

# Chapter 1

## Verb Classes and Aspectual Classification

### 1.1 Introduction

This book is about lexical aspect. Aspect traditionally concerns itself with what Comrie (1976) calls “different ways of viewing the internal temporal constituency of a situation” (pp. 3, 5). The intuition behind this definition is that while tense relates the temporal location of a situation or “eventuality” to some other temporal reference point such as the time of utterance, aspect is concerned with the structural properties of the event itself. Within the study of aspect, linguists make a distinction between grammatical and lexical aspect. Some people take this to be a formal distinction between aspectual properties expressed by a grammatical category and/or characterized by a particular inflectional morphology (for example the French imparfait or the passé simple), and aspectual distinctions which are lexicalized or characterized by derivational morphology or which are not characterized morphologically at all. However, the distinction I am interested in here is not formal but semantic, and is more or less the distinction formulated by Smith (1991) as a distinction between situation aspect and viewpoint aspect (see also Filip 1993, 2000, and the discussion on the distinction between “telic” and “perfective” in Bertinetto 2001). Lexical aspect, sometimes called “Aktionsart” and corresponding to Smith’s situation aspect, covers distinctions between properties of event-types denoted by verbal expressions, which linguists have tried to capture by classifying verbs into verb classes. Grammatical aspect, in particular the contrast between perfective and imperfective, concerns the distinction in perspective on events, or Smith’s “viewpoint aspect.” (1) shows a contrast in lexical aspect between a state and an accomplishment, while (2) shows a contrast between an imperfective and perfective use of the verb *built* (where the imperfective can be naturally replaced by the progressive):

- (1)a. Mary *loved* John very much. (*state*)  
b. Mary *built* a house. (*accomplishment*)
- (2)a. He lived in a hotel while he *built/was building* the house. (*imperfective*)  
b. He *built* the house and then sold it for profit. (*perfective*)

This book is concerned with lexical aspect and the properties we can ascribe to event types in the denotations of particular lexical items. I assume that the events in the denotation of *build a house* have essentially the same properties whether the expression is used imperfectively or perfectively, and that it therefore makes sense to ask what these properties are. The interaction of lexical aspect and grammatical aspect is an important and fascinating question (see, for example, Smith 1991), but it is beyond the scope of this book.

A number of questions stand at the center of the study of lexical aspect. First are aspectual properties, properties of linguistic expressions or of events "in the real world." Aristotle's original discussion of the aspectual distinction between "kinesis" (movements) and "energia" (actualities), both in the *Metaphysics* 1048 and in the *Nicomachean Ethics* 1074, naturally reads as a characterization of kinds of actions, rather than expressions. He contrasts actions which are complete in themselves (energia) and classified as atelic, such as seeing and thinking and being happy (roughly what we call states and activities), and actions which are inherently incomplete and which are directed towards an end, such as building a house or learning a poem, which we call accomplishments and classify as telic. Much recent linguistic work has stressed that aspectual distinctions are distinctions between linguistic expressions and are not properties of events in themselves. Thus Krifka (1998) writes:

it is misleading to think that a particular event can be called "telic" or "atelic". For examples, one and the same event of running can be described by *running* (i.e. by an atelic predicate, or by *running a mile* (i.e. a telic, or delimited, predicate). Hence the distinction between telicity and atelicity should not be one in the nature of the object described, but in the description applied to the object.  
(p. 207)

While linguists have continued to talk as if aspectual properties are properties of entities "out there" in the world (see, for example, Bach 1981, 1986, and Parsons 1990, chapter 3), the idea that aspectual properties are properties of event descriptions, or of events under a particular description, is supported by the theory of fine-grained event individuation argued for in Parsons (1990) and Landman (2000). They argue that events are only individuable under particular descriptions, and do not have any inherent atomic structure themselves (see also Partee 1999 and Filip 1993). On the other hand, a strong argument in favour of a theory in which events themselves have properties comes from Kamp (1979a,b), who argues that *change* is a primitive concept, and that the distinction between static events and events of change is a primitive distinction in any theory. That a particular collection of real world "happenings" can be described by both telic and non-telic expressions is undeniable, and I shall assume that lexical aspect deals with properties of linguistic expressions. However, we will come back to the challenge of Kamp's theory in chapter 8, where we will discuss what the basis of aspectual classification is.

A separate but related issue concerns the nature of lexical aspectual classifications. Vendler (1957, 1967) showed that a classification into states, activities, achievements and accomplishments is very useful in terms of predicting the linguistic behavior of verbal predicates, and it is this classification which has become most influential over the last 35 years. But are lexical classes just accidental generalizations over properties of lexical items, or are they constraints on possible meanings, and if the latter, where do they come from?

A third set of issues concerns the relation between the telic/atelic distinction and the classification of predicates into lexical aspectual classes, and the related issue of at what syntactic "level" the classifications should apply. Intuitively, states and activities are atelic, as they do not involve changes of state, whereas achievements and accomplishments are telic. Does this mean that verb classes just subdivide the telic/atelic groups one stage further? And is it verbs or Verb Phrases which should be so categorized anyway? It was Verkuyl (1972) who pointed out that accomplishment verbs such as *build* differ in telicity depending on the properties of their direct objects. *Build* normally heads a telic VP, but it heads an atelic VP when it has a bare plural or mass nominal as a direct object. "Telic" *build* can be modified by *in  $\alpha$  time*, while "atelic" *build* is naturally modified by *for  $\alpha$  time*. If a verb is an activity, the properties of the direct object do not affect the telicity of the VP:

- (3)a. Mary built two houses \*for an hour/in an hour.
- b. Mary built houses for a week/\*in a week.
- (4)a. John pushed the cart for an hour/\*in an hour.
- b. John pushed carts for an hour/\*in an hour.

Some (e.g., Dowty 1979) have taken the data in (3) to mean that it is really VPs that should be classified as accomplishments or activities. This position is strengthened by the contrast between (4) and (5), where *push* also heads a telic VP:

- (5) John pushed the cart a mile/to the edge of the park in an hour/\*for an hour.

Verkuyl himself has argued (Verkuyl 1972, 1993) that the data in (3–5) shows that it is minimally VPs which should be classified as telic and atelic, and that there is good evidence that telicity is really a property of sentences. This is because of sentences such as (6), where the properties of the subject nominal determine the telicity of the sentence:

- (6)a. John discovered the secret room in a few weeks.
- b. Children have been discovering that secret room for generations.

Verkuyl claims, more strongly, that classification into Vendlerian verb classes is linguistically irrelevant, and that the only relevant question is how the

aspectual properties of the VP are derived compositionally. He argues that verbs can be classified essentially into dynamic or non-dynamic (what he calls [+ADD ON]), and that nominals are classified according to whether or not they determine a specified quantity [ $\pm$ SQA]. VPs denote stative eventualities when the V is [-ADD-ON] and the nominal is [ $\pm$ SQA]. Atelic VPs are derived when the V is [+ADD-ON] and the nominal is [-SQA], and telic VPs are derived when the V is [+ADD-ON] and the nominal is [+SQA]. He claims explicitly that any more fine-grained aspectual classification of verbal heads is linguistically irrelevant. This gives a classification into states, activities and accomplishment VPs, making no reference to achievements, and treating lexical classes as by-products of the theory, rather than theoretical entities in themselves.

In this book, I am going to argue against this position. I assume that events are countable entities which are individuable, relative to a particular description. Verbs denote sets of events and are classified into lexical classes depending on the properties of the events in their denotations relative to that particular description. I shall assume, following Parsons (1990) and Landman (1995, 2000), that verbs denote sets of events or an event (or eventuality) type, and that thematic roles denote functions from sets of events to their participants; and we can thus talk of the event-type denoted by V as showing the properties which determine the lexical class of the V.

I will argue in the course of the book that lexical aspectual classes are not generalizations over verb meanings, but sets of constraints on how the grammar allows us to individuate events. Telicity and atelicity are properties of verb phrases, and the status of the VP with respect to telicity will depend on the interaction of the meaning of the V with other elements in the VP. It will follow from the meaning (or properties) of an accomplishment that the structure of its direct object will determine whether it heads a telic or atelic VP, and it will follow from the meaning of the activity that a VP consisting only of an activity V:direct object will always be atelic regardless of the properties of that direct object. Certain measure and directional phrases, though, can make such VPs telic. This is essentially the standpoint taken by Krifka (1986, 1989, 1992, 1998) but I shall differ from him over what constitutes the relevant properties of accomplishments. I show why we can expect bare plural subjects to affect the telicity of achievement VPs in the same way that bare plural direct objects affect telicity of accomplishments; the atelicity of (6b) comes from the same sources as the atelicity of (3b).

These theoretical claims require an account of what the properties of the lexical aspectual classes are, so that we can explain how they interact with arguments and modifiers to get the effects in (1)–(6), and in order to explain how apparent movement between lexical classes is possible. The aim of this book is to give an account of the semantic basis of the lexical classes and to support the claims made in the previous paragraph.

The structure of the book is as follows. This chapter gives an introduction to the well-known linguistic properties of verb classes and the semantic

properties which are assumed to underlie them, in particular homogeneity, cumulativity and quantization. We identify states, achievements, activities, and accomplishments, as well as a fifth class, semelfactives. Chapters 2 and 3 provide in-depth case studies of two constructions in English in which we get aspectual shift: operations in which a VP headed by a verb from one aspectual class denotes a set of events in a different verbal class. In the first case, progressive VPs are headed by achievement verbs. This is intuitively problematic since it makes little sense to talk of near punctual events as being “in progress,” and there are indeed achievements which cannot naturally appear in the progressive, such as (7a,b). However, (7c) and (7d) are perfectly acceptable and the question is how:

- (7)a. #John is spotting his friend.  
 b. #Mary is noticing that it is raining.  
 c. The tram is arriving at the tram stop.  
 d. We are reaching the mountain top.

The second construction is the resultative construction, illustrated in (8), where an atelic activity verb heads a VP which can be telic when a resultative predicate is added:

- (8)a. Mary hammered the metal for an hour/\*in an hour.  
 b. Mary hammered the metal flat \*for an hour/in an hour.  
 c. John sang for an hour/\*in an hour.  
 d. John sang the baby asleep \*for an hour/in an hour.

