Aspectual Classes and Aspectual Composition

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1. Introduction.*)

In this paper, I would like to discuss in some detail the so-called Vendler-classes which play an important role in the linguistic and philosophical literature these days. Vendler breathed new life into an old Aristotelian tripartition of situational types by proposing a quadripartition: States, Activities, Accomplishments, and Achievements.

Basically, this temporal classification is ontological, because it concerns situational categories that are part of the world as we perceive and cognize it, but Vendler offered linguistic criteria to distinguish the four categories from one another. This made his work of interest to linguists as they were offered a linguistic counterpart: State terms, Activity terms, Accomplishment terms and Achievement Terms. More specifically, Vendler's proposal seems to incorporate the claim that the category of verbs of any natural language can be split up into these four categories. Among linguists accepting this division, the idea seems to be that, even though the specific linguistic criteria may vary across different languages, every language can produce congenial criteria so as to give the Vendler-quadripartition a solid grounding.

Kenny (1963) independently proposed a tripartition. Both he and Vendler go back to Aristotle for their inspiration, so they have two of his classes: States and Activities. However, Vendler's Accomplishments and Achievements are not distinguished by Kenny. He puts them together as so-called Performances. Part of the discussion in the present paper concerns the question whether or not Vendler's refinement is necessary, if justified at all. In this sense, Kenny is closer to Aristotle. People sometimes speak about the (Aristotle)-Vendler-Kenny classification.

What did Vendler actually propose? Did he make an ontological or a linguistic classification? Or did he do both? The question is of some importance because it is a rather striking feature of his analysis that he kept the quadripartition at the lexical level. He used the term 'term' to denote verbs, even though he seemed to be aware of the fact that his categories are complex in the sense that e.g. the direct object appears to co-determine whether

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or not a transitive verb belongs to one of the four categories. His inclination to stay at the lexical level enforces the idea that what he really did was to propose ontological categories: if knowledge of the world and knowledge of a language tie up intimately at some place, they do that at the lexical level not so much at the structural level (cf. Putnam 1978, Dowty 1979, Partee 1980).

Vendler's classification, however, turned out to bear on the linguistic theory of aspect. Some of his criteria were well known in the literature on the opposition between the imperfective and perfective aspect in Slavonic languages. The implication that each of his lexical classes can be used in the theory of aspect, would actually constitute a setback. It runs afoul of the growing evidence that aspect is essentially a non-lexical property of sentence structure, both in Slavonic and non-Slavonic languages.

As indicated in Verkuyl (1972:42), the insight that the direct object can at least affect some sort of basic temporal meaning of a verb was already present in the linguistic literature on aspect in the 1920's, though **in nuce**; cf. e.g. Poutsma (1926), Jacobsohn (1933). Taking up the idea that the nature of the objects can influence the basic aspect of a verb, I argued that the opposition between imperfective and perfective aspect is not a matter settled at the verbal level. I proposed that aspect be "taken away" from the verb and be assigned to higher levels of sentential structure; first of all, to the VP because this node dominates the verb and the objects, and subsequently, to the S, because the nature of the subject appears to be a determinant of aspect as well.

So the basic idea is that the verb needs to be specified as to its having a specific **meaning element** engaged in the composition of aspect, but that this feature cannot be identified with aspect itself, because aspect is to be considered a complex sentential property. This line of argumentation explains why I did not incorporate Vendler's classification in my analysis of aspect. Vendler kept his classes at the lexical level, whereas I wanted to get rid of the opposition between imperfective and perfective aspect as lexical properties.

The idea of aspectual composition has been widely accepted nowadays. Yet, Vendler-classes are still very popular: many linguists use the quadripartition as part of their theory of aspect. In my view, these two things cannot

be married as they are incompatible: if aspect formation is a process at a structural level it is hard to see how a lexical division can be maintained. Actually, closer analysis of recent contributions to aspectual theory reveals (a) that people say explicitly that they like Vendler's proposal, and (b) that they do not use his classes if they express linguistically relevant generalizations.

In this paper, I would like to give such an analysis. I will argue for a more proper use of classificatory devices than seems to be available in the literature discussed in the sections that follow. I shall also indicate how my own analysis in Verkuyl (1972) and in more recent work, relates to the Vendler-classes.

