have been argued to be derived from the Latin tripartite system of deixis (*hic-iste-illuc*). However, the third elements appear so infrequently as to not bear upon the modern deictic system.

deixis. This hypothesis is supported by Hauenschild (1982), wherein the *proximal-distal* vs. *neutral* distinctions are proposed for Czech and Russian as in the proposal for German in Ehrich (1982).⁶⁴ The set of deictic data provides fertile ground for research into the types of binary structures in language.

6.1.3 The Aspectual Load Hypothesis

The aim of the Aspectual Load Hypothesis is to find an explanation for the lack of overly complex words, as observed by Carter (1976). Carter hypothesizes that words are restricted in their degree of semantic complexity. He suggests two possible reasons for this limitation: either more complex words exist but are not as easily found, or the mind is not capable of processing information beyond a certain complexity. He rejects the first hypothesis, on the basis of words that he considers quite complex in meaning, e.g., *guffaw* and *prestidigital*. However, it is not clear how a word like *guffaw* can be judged to be semantically more complex than, say, the word *laugh*.

More convincing is Carter's observation that there appear to be no words that encode three different states at once, e.g., a change from a state *S* to a state of $\neg S$, and back to *S*, i.e., $\langle S, \neg S, S \rangle$. At first glance, English verbs like *relapse*, *reshut* and *reborn* seem to exemplify words encoding these three consecutive states. One might consider ambiguous examples involving *re-* (4a), *again* (4b), and *another X* (4c) as clues to the nature of word complexity. For example, (4b) is ambiguous: Henry could have closed the door twice, or the door was closed to begin with, opened by Jane, and Henry only closed the door once. Similar ambiguities exist for (4a,c).

- (4) a. Henry relapsed today. *Was he ill earlier today?*
b. Henry closed the door again. *Did he close the door twice?*
c. Henry baked another cake. *Did he bake the first cake?*

⁶⁴It has been pointed out (personal communication) that the deictic systems in languages such as Mohawk (Mark Baker) and Malagasy (Lisa Travis, Ileana Paul and Matt Pearson) have far more complex deictic systems than the tripartite ones. These merit further investigation as well.

Evidence from data on *almost* (Carter 1976) and temporal adverbs like *today* suggests that verbs like *relapse* cannot encode two transitions in their lexical entries, since complete specification of all three states in a single word prevents the observed ambiguity from arising. (4a) should only have a single meaning, since *today* would modify all three states in $\langle S, \neg S, S \rangle$, preventing the reading where the initial state of sickness occurred outside the temporal domain of *today*.

The data suggests that at most, one transition is encoded in a possible word. I hypothesize that the amount of aspectual information that needs to be encoded is minimal, and a strict limit to aspectual information applies to each morpheme, which rely on underspecification to simplify informational load. Let us call this limit on aspect/word complexity the Aspectual Load Hypothesis (ALH).

An initial formulation of ALH states that languages at most grammaticalize only a single distinguished process or distinguished point for each morpheme. A single verb, then, can either be specified for a distinguished process or distinguished point of that event, but never a combination of both: it must be *dP*, *dT*, or neither. This hypothesis on the minimal specification of change forces verbs that describe change to be as simple as possible morphologically. A consequence of the ALH constraint means that more complex aspectual meanings must be built compositionally: more detailed actions must rely on event composition (i.e., additional inflectional morphology, prepositional phrases, direct objects and adverbs) to be expressed, since a lone verbal morpheme cannot express more than a transition or process. How the ALH interacts with the idea of s-word complexity, which impose an upper limit to the components that make up an event, is another issue to be addressed.

Finally, more work remains to be done in terms of event compositionality, and further investigation into its exact nature will improve upon the present formulation of Event Mereology.

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