The data in (7/8) could be taken as evidence against assigning verbs to particular aspectual classes, but I argue against this conclusion and show that the original lexical head is incorporated, with its original meaning, into a derived accomplishment. These case studies will be of central importance to the theory: the fact that there are shifting operations into accomplishment structures is evidence that lexical classes are not accidental generalizations over lexical meanings, but are independently characterizable templates, or schemas, which constrain lexical meanings. In chapter 4, I present a theory of the structure of accomplishments, and in chapter 5 I show how this supports the shift operations postulated in chapters 2 and 3. Chapters 6 and 7 discuss telicity. I argue against Krifka’s account of telicity in terms of quantization *vs.* cumulativity, and show that telicity is not about being able to calculate the endpoint of an event in VP, but about being able to identify the atoms in VP and thus being able to count them. Chapter 8 returns to the question of where the aspectual classes come from. I argue that the aspectual classes constitute a set of constraints on what eventualities are linguistically individuable, and draw some general conclusions about what a theory of aspect based on the results in this book should look like.

## 1.2 Aspectual Classes of Verbs

### 1.2.1 The four aspectual classes

The classic twentieth-century philosophical sources for classifying verbs into aspectual classes are Ryle (1949), Vendler (1957, 1967), and Kenny (1963). Ryle crucially distinguished between achievements and accomplishments; accomplishments are changes of state which have some “task” associated with them, whereas achievements are changes of state without such an associated task – in other words the bare change of state itself. Kenny ignores Ryle’s distinction and concentrates on the differences between states, activities and performances, where performances are events which have a natural endpoint. He is concerned mainly with accomplishments, but tacitly he would probably categorize achievements as performances. It is Vendler’s (1957) four-way classification into states, activities, achievements, and accomplishments, encompassing both Ryle’s and Kenny’s intuitions, which has proved most fruitful and relevant for linguistic research, and which provides the basis for Dowty’s seminal semantic analysis (1979). This is the classification which I will present below. Smith (1991) adds a fifth class, semelfactives, which I will largely ignore here, but these will come into their own and play a crucial role in the theory of why we have the lexical classes we do, which I will present in chapter 8.

Dowty (1979) discusses and develops Vendler’s (1957, 1967) classification of verbal predicates into four different classes according to their logical entailments, interactions with temporal modifiers, and interaction with tense. The account I present here draws heavily on his discussion.

The four-way classification is into **states**, **activities**, **achievements**, and **accomplishments**. Crudely, states are non-dynamic situations, such as *be happy* or *believe*; activities are open-ended processes, such as *run*; achievements are near-instantaneous events which are over as soon as they have begun, such as *notice*; and accomplishments are processes which have a natural endpoint, such as *read the book*. Further examples from Dowty are given below:

States	Activities	Achievements	Accomplishments
<i>know</i>	<i>run</i>	<i>recognize</i>	<i>paint a picture</i>
<i>believe</i>	<i>walk</i>	<i>spot/notice</i>	<i>make a chair</i>
<i>have</i>	<i>swim</i>	<i>find/lose</i>	<i>deliver a sermon</i>
<i>desire</i>	<i>push a cart</i>	<i>reach</i>	<i>draw a circle</i>
<i>love</i>	<i>drive a car</i>	<i>die</i>	<i>recover from an illness</i>
<i>understand</i>			<i>build a house</i>
<i>be happy</i>			

Dowty (1979, chapter 3) discusses a number of problems with this classification, and revises and refines some of the distinctions, including subdivisions into verbs which do and verbs which do not have agentive subjects. But while we will be concerned (in chapter 8) with some of the problems which he

raises, including the nature of the distinction between activities and accomplishments, the fruitfulness of the original Vendlerian distinction has proved itself, and this will be our starting point.

The four-way Vendlerian classification is an expression of the intuition that there are two properties which are crucial in categorizing eventualities or event types. The two properties are whether an event type has a natural stopping point (whether it is telic) and whether we can analyze it as progressing or developing (whether it is dynamic, or has stages). I will discuss each of these briefly, before going on to look at the properties of each aspectual class, but I will not try to give a formal definition of what either telicity or dynamicity is. Also, for the moment, we will discuss only event types with singular arguments, such as *build a house*. We will not make a distinction between event types denoted by V and those denoted by VP until section 1.3.

The first property, [ $\pm$ telic], groups states and activities together on the one hand, and achievements and accomplishments on the other. [ $\pm$ telic] targets the Aristotelian distinction *kinesis vs. energia*. Eventualities of the first kind are [ $+$ telic] or **telic**, and are movements towards an endpoint where the properties of the endpoint are determined by the description of the event. Eventualities of the second kind are [ $-$ telic] or **atelic**; once they have started, they can go on indefinitely, since the nature of the eventuality itself does not determine its endpoint. The telic point is often called the **culmination** or **set terminal point**. Achievements and accomplishments are [ $-$ telic], and states and activities are [ $+$ telic]. Thus if John loves Mary, there is nothing in the nature of the loving state which will necessarily bring that event to a close, and similarly, if Mary ran, the description of the event does not say when or if the running event stopped. *Mary ran yesterday and she hasn't stopped yet* is a perfectly coherent and non-contradictory piece of discourse. Of course we know that in the "real world" people don't usually carry on running indefinitely (although machines may), and that people often do stop loving, but there is nothing in the description of the event itself which makes it the case that such a stopping-point occurs. By contrast, achievements and accomplishments have a natural endpoint which is determined by the description of the eventuality. An event which makes *Mary arrived at the station* true is over when Mary becomes "at the station." Whatever happens after that is not part of the arrival event. And if Mary read *War and Peace*, then that event is over when Mary finishes reading *War and Peace*. What counts as the end may be a bit fuzzy; it may be when she reads the last page of the book, or when she reads the last page of the story proper and decides to skip the final section on the philosophy of history, or when she finishes rereading the bits she particularly liked and puts the book back on the shelf. But this imprecision, which leaves room for contextual determination of what the endpoint of an event actually is, does not take away from the fact that the description of the event entails that there is a point (in part contextually determined) at which the event is over. If Mary finishes the book and immediately starts reading it again, this is a new event of reading *War and Peace* and not a continuation of the original one. The standard test for

telicity is the use of temporal modification: *in  $\alpha$  time* modifies telic VPs and *for  $\alpha$  time* modifies atelic VPs as in (9):

- (9)a. John knew Mary for years/\*in a year.  
 b. John danced for hours/\*in an hour.  
 c. John spotted Mary in a few minutes/\*for a few minutes.  
 d. John built the house in a few weeks/\*for a few weeks.

Krifka (1986, 1989, 1992, 1998) has probably gone furthest toward giving a precise characterization of telicity. He characterizes a predicate as telic if the following holds (1998, p. 207): if *e* is in the denotation of *X*, then all parts of *e* (subevents of *e*) which are also in the denotation of *X* must have the same starting and stopping points. *Read "War and Peace"* is telic because for any event *e* in its denotation, any subparts of *e* which are also events of reading *War and Peace* will have to start at the same point and end at the same point. Events which do not last as long as *e* will not be big enough to count as events of reading *War and Peace*. *Run* is atelic, since an event of running which lasts from 9 a.m. to 10 a.m. has subevents of running (for example, the event of running from 9.15 to 9.45) which are also in the denotation of *run*. Krifka's definition is too strong for some cases; the predicate *run to Paris* is telic according to the test in (9) since *run to Paris in two hours* is acceptable, but subevents of an event of running to Paris will also fall in the denotation of the predicate as long as they are runnings which end at Paris, even if they start after the original event had started. What apparently is crucial for telicity is that all subevents of *e* end at the same point.

Krifka identifies **cumulativity** and **quantization** as crucial properties of verbal predicates which lead to atelicity and telicity, respectively. A predicate *P* is cumulative if it has at least two distinct entities in its denotation, and for any *x* and *y* in *P*, their sum is also in *P*, where the sum operation is essentially that from Link (1983):

- (10) *X* is **cumulative** iff:  
 $\exists x \exists y [X(x) \wedge X(y) \wedge \neg x \sqsubseteq y \wedge \forall x \forall y [X(x) \wedge X(y) \rightarrow X(x \sqcup y)]]$

Krifka argues that *run* is cumulative because the sum of two running events is also in the denotation of *run*, while *eat three apples* is non-cumulative because the sum of two such events is not an event of eating three apples but an event of eating six apples. A closer look shows that if a verbal predicate *P* is cumulative, then it must be a mass predicate. If we assume that *run* is a count predicate, then the sum of two events of running must be in the denotation of the plural predicate *run*, and the predicate meets the criterion in (10) only because English does not show a morphological difference between singular and plural predicates. But if the sum of two running events is in the denotation of the plural predicate *run*, then telic predicates will have a cumulative

reading in the same distributive sense. The sum of two events of *eat three apples* is in the denotation of the plural predicate *eat three apples*, as in the distributive reading of *Dafna and Nomi ate three apples*, or *Dafna ate three apples twice*. So simple cumulativity can distinguish between atelic and telic predicates only if we allow that atelic predicates are verbal mass terms. However, there is good evidence that this is not the case. I earlier argued (Rothstein 1999) on the basis of a variety of modification facts that verbal predicates always have their denotation in the count domain (we will review this evidence in chapter 5). Landman (2000) argues that distributivity in the verbal domain reduces to semantic pluralization, which presupposes a count denotation. Since distributivity and collectivity phenomena appear with atelic predicates as much as with telic predicates, we must assume that both have a count denotation, and then (10) cannot make the distinctions that we want. Intuitively, however, there is a distinction between atelic and telic predicates. Two events of running can be summed to form a plural event, but they can also, in the appropriate contexts (usually temporal adjacency), be put together to make a new **singular** event. Thus an event of running from 2 p.m. to 3 p.m. and an event of running from 3 p.m. to 4 p.m. can be seen either as two distinct events of running or as a single event of running from 2 p.m. to 4 p.m. So what is relevant is not whether two eventualities in *P* can be summed to form a plural event in *\*P* (where *\** is the plurality operator), but whether two events in *P* can be put together to form a new singular event which is also in *P*. While two events in *run* can form a singular event in *run*, two distinct events in *eat three apples* cannot be put together to form a new singular event in *eat three apples*. So what distinguishes atelic from telic predicates is what we may call formally *S-cumulativity* (although for convenience I'll continue to talk about cumulativity except where the distinction between (10) and (11) is relevant). *S-cumulativity* is defined in (11), where *R* is a relation, and  $\textcircled{S}$  is the operation forming a singular entity out of a sum:

- (11) *X* is **S-cumulative** iff:  
 $\exists e \exists e' [X(e) \wedge X(e') \wedge e \sqsubset e' \wedge \forall e'' \forall e''' [X(e) \wedge X(e') \wedge R(e, e') \rightarrow X^{\textcircled{S}}(e \sqcup e'')]]$

From the examples given, it seems clear that “standing in an appropriate contextual relation” involves temporal adjacency and sharing the same arguments, but we won't go any further into this issue here.