This paper is organized as follows. After having surveyed in section 2, the diverse types of classification of Vendler-classes that I have found in the literature, I shall examine the criteria used by Vendler to establish his quadripartition, in section 3. My examination of his proposal will lead to the conclusion that Vendler mixed up some of his criteria: he did not distinguish very well between criteria based on (some sort of) agentivity and criteria based on purely temporal properties of situations such as boundedness, uniqueness, etc. In the sections 4 and 5, several proposals are discussed paying tribute to Vendler (and/or Kenny). My purpose is to examine what they did with the Vendler-(Kenny) classes and how they use them (rather freely). In section 6 I will discuss my own "constructive" approach and show that it is not classes that play a role in the explanation of aspectual phenomena but rather some semantic factors from which the classes are constructed, thus (again) leaving behind a Verb-classification as of no use to aspectual theory.

2. Types of classification.

There seem to be four major types of classification in the literature. They are represented in the diagrams of Table 1. Vendler seems to have constructed his classes out of two binary oppositions, say provisionally +A vs. −A, and +B vs. −B. Later on, I shall show that his proposal was more fuzzy than suggested by the matrix in Table 1A, but yet 1A seems to be a correct interpretation to begin with. The other diagrams represent different types of classification discussed in this paper.

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Table 1. A. Cross-classification   B. Partial ordering

	-A	-B
-B	-A,-B State	+A,-B Activity
+B	-A,+B Achievement	+A,+B Accomplishment

```
              X
           /     \
      -A,-B        Y
               /      \
          +A,-B        +B
                    /      \
              (-A,+B)    +A, +
```
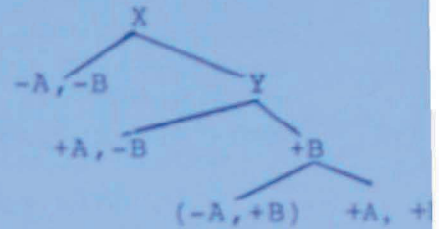
C. Strict hierarchy   D. Hinge ordering

```
  -A,-B
  +A,-B
  +A,+B
  -A,+B
```

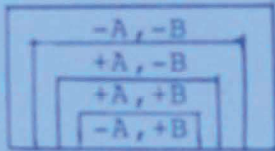| -A,-B	+A,-B	
--	+A,+B	(-A,+B)

In transferring the feature indications rather than the names of the classes from 1A to 1B - 1D, I want to show that the use of the **name** of a Vendler-class does not warrant the conclusion that the **concept** related to this name is a Vendler-concept. The relationship between concepts is of crucial importance to their interpretation. For example, in 1B the two occurrences of [-A] are not directly related, as they are in 1A, and the same applies to [-B]. Hence, even though some authors proposing a classification of type 1B, claim that their categories are similar to the ones proposed by Vendler, one can be sure that they are not.

In my view, the interpretation of theoretical terms of others requires that one's own position be made clear. Therefore, I shall put my cards on the table here. My aspectual theory requires a non-lexical classification of situational types as in Table 2.

Table 2.

NP:	-B	+B

STATE	PROCESS	EVENT

V:	-A	+A

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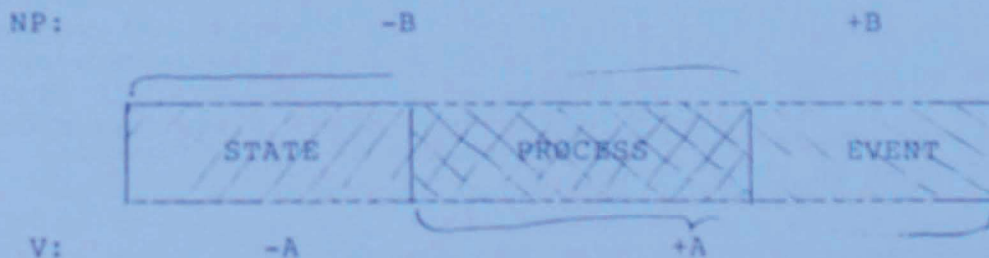
This classification, which belongs to type D in Table 1, was inherent to Verkuyl (1972), where the "double sided" nature of processes was essential to my aspectual analysis: they go with States as far as durative aspect is concerned, but they form an essential part of terminative events. In fact, my ordering was more like 1D itself, because following linguistic tradition, I accepted a 'momentaneous' aspect at the time, and hence (non-lexical) momentaneous events, but at present I no longer believe that they are an aspectual class on their own, as I shall make clear below.

I did not bother very much about a typology of situations at the time, because in my proposal classes as such do not play a role. I still hold this position so it is only for easy reference that I follow Mourelatos (1978) in using the terms 'State'(-A,-B), 'Process' (-A,+B), and 'Event' (+A,+B). As can be easily seen by comparing B with D in Table 1, there is a crucial difference in the way Processes and Events relate to each other in (Mourelatos') 1B and in Table 2, as I shall explain in more detail later on.

An essential feature of the proposal in Table 2 is that one of the parameters, provisionally just A, is tied up with the Verb whereas the other parameter B is associated with the NP in a way that will also be made clear later on. I shall argue that the aspectual differences in:

```
She(+B) hated(-A) that sonata(+B)    durative/imperfective
She(+B) hated(-A) sonatas(-B)        durative/imperfective
She(+B) played(+A) that sonata(+B)   terminative/perfective
She(+B) played(+A) sonatas(-B)       durative/imperfective
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can be explained in terms of the two parameters A and B that constitute the tripartition; only if there are plus-values may terminativity arise.[1] An explanatory perspective along this line is absent in most of the divisions in Table 1 that I know of. I will evaluate proposals negatively if there is no linguistic embedding of the aspectual parameters in sentential structure.

In the following section, I shall examine Vendler's proposal in some detail presuming the background of Table 2 as the source of my criticism. To avoid any misunderstanding, even though my discussion of Vendler's paper is very critical, it does not take away much from my longstanding admiration for this essay.

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3. Vendler's matrix.

3.1. Introduction.

Vendler used the following so-called time schemata to characterize his verb classes:

(1) STATE: A loved somebody from t_1 to t_2 means that at any i n s t a n t between t_1 and t_2 A loved that person

ACTIVITY: A was running at time t means that time instant t is on a time s t r e t c h throughout which A was running

ACCOMPLISHMENT: A was drawing a circle at t means that t is on the time s t r e t c h in which A drew that circle

ACHIEVEMENT: A won a race between t_1 and t_2 means that the time i n s t a n t at which A won the race is between t_1 and t_2.

I have cited Vendler's own wording, adding enlarged space in the terms pertaining to temporal units (instant, stretch) to indicate one of the two crucial parameters involved, the other being the one italicized by Vendler himself, viz. the (in)definiteness of the temporal unit involved, expressed by **any**, **a**, and **the** in (1).

With Galton (1984) and Hoeksema (1984), I share the opinion that Vendler's division must be analysed as a partition in which the four classes are intended to be on an equal footing. Many authors ignore this aspect of Vendler's division. Essentially, (1) induces a matrix: States and Activities share the property of pertaining to non-unique, indefinite temporal entities, States and Achievements pertain to instants, so they cannot be seen as **processes going on** in time, Activities and Accomplishments are conceived of as **processes going on** at time stretches, and finally Achievements and Accomplishments involve unique, definite temporal units.

Anticipating my discussion of the criteria pertaining to the opposition Stretch vs. Instant, I have italicized the phrase 'processes going on' because it is crucial to the interpretation of the opposition 'Stretch vs. Instant': processes going on in time require there to be stretches to "go on in". In view of this, the division based upon (1) will be constructed as in Table 3. Vendler presented

criteria to tell the four classes apart. In section 3.2, I shall discuss criteria pertaining to its vertical division, which I have dubbed the Continuous Tense Criteria (CTC).

Table 3

	-Process (Instant)	+Process (Stretch)
-Definite (any, a)	State	Activity
+Definite (the)	Achievement	Accomplishment

In 3.3, the horizontal division will be examined under the heading of Definiteness Criteria (DC). Finally, in 3.4 Vendler's plea for an Achievement class **sui generis** will be examined.

3.2. Continuous Tense Criteria.
These criteria involve the opposition between continuous and non-continuous tense. The most important one is **ProgF**: Accomplishment verbs and Activity verbs can have a Progressive Form, whereas State verbs and Achievement verbs cannot have it. This is illustrated by the following data:

(2)   a. *I am knowing, she is loving him, he is possessing the house, he is ruling the country (State)
      b. He was running, she is swimming, they are pushing a cart (Activity)
      c. She is running a mile, he is drawing a circle, he was eating a sandwich (Accomplishment)