It is clear that *S-cumulativity* results in atelicity. If *e*, *e'* and  $\textcircled{S}(e \sqcup e')$  are all in the denotation of *X* and *e* is not part of *e'*, then either *e* or *e'* end before  $\textcircled{S}(e \sqcup e')$  does. But then there is an event which is part of  $\textcircled{S}(e \sqcup e')$ , which had an ending point earlier than  $\textcircled{S}(e \sqcup e')$ , which falls under the same predicate. This means that the stopping point of  $\textcircled{S}(e \sqcup e')$  is not determined by the content of the predicate, and thus the predicate is not telic.

Krifka uses quantization to identify lexical predicates which are telic. If *x* and *y* are in the denotation of *X*, and *X* is quantized, then neither can be a proper part of the other.

- (12) A predicate  $X$  is **quantized** iff:  
 $\forall x \forall y [X(x) \wedge X(y) \rightarrow [x \sqsubset y \rightarrow x=y]]$

So, if  $e$  is an event in the denotation of  $X$ , and  $X$  is quantized, there can be no proper part of  $e$  which is also in the denotation of  $X$ . It follows that any part of  $e$  which is also in  $X$  will be identical to  $e$  and thus  $X$  will be telic. An event of eating exactly three apples has no proper subpart which is also an event of eating three apples; *eat exactly three apples* is quantized and telic. (Note, however, that *run to Paris* continues to cause problems since it is telic but non-quantized.)

A related property is homogeneity. There are several definitions of homogeneity: very weak homogeneity in (13a), weak homogeneity (13b) and strong homogeneity in (13c):

- (13)a.  $X$  is **very weakly homogeneous** iff:  
 $\exists x [X(x) \rightarrow \exists y [y \sqsubset x \wedge \neg y=x \wedge X(y)]]$
- b.  $X$  is **weakly homogeneous** iff:  
 $\forall x [X(x) \rightarrow \exists y [y \sqsubset x \wedge \neg y=x \wedge X(y)]]$
- c.  $X$  is **strongly homogeneous** iff:  
 $\forall x [X(x) \rightarrow \forall y [y \sqsubset x \wedge \neg y=x \wedge X(y)]]$

A predicate  $X$  is **very weakly homogeneous** if there is some  $x$  in  $X$  which has a proper part also in  $X$ . Thus very weak homogeneity is equivalent to non-quantized, since a predicate is quantized if this never occurs. A predicate  $X$  is **weakly homogeneous** if every  $x$  in  $X$  has a proper part which is also an  $X$ . *Run to Paris* is weakly homogeneous, since every event of running to Paris has a proper part which is also a running to Paris, but the remainder is not an event of running to Paris. (An event  $e$  of running from Amsterdam to Paris is in the denotation of *run to Paris*, and so is the subpart of  $e$  which is running from Brussels to Paris, but the remainder of  $e$ , the running from Amsterdam to Brussels, is not in *run to Paris*.) A predicate  $X$  is **strongly homogeneous** if every subpart of it is also in  $X$ . Thus *love Mary* and *run* are strongly homogeneous, since they can be subdivided into a number of events all of which are also events in *love Mary* and *run*, respectively.

While very weak homogeneity is equivalent to non-quantized, strong homogeneity is related to S-cumulativity (in a non-finite model). S-cumulativity says that if a predicate holds of contextually related  $x$  and  $y$ , it also hold of  $\hat{s}(x \sqcup y)$ , whereas homogeneity says that if a predicate holds of an entity, it also holds of distinct parts of it. (In Rothstein (1999) I called homogeneity “downward homogeneity” and cumulativity “upward homogeneity”: here I will stick to “homogeneity” and “cumulativity.”) Homogeneous predicates tend to be cumulative. If  $X$  is strongly homogeneous and  $x$  and  $y$  are in  $X$ , and  $x$  is a proper part of  $y$ , then there must be some  $z$  which is also a proper part of  $x$

and which is in X. But then  $\exists(x \sqcup z)$  is also in X, which indicates that X is cumulative. But this is not an entailment relation. Problems arise with transitive activities such as *push the cart*, where homogeneity does not entail cumulativity (neither simple cumulativity or S-cumulativity), since *push the cart* is homogeneous, but two events of *push the cart* can form a singular event in the denotation of the same predicate only if the referent of the cart is kept constant (see also discussion in Ramchand 1997). We can continue to consider *push the cart* as S-cumulative if identity of participants is one of the factors contributing to the contextually defined relation R. We will discuss this further below, and in chapter 8.

Cumulativity does not entail homogeneity either; it only entails homogeneity down to minimal parts (see the discussion in Dowty 1979, chapter 3). Thus a cumulative predicate such as *run*, although intuitively homogeneous, has non-homogeneous minimal parts: there are parts of running events which are just too small to count as events of running. The distinction between homogeneity down to instants and homogeneity down to small parts is crucial in distinguishing between states (which are homogeneous down to instants) and activities (which are homogeneous down to small parts), and because of this we will use cumulativity as the defining characteristic of atelicity.

The second property which is important in characterizing the Vendlerian classes, in addition to the  $[\pm\text{telic}]$ , is whether the verbs can appear in the progressive. States and traditionally achievements (Vendler 1957, and others) generally do not appear in the progressive, while activities and accomplishments do, as illustrated in (14):

- (14)a. \*John is believing in the afterlife/loving Mary. (*state*)  
 b. \*Mary is recognizing John/losing her pen. (*achievement*)  
 c. Mary is running/walking. (*activity*)  
 d. John is reading a book.

There are groups of counter-examples to this generalization. In chapter 2, I discuss achievements which occur freely in the progressive as in *our pizza is arriving*, but, I shall argue, this happens only after the VP has undergone a shift in meaning. Also, there is a group of stative predicates including *lie*, *hang*, *sit*, and *live*, termed "interval states" by Dowty (1979), which have progressive uses such as *The socks are lying on the bed*, *This year we are living in Amsterdam*. But for the moment, we will take the criterion at face value, based on intuitions such as those in (14).

The reason why the progressive test is important is phrased differently depending on your theory of the progressive, but the intuition behind it is the same in each case. A sentence with a verb in the progressive asserts that an eventuality of a particular kind is "in progress" or going on. We understand naturally what this means for activities and accomplishments. (14c) asserts that Mary is in the middle of the running activity, and (14d) that John is in the middle of reading the book. However, there is no natural sense in which either

states or achievements can be said to “go on.” States do not go on or progress because they are inherently non-dynamic, and achievements do not go on or progress, because they are near instantaneous, and are over as soon as they have begun. Landman’s (1992) account of the progressive allows an insightful formulation. He argues that the meaning of a progressive sentence is that a **stage** of the eventuality given by the verb occurred, or is occurring, where  $e$  is a stage of  $e'$  if  $e$  develops into  $e'$ . Thus (14c) asserts that a stage of a running event with Mary as agent is going on, and (14d) that a stage of a reading a book event with John as agent is going on. Although it is not explicit in his paper, states and achievements cannot (and should not) occur in the progressive because they do not have stages, and there are two different reasons for this. Achievements are too short: they do not extend over time but are instantaneous events, and thus stages cannot be distinguished. States, on the other hand, are long enough, but they are non-dynamic so that every bit is exactly the same as every other bit and therefore no stages can be distinguished.

We thus have two crucial aspectual properties which can distinguish the four verb classes; whether or not they naturally head telic VPs (which we will call [-telic]) and whether or not they naturally occur with the progressive (which we will call [+stages]). This leads to the classification in (15):

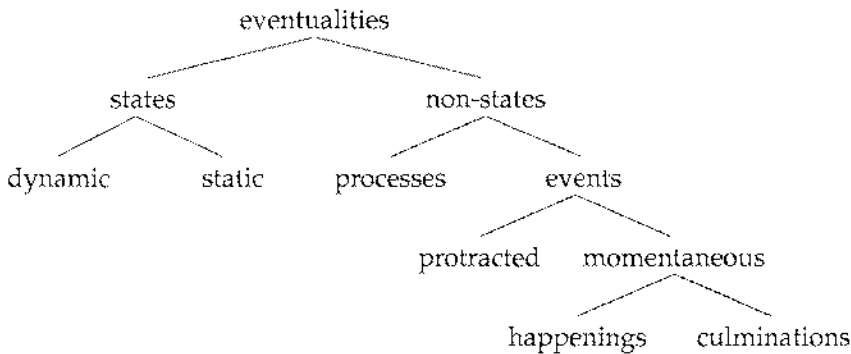
- (15) States: [-telic, -stages]  
 Activities: [-telic, +stages]  
 Achievements: [+telic, -stages]  
 Accomplishments [+telic, +stages]

Reformatting this data in (16) we can see at a glance which event types pattern together:

(16)

	[+stages]	[+telic]
States	-	-
Activities	+	-
Achievements	-	+
Accomplishments	+	+

It is important to see that the classification of eventuality types need not be done in terms of featural opposition. Bach (1986), for example, classifies eventualities via a tree diagram which he bases on Carlson (1981), and which looks like this:



From his examples, it is clear that Bach's states correspond to our states, his processes are our activities, his protracted events are our accomplishments and his momentaneous events are our achievements, subdivided into those which "happen to you", such as *notice* or *recognise*, and those which can be seen as the culmination of some kind of activity or process, such as *reach the top of the mountain* or *die*. But his representation, or any partial order of this kind, expresses an approach in which aspectual categories are related via set and subset relations: states and non-states partition the set of eventualities: non-stative eventualities themselves can be divided into atelic processes and telic events, which are further subdivided into accomplishments and achievements, and so on. Another ordering of structural relations between aspectual classes is to analyze accomplishments as a subset of activities, namely activities with telic points (ter Meulen 1995). Yet a third approach, e.g. Verkuyl (1972), sees achievements as a subset of accomplishments, namely accomplishments whose process or activity stage is so short as to be negligible.