      d. *She was recognizing him, he was reaching the top, she was winning (Achievement)

The judgments are Vendler's. I have starred (2a) and (2d) to indicate that they are meant to exclude the Progressive Form. **ProgF** seems to be based on the opposition [+Process] in Table 3, which in its plus-value [+Process] pertains to processes going on in time. As Vendler put it: "...running, writing and the like are processes going on in time, that is, roughly, that they consist of successive phases following one another in time" (p.99).

ProgF has not been accepted as a solid criterion by a great many authors, who noted that sentences like (3) and (4) are acceptable. (e.g. Leech 1971: 14-27; Comrie 1976:37f; Vlach 1981:279ff.):

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(3) a. I am living in Amherst
     b. The dead man is hanging there to deter the
        population
     c. Mr. Smith is standing by the Nile
     d. You are looking well
     e. He is being ill

(4) a. She is winning this game
     b. He is dying
     c. She was reaching the top
     d. Look at the screen, the Challenger is exploding
        now
     e. Manufacturers were beginning to find it more
        difficult to meet the dates

Putting aside the observational inadequacy of **ProgF**,
however, one can easily see that it does not do what it is
assumed to do. This becomes clear from the choice of
examples like (2), which shows that **ProgF** is factually
based on another criterion, namely the opposition between
expressing or not some specific sort of agentivity which is
absent in (2a) and (2d), showing up in (2b) and (2c)
though. But examples like (5) are non-agentive; (5c) – (5e)
cannot even be taken as quasi-agentive:

(5) a. The weather is developing a strange pattern
     b. Colgate is starting to score some coups of its
        own
     c. Imports are increasing in price as a
        reflection of the weakening dollar
     d. Two years ago these operations were not making
        any money
     e. We are at a point here where small things are
        mattering

The problem appears to be that **ProgF** is used to cover two
quite different semantic factors. It is said to pertain to
successive phasal progress in time, but it is also tied up
with the concept of agentivity. Thus, it is strongly
suggested that these two factors are identical, which they
are not; or that they are very closely related which they
are not either. Consider Table 4.

Table 4

	+Agentive	−Agentive
+Progress	he is running	prices are increasing
−Progress	he is ignoring	small things are mattering

Here it is shown (a) that the concept of agentivity is not essentially tied up with the use of the Progressive Form, and (b) that the use of the Progressive Form is not essentially tied up with the criterion of Progress in time, though it is more closely related to temporality. Emmon Bach (pers. comm.) pointed out that in stories the Progressive Form can pertain to States in such a way that the objects which are in a given state are temporarily experienced by the narrator (cf. also Galton 1984;Dowty 1979). Thus, a sentence like **The village was lying in the valley** seems to report a state of a village as seen by the narrator who is telling the story as if he just had entered the valley. The use of the Progressive Form tends to actualize its ephemerical nature: the state is reported from the point of view of the narrator. It would be natural to say that the lying-state of the village is presented here as temporarily present: in terms of Verkuyl (1972:63ff.; 1976), what is going on is an actualization, a temporal realisation of an abstract stative object.

Let us now have a look at the negative side of **ProgF**: States and Achievements. Undoubtedly, the important role of agentivity in the analysis of temporal phenomena in the work of both Vendler and Kenny is due to Ryle (1949), who also led them back to Aristotle. In this perspective, it is clear why Vendler put States and Achievements in one category: to distinguish Achievements from Accomplishments, he argued that the former have State-like properties. However, do States and Achievements form a natural class?

It can be observed that **She is loving him** is rejected on a different ground than **She is recognizing him**. In the latter case one could say, following Vendler's description of Achievements for the moment, that there is some temporal unit but there is no room within the bounds of a point, because there are no bounds: points are atomic. In the case of States, some sort of universal quantification over a certain time stretch is assumed. Galton makes the same point from a slightly different angle by pointing out that Vendler's "state-verbs lack continous tenses because their meaning is already necessarily continuous in nature, so a continuous tense would be superfluous; while achievement-verbs lack continuous tenses because their meanings, involving as they do the idea of punctuality, are incompatible with continuity" (1984:71). I shall return to this point in section 3.3.

Vendler introduces other **CTC** to strengthen his case, but as formulated most of these turn out to be tests for agentivity. A clear example is the so-called **Do**-criterion

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applied to the difference between **Do you know that she is ill?** (Answer: **Yes, I do**), and **Do you run?** where **Yes, I do** expresses an intention. Clearly, this criterion cannot be used in non-animate cases like (5). Yet, the **Do-criterion** is given an important place in the exposition of **CTC** (p.99). Dowty (1979) does not have it.

Connected with the use of **Do**, there is a criterion which I shall call **AgMod**, as it boils down to Agentive modification by adverbials. This is shown by the examples in (6).

(6) a. *John deliberately knew the answer(State)
    b. John deliberately pushed the cart(Activity)
    c. John deliberately painted a circle
        (Accomplishment)
    d. *John deliberately found a penny(Achievement)

This seems to work quite well, as in the case of adverbials like **attentively, studiously, carefully,** etc., but now consider (7):

(7) a. The sun had (*deliberately) evaporated four
       gallons
    b. The lightbeam (*deliberately) passed the house
    c. The mummy was (*deliberately) dried out by the
       drought
    d. The washer (*deliberately) ejected these dishes

Even though **deliberately** is incompatible with the sentences in (7), I think that Vendler would have to put **evaporate, pass, dry out,** and **eject** in the category of Accomplishments. For example, it is appropriate to ask **How long did it take for the mummy to dry out?** whereas it is somewhat queer to ask **For how long did the mummy dry out?** (I shall discuss that criterion below). Dowty(1979) would have no problem either in accepting these verbs as non-agentive Accomplishments. So again, it seems as if one of the **CTC, AgMod,** has to do with voluntary agency rather than with continuous tense. This is exactly the reason why Mourelatos (1978) introduced the term **Developments** in order to comprise both (agentive) Accomplishments and non-agentive cases like (7).

The same objection applies to verbs like **stop** and **start** which are said by Vendler (but not by Dowty) to take only Activities and Accomplishments as shown in (8):

(8) a. *She stopped/started loving him
    b. She stopped/started running
    c. She stopped/started drawing a circle
    d. *She stopped/started recognizing him

Again one could say that some sort of (voluntary) agency
seems to be involved in (8b) and (8c) rather than a process
taking time: it is rather odd to say **The mummy stopped
drying out**, even though **dry out** is not a State or an
Achievement term. Consider also (9):

(9) a. Stop being a fool, being naughty, being a
        workalcoholic
    b. ?Stop being ill, being eight feet long, being
        loved
    c. He is being a fool, naughty, a work-alcoholic
    d. ?He is being ill, eight feet long, loved

where both (9a) and (9b) without the verb **stop** pertain to
states of affairs or habits or dispositions. **Stop being ill**
is somewhat strange given the current insights in the
causes of illness: one does not have control over illness.
The meaning of **love** seems to express that the one who loves
as well as the one being loved have no agentive control: it
seems to happen, just like recognizing some object.

   Strictly speaking, **Stop/Start** cannot be a criterion,
because there is no Progressive Form in the sentences of
(8). This is no hair-splitting. If one allows for the
-ing-forms in (8), one should be able to explain why
phrases like **Knowing that he was ill...**, **Recognizing her
sister...**, are perfectly acceptable.

   Summarizing, one can say that Vendler seems to be
guided by at least one of the following principles, where
CTC stands for **ProgF**, for **Do**, for **AgMod**, and for
Stop/Start:

(10) If a Verb is positive w.r.t. **CTC**, then it belongs
      to the set of Activity verbs or Accomplishment
      verbs.

(11) If a verb belongs to the set of Activity or
      Accomplishment verbs, then it is positive w.r.t.
      CTC.

Of course, Vendler is only committed to (10), as the
antecedent of (10) refers to linguistic criteria. But it
would be very nice for him if both (10) and (11) held. This
is not the case, in two directions. Firstly, (10) does not

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hold, which becomes clear as soon as we take its contraposition: many State verbs and Achievement verbs allow for the Progressive Form, as shown by (4) and (9c). Even if a verb is negative with respect to **CTC**, it can be a (non-agentive) Accomplishment verb, as shown in e.g. (5a).