Relating lexical classes to each other through partial orders or through a feature system makes a different set of predictions about how the classes are related to each other and allows a different set of linguistic generalizations. A partial order relates an aspectual class to its sister nodes and linearly back to its point of origin, while a feature system such as that proposed in (16) proposes a set of oppositions, and thus makes a different set of generalizations about how the linguistic classes are related to each other. The table in (16) should make predictions about what kind of movement between classes, or aspectual shift, is possible. States share one feature with both activities and achievements, but none with accomplishments, and thus we would expect *prima facie* that it would be easier to coerce or shift a state into either an activity or an achievement reading than into an accomplishment reading, and this seems to be the case. A second prediction of a feature system concerns how many classes there are, since  $n$  features will give  $2^n$  classes. Since it also allows us to ask why the particular features used are the relevant ones, it gives us a way to address the question of why we have the particular lexical classes that we do. These are the questions that I shall discuss in chapter 8.

Let us now look at the four verbal classes in more detail, and see how the various tests discussed in Vendler (1957, 1967) and Dowty (1979) work, and why.

### 1.2.1.1 States [-telic, -stages]

States, or stative eventualities, are cumulative and non-dynamic, i.e. [-telic, -stages]. They are also totally homogeneous. Note that here I am considering only states in the denotation of verbal predicates, and not those denoted by adjectival predicates. I argued earlier (Rothstein 1999) that all verbal predicates, including verbal stative predicates, have their denotations in the count domain, while the denotation of adjectival predicates is in the mass domain. State verbs thus denote sets of countable stative eventualities, and as this book is concerned with the internal temporal constitution of individual eventualities, these are the only states we discuss here (see the discussion in chapter 7).

According to (11), states are clearly cumulative. If John was in the state of believing in the afterlife from 1970 to 1980 and he was in the same state from 1980 to 1990 then he believed in the afterlife from 1970 to 1990. We cannot identify stages in the development of a state, and thus a state is non-dynamic and [-stage]. This is because no change necessarily takes place while a state holds. Although it is a real world fact that, for example, the quality of John's love for Mary may change over twenty years, this is not encoded in *John loved Mary for twenty years*. States are also strongly homogeneous, and thus (17) holds:

- (17) If a predicate is homogeneous then *x P-ed for y time* ENTAILS that at any time during *y*, *x P-ed* was true.

*John loved Mary for twenty years* entails that at any time during those twenty years he loved her (allowing for contextually irrelevant pauses, which we shall discuss when we get to activities). States are unqualifiedly homogeneous since they are homogeneous down to instants. If John loved Mary for twenty years (without any pauses), then he loved her at each instant during that twenty-year period, and there is in principle no subpart of that period which is too small to contain an event which will verify *John love Mary*. And if John believed in the afterlife till the age of twenty-five, the sentence *John believed in the afterlife* was true at any instant during that interval, no matter how small. So stative eventualities are homogeneous down to instants and contrast with the other atelic eventuality type (activities), since we cannot say that *John ran* is true at an instant, but only at an interval, although a very small one (see Taylor 1977 and Dowty 1979).

Note that although homogeneity is often thought to result in atelicity, it is actually crucial in determining the other characterizing property of states, that they cannot be analyzed into stages. If a stative predicate *P* hold at an interval, it holds in the same way at each instant in that interval. And if each instant

looks identical with respect to P, then there is no way of determining change or development with respect to P during that interval.

The following are classic tests for identifying states.

- Stative eventualities do not generally occur in the progressive (although see Dowty's 1979 discussion of "interval states", and modified states such as *John is resembling his father more and more*, discussed in Zucchi 1998):

- (18)a. \*John is knowing the answer.  
 b. John is running.  
 c. John is building a house.

- With stative eventualities, the simple present has a non-frequentive, non-habitual reading, which is impossible with any other verb class. Except for (19a), all of the sentences in (19) must be habituals. This test is particularly crucial because, unlike (18), it also distinguishes between statives and achievements.

- (19)a. John knows the answer.  
 b. John runs.  
 c. John builds a house.  
 d. John reaches the top of the mountain/arrives on time.

Statives are also for the most part non-agentive (although, as Dowty notes, there are crucial exceptions, notably with the "interval statives" which may occur in the progressive). Thus we find the following four patterns:

- Stative eventualities do not generally occur in the complement of *force* and *persuade*:

- (20)a. \*John forced Harry to know the answer.  
 b. John forced Harry to run.  
 c. John forced Harry to build a house.

- Stative eventualities do not generally occur as imperatives:

- (21)a. \*Know the answer.  
 b. Run.  
 c. Build a house.

- Stative eventualities do not generally occur with the adverbs *deliberately*, *carefully* and *willingly*, or any other adverb indicating agentivity:

- (22)a. \*John deliberately knew the answer.  
 b. John deliberately ran.  
 c. John deliberately built a house.

- Stative eventualities do not generally occur in pseudo-cleft constructions:

- (23)a. \*What John did was know the answer.  
 b. What John did was run.  
 c. What John did was build a house.

Vendler (1957, 1967) argues that with states, *could* entails *would*. A careful study of counterfactuals would probably show that this is too strong, but it is noteworthy that “I could like him if he didn’t make such bad jokes” can be paraphrased as “I would like him if he didn’t make such bad jokes”, while “Even if I could like him, I wouldn’t” sounds nonsensical. In contrast, “Even if I could run/tell you the answer, I wouldn’t” make perfect sense. The non-agentive relation between a participant and the state that she is in, means that often the ability to be in a state and actually being in it are indistinguishable.

The data in (16) indicated that statives shared the property of atelicity with activities, and so we expect them to pattern with activities with respect to some appropriate test. The relevant test is modification by *for a time*; this assigns to a non-measured eventuality a particular temporal length (Krifka 1998). Statives and activities co-occur with *for x time*, while achievements and accomplishments do not. Thus we have:

- (24)a. John loved Mary for years.  
 b. John ran for hours.  
 c. \*John arrived for hours.  
 d. \*John built a house for years.

Similarly, (16) predicts that statives should pattern with achievements in at least one way, and this should be a test which makes reference to whether an event can be analyzed into stages. As we saw in (7) and (18), neither states nor achievements normally occur in the progressive. Furthermore, if stative verbs are coerced out of their natural stativity, they are coerced into an inchoative or achievement reading. Thus, telic predicates naturally occur with the temporal modifier *in x time*, which locates the endpoint or telic point of the event as occurring within x amount of time from a contextually relevant point. If a stative occurs with *in x time* the effect is an inchoative reading:

- (25) John was curious to find out where his grandfather had been born, and with the help of the record office he knew the answer in a few hours.

(25) really asserts that within a few hours, John began to be in a state of knowing the answer, or changed from a state of not knowing to a state of knowing. Such an event of changing from one state to another is characteristic of events in the denotation of achievement predicates. Similarly, a state can be coerced into an achievement reading in contextually situated imperatives. (26) contrasts with (21a):

- (26) Teacher to student: "Know the answer by tomorrow, or there will be big trouble."

### 1.2.1.2 Activities [-telic, +stages]

Activities, like states, are atelic, but unlike states, they are dynamic. We saw in (24) that the *for  $\alpha$  time* test shows that VPs headed by activities are atelic, and we see from (7) and (18b) where they occur naturally in the progressive, that they can be analyzed into stages – although, so far, we have left the concept "stage" undefined. Activities are S-cumulative with respect to contextually related events, where the contextual relation frequently involves temporal adjacency. If Mary ran from 4 p.m. to 5 p.m., and from 5 p.m. to 6 p.m., we can reasonably assert from one perspective that there was one event of her running from 4 p.m. to 6 p.m. We may also want to distinguish two events of running within that time – perhaps she ran in two different races, or with two different friends – but in any of these situations, the assertion that she ran from 4 p.m. to 6 p.m. is true, and the predicate comes out as cumulative, and thus atelic. As mentioned already, intransitive singular predicates such as *run* are straightforwardly cumulative. With transitive activity predicates such as *push the cart*, it is not so simple. As Ramchand (1997, p. 225) shows, the sum of two events in the denotation of *push the cart* forms an event in the denotation of the same predicate only if we keep the cart constant. Otherwise the sum of two *push the cart* events normally falls under *push two carts* or *push carts*.

However, we can still use S-cumulativity to distinguish between activities and accomplishments. First, if we keep the direct object constant we get cumulativity effects with activities but not with accomplishments. The sum of two distinct (but contiguous) events of Mary pushing a single cart comes under the denotation of the singular predicate *push the cart*, but the sum of two contiguous events of John reading the same book is not normally in the denotation of the singular *John read the book*. So in (27a) either discourse A or B can be appropriate, but in (27b), only discourse B is appropriate.

- (27)a. Mary pushed the cart for an hour. And then without stopping, she pushed it again for another hour.  
 A. So she really pushed it once for a long time.  
 B. So she really pushed it twice.
- b. John read a book. And then without stopping he read it again.  
 A. #So he read it once for a long time.  
 B. So he read it twice.

Second, if we compare VPs with indefinite objects like *push a cart* and *write a letter*, then at least some speakers find a difference in whether the predicate can distribute to different events involving different entities. These speakers find the following differences:

- (28)a. Yesterday I minded a baby all day. In the morning I minded John's baby, and in the afternoon I minded Bill's baby.  
 b. #Yesterday I wrote a letter all day. In the morning I wrote to John and in the afternoon I wrote to Mary.

In (28a), the singular activity predicate, *mind a baby*, can be interpreted as formed out of the sum of two "mind a baby" events each involving a different baby, but with the accomplishment *write a letter* this is impossible. Some people who accept (28a) add that they would prefer to use a plural predicate like *mind babies* but, despite this, the contrast between (28a) and (28b) is telling.

Given the subtlety involved in this discussion, wouldn't (strong) homogeneity be a better criterion for atelicity rather than cumulativity? On the surface, activities are straightforwardly homogeneous, as the entailment test in (17) shows. If John ran for two hours, then *John ran* was true at any time during those two hours (ignoring temporary pauses). And since activities, unlike states, can be used in the progressive, we can use a second entailment test relating to homogeneity, dating back to Aristotle (*Metaphysics* 1048), which Dowty originally formulates as:

- (29) If P is an activity predicate, then *x is (now) P-ing* ENTAILS *x has P-ed*.

Thus, *Mary is now pushing a cart/minding a baby* entails that Mary has pushed a cart or minded a baby because the fact that the event is already started means that part of it has already gone on, and that part must itself be in the denotation of the activity predicate.

However, homogeneity is not a good test for atelicity because, while states are truly homogeneous, activities are homogeneous only down to intervals of a minimal size. Dowty (1979, pp. 166–72) discusses this in depth. He begins with Taylor (1977), who was the first to make the problem explicit. Taylor shows that a stative predicate which is true at I is true at all moments within I, but that an activity predicate can only be true at intervals larger than a moment.

Dowty explains this in the following way. Suppose we look at a film of a ball rolling down a hill. He writes:

A single frame of this film does not in itself offer us the evidence to say that the ball is really in motion, assuming that the film does not show any blurs, but any two frames (adjacent or not) showing the ball in slightly different locations do provide evidence of movement. . . . If we attempted to tie the truth conditions for basic predicates to physical properties represented in the model by "logical space" . . . then quite clearly the truth conditions for "motional" predicates and others denoting a change in physical properties of some sort would require access to information about the physical state of the world at least two moments in time. (p. 168)

If we need evidence about more than one moment in order to say whether an event in P has occurred, then it must be the case that e is true only at an

interval and not at an instant. But then, *P* is not a truly homogeneous predicate. Let us look more closely at a different activity predicate: *walk*. What has to be the case for it to be true that one has walked. Take a step? Take two steps? Lift one's foot in the air? Begin to lift one's foot in the air? One may reasonably disagree about how many steps one needs to take in order for it to be true that one is walking (consider parents who are sitting around discussing whether their child has yet walked), but presumably we would all agree that just moving one's foot or lifting it is not by itself walking. These are actions which are necessary parts of walking, but do not by themselves constitute walking. So, "walk" events break up into smaller entities, events which are not in themselves in the denotation of *walk*, but which hold at short intervals, maybe even instants, as part of an event of walking. Then if *x walked for half an hour* is true, it doesn't entail that *x walked* is true at these shorter intervals during the half hour, but only that some constituent event holds. Suppose we agree that taking one step is enough to make it true that one has walked (although Dowty suggests that we need at least two steps, if only to distinguish the predicate *walk* from the predicate *take a step*). Then, if *x walked for half an hour* is true at *I*, *x walked* can only be true at those subintervals of *I* which are big enough to take a step. There must be some defined, minimal event of walking, and *x walked* will be false at any interval which is not long enough to contain such a minimal event. In terms of temporal measurement, the minimal length of the interval is context dependent. If a minimal event of walking is taking a step, it will take an old man with a stick much longer to take a step than it does a five-year-old child, but both of them are walking.

Dowty discusses other problematic examples (p. 171), showing that some predicates by definition require a sequence of events to occur in order for one to say that a minimal event of the right kind has happened. He discusses the problem of *waltz*, where a minimal event requires the participant to take at least three steps in a specific order. This means that in many cases we need more than evidence from two moments to verify that an event in *P* has occurred; what we need is evidence that a particular minimal sequence has been completed.

Dowty argues that minimal activity events are minimal changes of state, where the lexical meaning of the verb determines the relevant change of state. A minimal event of the ball moving is a minimal movement of the ball from location *I* to a different location *I'*, and a minimal activity event of walking is a movement from *I* to *I'* effected by a taking of one (or two) steps. So an activity predicate *P* denotes a set of events which includes minimal events of type *P*, and an activity predicate can hold at any interval at least as big as the interval required for a minimal event in *P* to occur. If *x P-ed* is true, then it is true either because some minimal event of type *P* occurred, or string of such events occurred. Activity predicates will thus be homogeneous down to minimal events, and the entailment which does go through is the one formulated in (30):

- (30) If  $x$  is  $P$ -ing holds at  $y$ , and  $P$  is an activity predicate, then at any subinterval of  $y$  containing a non-minimal event in  $P$ ,  $x$   $\phi$ -ed is true.

The imperfective paradox will occur with activities whenever the event witnessing the progressive is not big enough to contain a minimal event. *John is walking* entails that *John has walked* if and only if the event which makes *is walking* true is already bigger than a minimal event. If John is in the middle of taking his first step, *John is walking* is true at the present instant, since the event is likely to turn into at least a minimal event of John's walking. But *John walked* is not true, because although it is the case that a minimal event of walking is in progress, it is not the case that a minimal event of walking has happened. So (29) does not hold.

However, if the entailment which ensures that activities do not lead to the imperfective paradox is formulated as in (30), we trivialize the entailment, and also the fact that progressive accomplishments do not entail the simple past. *Mary is building a house* entails *Mary built a house* whenever the event verifying the progressive is at least a minimal event. The difference between the accomplishment and the progressive is that the singular predicate *build a house* denotes a set of minimal events, while *walk* denotes a set containing minimal and non-minimal events. So a singular accomplishment predicate in the progressive can never entail the simple past. *Walk* includes non-minimal singular events in its denotation where *build a house* doesn't because the former but not the latter is cumulative. Thus we see that the attempt to distinguish between activities and accomplishments in terms of homogeneity brings us back to the fact that it is cumulativeness which is the crucial distinction between activities and accomplishments, and thus between atelic and telic predicates. We return to this topic in chapters 7 and 8.

Going back to the discussion about the relation between activities and states, we have seen that, as postulated in (16), they are both atelic, but they differ with respect to whether they have stages. Atelicity follows from the fact that both are cumulative with respect to contextually related events. They differ with respect to whether they have stages because states are homogeneous down to instants, while activities are homogeneous only down to minimal events. If a stative predicate  $P$  holds at interval  $I$ , it holds at every instant of  $I$ , and every instant in  $I$  must be identical with respect to  $P$ . This means that there can be no changes within  $I$ , and  $P$  must be a static predicate. Activities are homogeneous down to minimal events, since within each minimal event there is a change of state or movement; according to Dowty (1979), this is characteristically a movement from  $l$  to  $l'$ . Thus each minimal event is dynamic, and an activity consisting of a string of minimal events is a series of changes of state strung together. It is this which makes activities dynamic.

It is worthwhile here clarifying the status of pauses and pause stages. Landman (1992) recognizes pause stages in activities. If John ran for two hours, we allow him to pause briefly to tie his shoelace or to wait for the traffic lights to turn to green so that he can cross the road safely. But presumably such

pause stages occur with states too: if John asserts "I believed in the afterlife for my whole life," we don't fault him for a transient moment of doubt somewhere in the middle of an 80-year period. The point is that pause stages are accidental breaks in an event and not essential parts of the event which differ in type from the event itself, and so they do not conflict with homogeneity. In particular, a pause is not evidence against the claim that states are homogeneous down to instants. A pause in a stative eventuality P is an interval at which P does not hold, but this does not take away from the fact that when P does hold, it holds at instants. So states, which do not have distinguishable stages, can have pause stages.

The fact that activities are [+stages] means that there should be important properties which they share with accomplishments, which are also [+stages], and indeed this shared feature expresses itself in the fact that both activities and accomplishments occur naturally in the progressive. Landman (1992) analyses the progressive making direct reference to event stages. His analysis makes it obvious why these two aspectual classes can appear in the progressive whereas others cannot: if the interpretation of the progressive requires analyzing the event denoted by the verbal predicate into stages, then the non-dynamic [-stages] classes will not naturally be interpretable. In chapter 8, we discuss in more detail how the "stage" property might be characterized.

Since it doesn't make much sense to review the tests for activities without being able to compare activities with accomplishments and achievements, I will first discuss these aspectual classes, and then give a general review of the tests below.

### 1.2.1.3 Accomplishments [-telic, +stages]

Accomplishments are telic, and thus behave differently from both states and activities, but they have stages, and in this way are similar to activities. Typical accomplishments are given in (31):

- (31)a. John ate a sandwich.  
 b. Mary mended the chair.  
 c. Jane worked out the solution to the problem.  
 d. Bill painted the house.

Intuitively, an accomplishment is an activity which moves toward a finishing point, or "set terminal point," or "culmination" or "telic point" as it has variously been called in the literature. Another way of putting this is that an accomplishment is a non-cumulative activity: it is an activity which has an internally determined point at which it ends, and therefore it cannot be part of a bigger singular event of the same kind without changing its internal structure. Thus, (31a) reports an accomplishment event of John eating a sandwich. The event is over when the sandwich is over. If John then goes on to eat another sandwich, it is not part of the same *eat a sandwich* event, but a different

event. The sum of the two events cannot be described by *eat a sandwich*, but only by *eat two sandwiches/eat some sandwiches/eat sandwiches*. Telicity then is indicated by non-cumulativity: while both state and activity events can be extended or iterated under the same description, this is not the case with accomplishments. Accomplishments also fail to be homogeneous: a part of an *eat the sandwich* event cannot also be described as an *eat the sandwich* event precisely because the whole sandwich isn't eaten. This property of downward non-homogeneity is Krifka's property of [+quantized].

While telicity distinguishes accomplishments from activities and states, accomplishments share with activities the property of having stages. The crucial test for this, as we have already mentioned, is that both activities and accomplishments occur easily in the progressive, as in (32):

- (32)a. John is eating a sandwich.  
 b. Mary is building a house.  
 c. Bill is running/crying.