Secondly, it has become clear that (11) does not hold either. This too can be shown by contraposition: there are verbs thrown out by **CTC** which are Activities or Accomplishment by any other account, because they take time, as shown by (5) and (7).

Vendler's **Progressive Form** criterion turns out to be a criterion actually focused on some unclear concept of agentivity. Vendler seems to follow here the linguistic tradition which coined the term **Aktionsarten** for the phenomena at issue: the ways actions are conceived of. This term itself suggest that agentivity plays an important role. However, important for what? Human actions are extremely important for philosophers. But are they linguistically? And if they are, do they concern aspect? The answer should be negative, I think. It is a rather bad but understandable habit of linguists to mainly choose sentences pertaining to animate beings such as John and Mary, or Jack and Jill at the expense of non-animacy. However, the concept of agentivity may overlap greatly with the concept of processes going on in time, because most of the time we speak about human actions. But this does not mean at all that these concepts can be identified.

3.3. Definiteness criteria.

Returning to Table 3, I would like to review Vendler's arguments for a horizontal division on the basis of the Definiteness features. The characterizations in (1) should set Accomplishments and Achievements apart from Activities and States, but Vendler restricted himself mainly to the opposition between Accomplishments and Activities. The few words that he spent on the difference between Achievements and States complicate the picture considerably, as I shall point out in this section.

Vendler characterized the differences between Activities and Accomplishments by two different sorts of linguistic criteria: (a) those based on cooccurrence; (b) those based on entailment. I shall treat them in separate subsections.

3.3.1. FIT-criteria.

The first sort of criteria concern certain restrictions on co-occurrence of verbs with certain

adverbials or verbs. I shall refer to these criteria with the letters **F** for **For**-adverbials, **I** for **In**-adverbials and **T** for the verb **Take**, as exemplified by (12)-(14):

(12) a. He ran for half an hour   F
     b. #He ran a mile for half an hour

(13) a. *He ran in half an hour   I
     b. He ran a mile in half an hour

(14) a. *It took him half an hour to run   T
     b. It took him half an hour to draw the circle

The peculiar feature of sentences like (12b) is not only that a single event reading is blocked, but that in many cases an interpretation is invoked in which repetition of the event or a peculiar sort of stretching the event, in this case 'He ran a mile', is forced upon us (cf. Verkuyl 1986, fn. 4). From now on, I shall indicate this reading with the symbol #. One of the basic problems of aspectual theory is how to explain the blocking of the singular event reading and the tendency to assign a repetitive reading.

As shown in Verkuyl (1972), the F-criterion can be considered the most important one in connection with the study of aspect. As a litmus-test for perfective aspect, it has had a long history in the literature. It also has a reasonably clear interpretation: the duration expressed by the adverbial is incompatible with the concept of a unique definite event that is discernible by its bounds.

An agentless variant of **F** not discussed by Vendler but giving nice results, is what I call the **Conjunction-criterion C** in (15):

(15) a. The VAX printed a paper on Saturday and on Sunday
     b. The VAX ran on Saturday and on Sunday
     c. The postman delivered a parcel on Saturday and on Sunday

In (15a) one can be sure that there were two printings, one on Saturday, the other one on Sunday. In (15b), the VAX may have been running twice having stopped to work at night, but it may also have been working constantly throughout the weekend. In (15c), I have given an example of what Vendler would call an Achievement: as in (15a) there were two deliveries. Vendler's Accomplishments and Achievements form a natural class with respect to C.

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The I-criterion seems to have the same range as **F**, though again **I** as presented by Vendler is tied up to the concept of agentivity: tasks are carried out by some agent in x many time units. Thus, Vendler says that **He did it in twenty seconds** is the appropriate answer to **How long did it take to draw the circle?** But it is quite possible to apply **I** to non-agentive cases.

Many linguists consider **I** to be equivalent to **F**. I doubt it. Note, for example, that (13a) can have a meaning: it took him (less than) half an hour before he started to run. The same interpretation can be given to (14a). The notion of "inchoativity" is absent in **F**. The problem (at least in Dutch) is that **in** can mean 'within, i.e. counting the time units from the begin to the end of an interval' and 'on/at, i.e. locating a unit in a larger unit'. Thus, I rely more on **F** and **C** than on **I**.