Traditionally, the progressive also allows us to distinguish between them with respect to the imperfective paradox. Thus the entailments in (33a and b) are supposed to contrast with the lack of entailments in (33c and d):

- (33)a. John is running ENTAILS John has run/ran.  
 b. Bill is crying ENTAILS Bill has cried/cried.  
 c. John is eating a sandwich DOES NOT ENTAIL John has eaten/ate a sandwich.  
 d. Mary was building a house DOES NOT ENTAIL Mary has built/built a house.

We have already seen that despite the intuitively obvious contrast between the examples in (33), it is difficult to formalize the imperfective paradox precisely in a non-trivial way which will actually distinguish between the activities and the accomplishments. The contrast in the way the imperfective paradox works seems to reduce to a contrast in cumulativity. We will come back to this in chapter 8.

#### 1.2.1.4 Achievements [+telic, -stages]

Achievements are similar to accomplishments in their telicity. They are not (downward) homogeneous, since a part of a dying event is not in itself an event of dying (and in fact they cannot be homogeneous, since, as we shall see, they have no internal structure). They are also not cumulative with respect to contiguous events: two contiguous events of John recognizing a friend cannot together form a single event in the denotation *recognize a friend*.

Achievements are best thought of as "near instantaneous changes of state" (Dowty 1979; Piñon 1997). For example, an event which is in the denotation of

*die* is crucially a change of state from being alive to not-being alive, while an event in the denotation of *recognize* is a transition from not being able to categorize information to being able to categorize it; the actual transition event occurs in next to no time, and “none of its internal structure is accessible for description” (ter Meulen 1995, p. 7). Temporal modification shows the non-cumulativity of both accomplishments and achievements, but also the contrast in the temporal properties that the events have. Since achievements, like accomplishments, are non-cumulative, we can ask how long they took, as in (34):

- (34)a. How long did it take John to read *War and Peace*?  
 b. How long did it take John to recognize Mary?  
 c. #How long did it take John to be short? (*on the non-inchoative reading*)  
 d. #How long did it take John to push carts?

However, this test shows the contrasts between them. Since achievements are instantaneous, (34b) can only be interpreted as asking how long it was before the event took place, and not, as with (34a), how long the event lasted. It makes no sense to ask how long a recognition took, although one can ask how long it took before a recognition took place. (35b) is a paraphrase of (34b), but (35a) is not a paraphrase of (34a):

- (35)a. How long did it take before John read *War and Peace*?  
 b. How long did it take before John recognized Mary?

And (36a) is itself a paraphrase of (35a), while (36b) is nonsensical:

- (36)a. How long did it take before John started/finished reading *War and Peace*?  
 b. #How long did it take before John started/finished recognizing Mary?

Vendler (1957) quotes Ryle (1949) as pointing out that the present perfect is used to report occurring achievements; as achievements are near instantaneous, they **have** occurred as soon as they **are** occurring. This is illustrated in (37):

- (37)a. Now he has found it.  
 b. Now she has noticed the new curtains.

The data thus collect to support Ryle’s original characterization of the difference between achievements and accomplishments: unlike accomplishments, achievements are changes of state which are not associated with any preceding task or activity.

The [–stage] property also traditionally shows itself in the fact that achievements are not felicitous in the progressive. If achievements are instantaneous, and cannot be analyzed into temporal parts, then it makes no sense to assert

than they are “in progress.” As has by now often been pointed out, achievements do very frequently appear in the progressive (Verkuyl 1989, Mittwoch 1991, Smith 1991). This problem or paradox is the topic of chapter 2, where I shall argue that achievements do appear in the progressive, but that the semantics of progressive achievements is sufficiently different from progressive accomplishments for the construction to show up the differences between the two classes, rather than blurring or obliterating them.

## 1.2.2 Testing for temporal constitution

Several of the central linguistic tests for distinguishing between aspectual classes have already been discussed above, in particular, the tests involving entailments and the progressive, but others, including modification by different expressions of temporal modification, have not been discussed systematically. At the risk of being repetitive, I shall sum up the contrasts between the aspectual classes by reviewing the standard tests briefly.

### 1.2.2.1 Expressions of duration: “for $\alpha$ time”

Expressions of duration such as *for  $\alpha$  time* denote sets of intervals and modify VPs (or Vs). The condition is usually expressed as follows: *x P-ed for two hours* is true if at every subinterval of a two-hour period, *x P-ed* is true. These expressions can thus occur with downwardly homogeneous expressions, namely states and activities (on the assumption that homogeneity is homogeneity down to minimal intervals, rather than instants). They do not occur with singular achievements. To the degree to which they occur with accomplishments, they force a non-telic activity reading of what is usually an accomplishment verb. Thus we have the judgments in (38):

- (38)a. Mary was happy with John for twenty years. (*state*)  
 b. Bill believed in Marxism for twenty years. (*state*)  
 c. John ran for half an hour. (*activity*)  
 d. #Bill arrived for half an hour. (*achievement*)  
 e. #Mary built a house for years. (*accomplishment*)  
 f. ?Jane read a book for half an hour. (*non-telic accomplishment*)

Here, (38a–c) are grammatical, (38d–e) are unacceptable, and (38f) is acceptable, but only if a non-telic reading is forced on the accomplishment. *Jane read a book* normally entails that the event ended with the reading of the whole book and that the book consequently became “read,” but (38f) – which focuses on the activity of reading – does not have this entailment. Thus there is no contradiction in saying “Jane read *War and Peace* for two hours, but she never read *War and Peace*.” Not all accomplishments can be pushed to this non-telic reading, as the unacceptability of (38e) shows, and some issues relating to this are

discussed in chapter 4. Achievements cannot be coerced into this non-telic reading. Achievements and accomplishments occur comfortably with *for  $\alpha$  time* only if there is a plural argument which allows an iterative interpretation, as in (39). With accomplishments this is normally the object, whereas with achievements this is normally the subject.

- (39)a. Dafna read *Moomintroll* books for some years.  
 b. Guests arrived for two hours.

These assert that at every (contextually determined) minimal interval of some/two hours, there was an event of Dafna reading a *Moomintroll* book, or of a guest arriving.

Another durational expression which reflects differences between aspectual classes is *spend  $\alpha$  time*. *Spend* has an agentive participant as subject, and thus does not occur with statives except with a semi-ironic reading, but other than that, it discriminates in the same way as *for  $\alpha$  time*. It occurs freely with activities, it does not occur with achievements, and when it occurs with accomplishments, it forces an activity/non-telic reading on the predicate. Again (40d) does not entail that the book was read.

- (40)a. Bill spent twenty years believing in Marxism. (*state*)  
 b. John spent half an hour running. (*activity*)  
 c. #Bill spent half an hour arriving. (*achievement*)  
 d. Mary spent twenty minutes reading a book.

### 1.2.2.2 Punctually locating expressions: "at $\alpha$ time"

The punctually locating expression *at  $\alpha$  time* gives an event a temporal location at a particular point in time, and discriminates between aspectual classes in such a way as to classify states and achievements together. This is demonstrated in (41):

- (41)a. At that moment, John believed in miracles. (*state*)  
 b. Mary was happy at midnight. (*state*)  
 c. John ran at 9 p.m. (*activity*)  
 d. The guest arrived at midnight. (*achievement*)  
 e. #Mary painted a picture at midnight. (*accomplishment*)

States can occur with *at  $\alpha$  time* since they are totally homogeneous, and thus hold at instants, as in (41a and b), and achievements, which are instantaneous changes of states, can also be punctually located, as in (41d). When an activity occurs with a punctual adverb, the effect is to assert that the activity **began** at the temporal point given, presumably since this is the only privileged instantaneous event available. (41c) has only the reading that John began to run at 9 p.m. Accomplishments do not have even this reading.

1.2.2.3 *Adverbials which locate the end of eventualities:  
"in  $\alpha$  time" and "take  $\alpha$  time"*

These place an eventuality within a temporal period of a certain size (Dowty 1979), although for Gricean reasons, the sentence carries a scalar implicature that the measure of the eventuality is equal to the temporal period stated. Thus *in an hour* locates the eventuality it is predicated of within a particular period of an hour by locating the end of the event as being within an hour, with the hour measured from a contextually determined point. The scalar implicature is that, unless otherwise indicated, the whole of the hour period is relevant, i.e. that the endpoint of the eventuality is just within the hour. These adverbials apply naturally to telic VPs, accomplishments and achievements, since these are the events which have endpoints to be located. They have derived readings with some states and activities, as in (42a and c):

- (42)a. John was happy in an hour. (*acceptable on an inchoative reading*)  
 b. \*John pushed the cart in an hour.  
 c. John ran in an hour. (*acceptable with an understood specified distance*)  
 d. The critic noticed the picture in a few minutes.  
 e. Dafna fell asleep in ten minutes.  
 f. Mary painted a picture in an hour.  
 g. Dafna read a book in twenty minutes.

With the achievements and accomplishments in (42d-g), which are acceptable, the adverbial locates the telic point of the eventuality at (or very near) the end of the time period specified. Since achievements, as in (42d and e), consist only of an telic point, this is equivalent to asserting that the achievement event happened at the end of the relevant time period, and the time period itself begins, or is counted from, some contextually specified point. With the accomplishments in (42f and g), the whole event must be located within the hour period. Thus we have the entailment in (43), which holds for accomplishments and not for achievements (Dowty 1979, p. 59):

- (43)  $x$  P-ed in  $\alpha$  time ENTAILS  $x$  was P-ing during  $\alpha$  time.

Thus (44a) is valid, but not (44b) or (44c):

- (44)a. Dafna read that book in twenty minutes -> Dafna was reading that book during twenty minutes.  
 b. Dafna fell asleep in ten minutes -> Dafna was falling asleep during ten minutes.  
 c. The critic noticed the picture in a few minutes -> The critic was noticing the picture during a few minutes.

Achievements may be preceded by a preparatory activity, but this is not a lexical entailment. Thus (44b) is true if there was an activity of dropping

gently off to sleep which took ten minutes, but it can also be true if Dafna sang songs loudly for ten minutes and then suddenly lay down, shut her eyes, and fell asleep. This contrasts with (44a) where the activity entailment is lexically determined. (44c) cannot have a preparatory activity associated with it, because an event of "noticing" is by definition an event which "happens" to you without an associated preparatory activity.

Usually, although not necessarily, the beginning point of the hour is calculated from the beginning of the activity. Thus (45a) and (45b) can be true of the same review, depending on whether the contextually relevant point for determining the beginning of the time period is the beginning of the writing event (as in 45a), or some other point such as when I got the request to write the review (in 45b):

- (45)a. I wrote that reader's report in a week.  
 b. I wrote that reader's report in two months.

Activities cannot normally occur with *in  $\alpha$  time* as (42b) showed, unless the eventuality is given a contextually telic reading. Thus (42c) is acceptable if *run* is interpreted as "run a specified distance," and then it means that this telic running event began and ended within the hour. States are non-telic. The only reading available for (42a) is one in which the state has been given an inchoative/achievement reading, meaning "begin to be happy," and the sentence asserts that John's happy state started within the hour. (46) shows that the verbal expression *take  $\alpha$  time* works essentially the same way as *in  $\alpha$  time*, again with the initial point of the time period contextually determined:

- (46)a. It took John an hour to be happy (again).  
 b. \*It took John an hour to push the cart.  
 c. It took John an hour to run.  
 d. It took the critic a few minutes to notice the picture.  
 e. It took Dafna ten minutes to fall asleep.  
 f. It took Mary an hour to Mary paint a picture.  
 g. It took Dafna twenty minutes to read that book.

(46a) has only the inchoative reading, (46b) is infelicitous, and (46c) is felicitous only on the same telic reading as is available for (42c). (46d–g) are all felicitous, but only the last two entail that a particular activity was going on during the stated period. I shall return to the distinction between achievements and accomplishments with respect to these tests in the beginning of chapter 2.

#### 1.2.2.4 *Complementation with aspectual verbs: finish vs. stop*

*Finish* occurs with eventualities which are dynamic ([–stages]) and a telic point. It thus occurs naturally with accomplishments. It occurs with activities only to the degree to which these can be given a telic reading contextually, and it does not occur with either of the [–stage] predicates. States and activities occur with

*stop*. If an accomplishment occurs with *stop*, the implication is that the eventuality was interrupted and the telic point was not reached. Achievements occur with neither, and as they are over as soon as they have begun, they cannot be stopped (or interrupted), and since *finish* also requires its complement to denote an eventuality with duration, they cannot occur with *finish* either.

- (47)a. John stopped/\*finished being happy.  
 b. John stopped/?finished running.  
 c. \*The critic stopped/finished noticing the picture.  
 d. \*The guest stopped/finished arriving.  
 e. Mary finished/stopped painting the picture.  
 f. Dafna finished/stopped reading the book.

Dowty (1979) points out that achievements like *find* are acceptable as complements of these aspectual matrix verbs if there is a “well-defined procedure” associated with the achievement; for example, a librarian might say to her assistant:

- (48)a. Have you finished finding those books?  
 b. Why have you stopped finding those books?

We will come back to Dowty’s example and other related cases in chapter 5.

### 1.2.3 Semelfactives

It has often been pointed out that there is another class of eventualities, called semelfactives. In particular, these are discussed in Smith (1991) and are the type of eventuality exemplified in (49):

- (49)a. John kicked the door.  
 b. Dafna winked.  
 c. Mary coughed.

Smith argues that these events are “conceptualized as instantaneous” (1991, p. 29) like achievements, but they seem to be atelic. That they are instantaneous (or punctual) is indicated by the fact that they occur with *at a time* as in (50):

- (50) John coughed/winked at 10 p.m.

They are argued to be atelic since, unlike achievements such as *die*, *break the glass* and *arrive*, they do not seem to bring about an explicit change of state.

Semelfactives are a problem for the kind of theory of aspectual classes we have been presenting here. First, a theory that deals with features should be uncomfortable with five aspectual classes. Our two features [ $\pm$ telic] and

[1stages] gave us four classes. A third feature would give us eight classes. A fifth class is thus a problem for a feature-based theory. Secondly, if we try to analyze semelfactives in terms of the features we already have, they should come out as [-telic] and [-stages], which would make them identical to states. While analysis via the features that we have reveals interesting properties about the other four verb classes, they do not give an insightful account of semelfactives. In chapter 8, I shall look at the problem raised by semelfactives in detail; here we will briefly look at how they relate to the data in (16).

Semelfactives have a natural place as the minimal event types of activities. As far as I know, every semelfactive has a homonym which is an activity, and indeed this seems to be the fact which has led people to assume that semelfactives are not an independent class. So while we have the data in (50) indicating that semelfactives are punctual, we also have the examples in (51) and (52) in which the same lexical items behave as activities.

- (51)a. John kicked the door for half an hour.  
 b. Dafna winked (furiously) for several minutes.  
 c. Mary coughed for the ten remaining minutes of the lecture.
- (52)a. John was kicking the door.  
 b. Dafna was winking.  
 c. Mary was coughing.

Note that in the progressive examples in (52), activity-type entailments hold. Each progressive activity in (52) entails the corresponding simple past sentence in (49). Since activities have minimal, non-homogeneous event parts, the natural conclusion is that semelfactives are activities used in this minimal way. We assume that this is why they do not have an independent feature classification, and return to this issue in chapter 8.

### 1.3 Can Verbs, as Opposed to VPs, be Aspectually Categorized?

One of the central questions in the theory of aspectual classes is whether verbs should be aspectually classified at all, or whether aspectual classification should apply only to Verb Phrases. (Here, VP covers both VPs and V's: on the assumption that adverbial modifiers are the daughters of VP, they must be sensitive to the aspectual properties of the V' complement which form V' level.) The *prima facie* evidence that only non-lexical verbal projections can be categorized is that the same verb may head VPs with different aspectual properties. We have already seen several ways in which verbs look as if they move between aspectual classes, but it is worthwhile itemizing the different problems: (i) cases where the aspectual properties of the VP are determined by the internal structure of the direct object; (ii) cases where the aspectual properties are

determined by the presence or absence of a modifier/non-subcategorized complement; (iii) cases where contextual factors seem to force a re-analysis; (iv) cases where the subject is plural; and (v) cases where the tests we have used above just don't seem to work.

(i) The first case includes the examples discussed originally in Verkuyl (1972). Verbs traditionally called accomplishments head VPs which are either telic or atelic depending on the properties of their direct object/theme. Thus, tests for telicity show that verbs like *write*, *build* and *eat* are telic when their theme arguments have definite, quantified or numerical determiners and are atelic when the same argument is a mass noun or a bare plural. Activity verbs with direct object themes do not show such an alternation:

- (53)a. John ate a sandwich/three sandwiches/every sandwich/the sandwiches in ten minutes.  
 b. \*John ate a sandwich/three sandwiches/every sandwich/the sandwiches for ten minutes.  
 c. \*John ate sandwiches/bread in ten minutes.  
 b. John ate sandwiches/bread for ten minutes.
- (54)a. \*John pushed a cart/three carts/every cart/the cart in ten minutes.  
 b. John pushed a cart/three carts/every cart/the cart for ten minutes.  
 c. \*John pushed carts/granite in ten minutes.  
 d. John pushed carts/granite for ten minutes.

(ii) The second case includes activity verbs which head an accomplishment VP if some complement or XP other than the direct object is added under V'. Striking cases are examples such as (55) where path arguments have been added to both intransitive and transitive activities respectively, and (57) and (58) where a resultative predicate forces an accomplishment reading on a predicate headed by an activity. (56) shows that a path argument forces a telic reading only if the path is bounded:

- (55)a. John ran for hours/\*in an hour.  
 b. \*John ran to the store for hours.  
 c. John ran to the store in an hour.  
 d. Mary pushed the cart for hours/\*in an hour.  
 e. \*Mary pushed the cart to the store for hours.  
 f. Mary pushed the cart to the store in an hour.
- (56)a. John ran along the street for hours/\*in an hour.  
 b. John ran to the end of the (very long) street \*for hours/in an hour.
- (57)a. Mary hammered the metal for an hour/\*in an hour.  
 b. Mary hammered the metal flat \*for an hour/in an hour.

- (58)a. Bill sang for an hour/\*in an hour.  
 b. Bill sang the baby asleep \*for an hour/in an hour.

Note also that in cases like (55), (57) and (58), the derivation of the telic reading is dependent on the theme argument being quantized, as in any accomplishment. Thus (55c/57b/58c) contrast with (59):

- (59)a. John pushed carts to the store \*in an hour/for an hour.  
 b. Mary hammered metal flat \*in an hour/for an hour.  
 c. Bill sang babies asleep \*in an hour/for an hour.

(iii) In some cases, context causes a verb to be interpreted as if it belongs to a different aspectual class. A classic example is (60), where context allows the activity verb *run* to be interpreted as a telic predicate with the meaning "run the specified distance," and so appear with the telic modifier *in  $\alpha$  time*.

- (60) *Context:* we know that Jan is a marathon runner and that last Sunday there was a marathon in Amsterdam.  
 He says: "Last Sunday I ran in 2 hours and twenty minutes."

These kinds of example, which we saw in (42c) and (46c), have been called instances of "coercion": the modifier *in  $\alpha$  time* forces an interpretation of the verbal predicate as telic. Unlike cases like (55a), the context makes such an interpretation available.

(iv) The examples in Sections (i)–(iii) above are cases where the shift is between activity and accomplishment. A well-known shift between achievement and activity is caused by plural subjects as in (61), noted in Verkuyl (1972):

- (61)a. \*John discovered this village for years/all summer.  
 b. Tourists discovered this village all summer.