The **T**-criterion is dubious if compared with **F** and **C**. Its form, **It took X y time to ...**, requires that the values of X be terms expressing some sort of agency. At least that is how **T** works: it excludes Achievements, as Vendler says explicitly on page 104. It is therefore important to see that it is **T** that seems to have prevented Vendler from staying in the right aspectual track. If he would only have used **FI** and not **T**, then he would have been forced to recognize that both Achievements and Accomplishments meet **FI** as shown by (12), (13), (16) and (17). Now he ignores this relation, thus suppressing an important part of aspectual theory.

(16)   a. *He won the race for half an hour
       b. *The bomb exploded for half an hour
       c. *She was born for half an hour
       d. *He reached the top for half an hour

(17)   a. He won the race in half an hour
       b. The bomb exploded in half an hour
       c. She was born in half an hour
       d. He reached the top in half an hour

Dowty(1979:58) also accepts (17) as well-formed. So again Vendler seems to have mixed up criteria pertaining to agentivity with criteria pertaining to the properties of temporal entities, such as the possibility of discerning intervals as temporal units that can be counted. But more importantly, Vendler did not acknowledge that Accomplishments and Achievements form a natural class indeed, as they are supposed to be by the definiteness expressed in (1).

Turning now to the difference between States and Achievements, one can observe that Vendler introduced a new opposition. He says:

(18) ...verbs like **knowing** and **recognizing** do not indicate processes going on in time, yet they may be predicated of a subject for a given time with truth or falsity. Now some of these verbs can be predicated only for single moments of time (strictly speaking), while others can be predicated for shorter or longer periods of time. One reaches the hilltop, wins the race, spots or recognizes something, and so on at a definite moment. On the other hand, one can know or believe something, love or dominate somebody, for a short or long period. (p. 102)

This opposition does not coincide with the opposition between +Process vs. -Process underlying the vertical division in Table 3. This cannot be, since the latter concerns (non-)continuous tense. What (18) seems to add to Table 3 is given in Table 3a.

Table 3a	Process	Definite	Momentary
STATE	-	-	-
ACTIVITY	+	-	-
ACCOMPLISHMENT	+	+	-
ACHIEVEMENT	-	+	+

The first two columns in Table 3a give the same information as expressed by Table 3. They have "an air of comp- leteness": all four classes are distinguished from one another. Yet, Vendler wants to distinguish States from Achievements by a redundant opposition based on **length**. Note that +Process implies -Momentary.

Clearly, the redundancy of Momentary shows up in an overlap with Definite, as can be shown by considering the criterion used to defend -Momentary for States as given by Vendler:

(19) a. For how long did you love her? For three years
     b. How long did you believe in the stork?
        -Till I was seven.

These are exactly the criteria given to separate Activities from Accomplishments: they are variants of **F**. Vendler misleadingly suggests that all verbs expressing -Momentary meet (19), but this is not so, because Accomplishments fail the test: **#For how long did you draw the circle?** is

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unwellformed on Vendler's own account. Thus, the cases in (19) should be headed under -Definite.

I have paid some attention to this superfluous imperfection and imperfect superfluity Table 3a since it explains why some authors fit in Table 1B: they adopted more or less the three parameters, though using different values, as I shall point out below.

3.3.2. Entailments.

Vendler used some important criteria based on entailment relations. He seems to return here to the well-known Aristotelian division discussed in Book IX of **Metaphysics** between verbs expressing incomplete movement (process, energeia) and completed movement (actuality, kinesis), cf. Kenny (1963), Taylor (1977), Mourelatos (1978), Galton (1984). Vendler says:

> (20) If it is true that someone is running or pushing a cart now, then even if he stops in the next moment it will be still true that he did run or did push a cart. On the other hand, even if it is true that someone is drawing a circle or is running a mile now, if he stops in the next moment it may not be true that he did draw a circle or did run a mile. In other words, if someone stops running a mile, he did not run a mile; if one stops drawing a circle, he did not draw a circle. But the man who stops running did run and he who stops pushing the cart did push it (p. 100).