(v) There are a variety of other cases where the tests used above seem to be suspect. Similar to (61), verbs "suddenly" appear in constructions where we would expect them to be impossible. Zucchi (1998) discusses a number of such cases, including statives which appear in the progressive, as in (62a and b), and accomplishments (with quantized objects) which are atelic, as in (62c). Another well-known example is that of achievements which appear in the progressive with either a "normal" reading (see Verkuyl 1989, Mittwoch 1991, Smith 1991), or a "slow motion" reading, first noted, I believe, by Sandro Zucchi. These are illustrated in (62d and e). And then there are statives which acquire an inchoative/achievement reading, as in (62f):

- (62)a. John is resembling his father more and more recently.  
 b. I think I am understanding you.

- c. Bake the cake/Cook the soup on a low heat for an hour.
- d. Our pizza is arriving!
- e. Mary is finally noticing that John has shaved off his beard.
- f. She was ready in five minutes.

The combined effect of these examples is to convince some linguists that there is no real distinction between verbs in different aspectual classes. Maybe the most notable in this group is Verkuyl (1972, 1993), who argues that aspectual distinctions should all be calculated at least at the level of the VP. Verkuyl (1972) argues that most of the alternations described above are the result of the interaction between the V and its complement, although the data in (61) indicate that aspect is properly a property of sentences and not of VPs. Verkuyl (1993) claims that even if aspectual classes can be distinguished at the verbal level and verbs can be classified aspectually, this is simply not relevant for explaining the aspectual properties of sentences. Verkuyl develops a theory in which the crucial distinction is between telic and atelic. There is a bivalent classification of verbs into [+ADD-ON], essentially [+dynamic], and a parallel division of nominals into [-Specified Quantity (SQA)]. Telicity results when a verb which is [-ADD-ON] combines with an argument which is [+Specified Quantity]. Various technical glitches need to be accounted for, such as the fact that [+SQA] verbs are atelic if they have no direct object. But Verkuyl runs into difficulties with transitive activity verb phrases such as *push the cart* which are clearly dynamic and thus [-ADD-ON], with a [+SQA] nominal, but which are none the less atelic. He argues that this is because *push* has incorporated its presumably [-SQA] direct object, and should be paraphrased as *give pushes to*; its surface direct object cannot then affect its telicity. (Note that Verkuyl would also have to assume two verbs *push*, one derived from *give pushes to* which would allow an activity reading, and another derived from *give a push to* which would allow the semelfactive reading.) But this approach cannot explain transitive activities such as *entertain*, where the verb cannot have incorporated a direct object since the relevant nominal is *entertainment*, which is derived from the verb itself. Then there are verb phrases such as *wipe the table* which are ambiguous between the telic and the atelic reading, but where there is presumably only one verb, and activities such as *hammer* where the incorporated argument is intuitively the instrument and not the direct object at all. The impossibility of generalizing the explanation leads us back to the task of clarifying what these transitive verbs have in common which allows the atelic reading with a quantized direct object, in other words exploring what an activity, or an activity reading, is.

Other linguists have been more open to the idea that an aspectual classification of verbs may be useful, without diminishing the significance of the data in (53–62). Krifka (1986, 1989, 1992, 1998) has attempted to make explicit the relation between a verb and its object which allows the telicity (or quantization) of the VP to be dependent on the properties of the nominal rather than the verb. He argues that accomplishment verbs which display the alternation in

(53) have a **gradual** relation with their patient argument. This means that the denotation of the patient argument is involved incrementally in the event denoted by the verb: we assign a part structure to the event and a part structure to the patient participant and as the running time of the event grows bigger, the proportion of the patient involved in the event will increase too. Thus the degree to which the sandwich is eaten (= the extent of the sandwich physically involved in the eating event) will grow incrementally as the event continues, and the extent of the sandwich will thus determine how long the *eat a sandwich* event continues. When there is no more sandwich left, the event will stop. By contrast, no property of the cart determines the extent of an event in the denotation of *push the cart*. Krifka thus attempts to make precise the intuition discussed in Verkuyl (1972), Dowty (1991), Tenny (1987, 1994), and others, that in telic accomplishments the **extent** of the theme argument (Dowty's 1991 expression is "incremental theme") determines the extent of the event. I will discuss problems with Krifka's theory in chapters 4 and 6; what is relevant at the moment is his claim that it is possible to give a coherent account of the activity/accomplishment distinction, while still recognizing the alternation in (53–8) as a real one. In Krifka's theory, the accomplishment/activity distinction is an aspectual distinction between those predicates which allow a patient argument to determine the extent of the eventuality in their denotation and those which do not, and I agree with him that this constitutes a genuine distinction between the two kinds of verbal predicates – although we will disagree about how the patient determines the extent of the event. This kind of theory makes space both for the validity of the aspectual classification of verbs and for the statement of why the same verb may head VPs with different aspectual properties. As Krifka (1998) shows, PPs such as *to the store*, can also indicate an incremental measure on an event. In *push the cart to the store*, it is the quantized property of the PP which determines the endpoint of the eventuality and makes it telic. Since different classes of verbal predicates interact with modifiers in different ways, an aspectual classification of verbs may also make predictions about what kinds of modifiers will affect the telicity of VP. So the data in (16) should not be interpreted too crudely. The opposition between activities and accomplishments is not that the first is atelic and the second telic, but a much finer opposition: an activity does not have a telos determined by its relation with its arguments, whereas an accomplishment may have a telic point determined by the verb's relation with its theme.

To sum up: I am going to argue that verbs can be classified into verb classes, that this classification reflects the properties of the events in their denotation, and that it can be used to make predications about how verbs from particular verb classes interact with arguments and modifiers. So "state," "activity," "achievement," and "accomplishment" will be properties of verbs. Telicity and atelicity, however, will be properties of VPs, and it will be a characteristic of a particular verb class that it allows telicity or atelicity to be determined in one way but not another. *Build a house* and *build houses* are, respectively, telic

and atelic VPs headed by an accomplishment verb, and *run to the store*, or *run a mile* are both telic VPs headed by an activity verb. Contrary to what is often assumed, and to what is implied in (16), telicity is not a property which is appropriately ascribed to verbs.

I shall argue that in addition to the aspectual effects of VP modification, a theory of lexical aspect must consider shifting operations which shift a verbal meaning from one class into another, or more precisely, build new verbal meanings which incorporate the original verb meaning into a new structure with the aspectual characteristics of a different verbal class. This operation of aspectual shift is analogous to the type-shifting operation which shifts syntactic expressions from one type to another, from the type *d* (of entities) into the type  $\langle d,t \rangle$  (the type of one-place predicates) or into the type  $\langle \langle d,t \rangle t \rangle$  (the type of generalized quantifiers). I shall argue that the aspectual class of the verb determines what shifting operations it may be input to, and in what contexts. The data in (16) makes predictions as to what shifting operations should be straightforward. The shift from achievement to accomplishment should be relatively natural since both sets of event types are telic, and differ with respect to dynamicity. The shift from activity to accomplishment should also be natural, since activities and accomplishments share the feature [+stages], but differ with respect to the telic feature. We will discuss instances of both kinds of shifting operation in chapters 2 and 3 respectively. Shifting from a state to an accomplishment should be much less natural since states differ from accomplishments in both features. States can naturally be shifted to inchoative readings though, as we saw in (62f): inchoatives are essentially achievement readings, and states and achievements are both [-stages], although they differ in terms of cumulativity. But rather than taking these predictions too strictly, I shall show that aspectual shift operations, like type-shifting operations, must preserve the information conveyed by the original predicate. This strong constraint on the operations will guarantee the "naturalness" constraints implied by (16).

The discussion in this book will focus in particular on the semantics of accomplishments. I shall examine in depth the ways in which achievements can be incorporated into accomplishment meanings and used in the progressive, and the ways in which activities can be incorporated into accomplishment VPs through the resultative construction. I'll argue that these kinds of movements do not blur aspectual distinctions but make use of them: for example, the meaning of progressive achievements is sufficiently different from "normal" progressive accomplishments that the construction strengthens – rather than weakens – our conviction that achievements and accomplishments are different. I shall use the analyses of both the progressive achievements and the resultative constructions as a basis for developing a semantic analysis of accomplishments, and show how this allows an account of the interaction between accomplishment verbs and telicity. This whole discussion will be the basis for re-evaluating the data in (16) and re-analysing the structure of the system of aspectual class.

How to represent the aspectual properties of verbal classes is a question which will be discussed at length in the course of the book. For heuristic reasons, I begin by assuming the following templates for verb meanings.

(63) **Verb class templates**

- |                    |   |
|--------------------|---|
| a. States          | $\lambda e.P(e)$  |
| b. Activities      | $\lambda e.(DO(P))(e)$  |
| c. Achievements    | $\lambda e.(BECOME(P))(e)$  |
| d. Accomplishments | $\lambda e.\exists e_1, e_2[e^s(e_1, e_2) \wedge (DO(P))(e_1) \wedge Cul(e)=e_2]$ |

These are approximate reconstructions of Dowty's (1979) verbal templates, translated into an neo-Davidsonian theory of verb representation, in which verbs are predicates of events and thematic roles denote functions from events into their participants. (These templates, however, make reference only to the properties of the verbal predicate, and not to any arguments.) In these representations,  $P$  is a variable over the idiosyncratic content of particular lexical items. (63a) represents states as consisting of bare event predicates. (63b) represents the meaning of activities as an bare event predicate under the scope of a  $DO$  operator, while (63c) represents the meaning of an achievement as a bare event predicate under the scope of a  $BECOME$  operator, in an attempt to capture Dowty's intuition that an achievement is a near-instantaneous change of state from a state in which  $x$  has the property  $\neg P$  to a state in which  $x$  has the property  $P$ . Accomplishments are represented as complex event predicates constructed by summing an activity and a culmination or telic point, where we assume that  $cul(e)$  is also a near-instantaneous event. The superscript  $s$  indicates that unlike the summing operation used in the formation of plural entities (Link 1983, Lasersohn 1992, Landman 2000), the summing operation involved here forms a singular entity.

These representations are heuristic devices which attempt to capture the basic relations between the aspectual groups. They are not explanatory, since we do not know what "BECOME" means or how "DO" captures the crucial properties of activities (or even what these properties are). For example, although the use of  $DO$  implies that both activities and accomplishments are agentive, this is clearly not the case, as Dowty points out. However, these definitions are sufficiently usable to get us through the first part of the book, until we can reconsider matters.