Dowty(1979:57) noticed that if one replaced the verb **stop** by an appropriate tense, Vendler could be said to have given in (20) two criteria at once, given in Dowty's formulation as (21a) and (21b):

> (21) a. **Homogeneity**
> If V is an activity verb, then **x V-ed for y time** entails that at any time **x V-ed** was true. If V is an accomplishment verb, then **x V-ed for y time** does not entail that **x V-ed** was true during any time within y at all.
>
> b. **Imperfective**
> If V is an activity verb, then **x is (now) V-ing** entails that **x has V-ed**. If V is an accomplishment verb, then **x is (now) V-ing** entails that **x has not (yet) V-ed**.

The intent of both criteria is clear: if you "get into" the

interval during which an activity takes place, **Homogeneity**, as I will call it, says that you can be sure to find the same sort of action at any part of the interval. Criterion (21b) has also been proposed by Kenny to separate Activities from Performances. I refer to it as **Imperfective**, because it has played an important role in the discussion of the so-called imperfective "paradox": if you are drawing a circle, you have not drawn a circle, whereas if you are walking now, you have walked.

As to (21a), it seems to me that it correctly renders what Vendler tries to express in the second part of (20). Yet, it must be rephrased because one cannot base entailment on sentences like **≠He drew a circle for an hour.** This sentence is not wellformed in the single event reading and it is this reading that is relevant to (20). But apart from that, what about sentences like (22)?

(22) a. For hours Judith ate sandwiches
     b. For some time she browsed   that book
     c. Judith was eating sandwiches
     d. She was browsing through that book
     e. She stopped waltzing

By all criteria, **to eat sandwiches** in (22a) must be taken as an Activity term (one can do it for hours, one cannot do it in an hour, one can stop it, etc. etc.). But it is clear that at the first sandwich, (21a) does not apply at all. And in order for someone to browse through a book she must at least have turned more than one page. And Dowty's (22e) raises a problem if she stopped after one or two steps. Dowty (1979:171) is aware of this problem (one has to do at least three steps before one can waltz), but he does not return to (21a) in order to repair it. Note also that the same problem arises with respect to (21b).

As to (21b), Parsons (1985) following Bach (1979) raises some doubts, though he says that the intuition behind it seems to be correct. His point is that if one says **Katinka is knitting a sweater** she might have knitted another sweater than the one she is knitting, but the criterion is said to hold good if one can exclude other sweaters(cf. Verkuyl 1972:85-97; Dowty in prep.).

Though these sorts of objections are certainly relevant, I would like to restrict myself here to observing that (20) and its close approximations (21a) and (21b) have been formulated with the help of active sentences. At least, both criteria must be rephrased to accommodate sentences like (23) - (25):

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(23)   a.  #John got dressed for hours
       b.  #The wall was pulled down for hours
       c.  #Mookie got hit for half an hour
       d.  #John was released the whole afternoon

(24)   a.  John got dressed in a minute
       b.  The wall was pulled down in five minutes
       c.  Mookie got hit in ten minutes
       d.  John was released in two hours

(25)   a.  John got dressed on Monday and on Tuesday
       b.  The wall was pulled down on Monday and on
           Tuesday
       c.  Mookie got hit on Monday and on Tuesday
       d.  John was released on Monday and on Tuesday
```

That is, all these sentences can be said to contain Accomplishment or Achievement terms according to the criteria **FIC**, two of which are proposed both by Vendler and by Dowty. However, one cannot apply **Homogeneity** and **Imperfective** to (23) – (25). So again, it seems to be the case that a specific linguistic criterion is associated with an unclear amalgamation of different factors such as agentivity and more purely temporal aspects. Of course, one could say that (23) – (25) can be "transformed" in such a way that their active counterpart can be captured by (21), but that is virtually impossible in the a- and the c-cases. My conclusion is that neither (21a) nor (21b) is a reliable criterion, and certainly not in their less clear formulation (20).

3.4. On the punctual nature of Achievements.

To set Achievements apart from the other three classes, Vendler used a criterion which I shall call **Present Perfect Now (PPN)**. Vendler observed that in the case of pure Achievement terms "the present tense is almost exclusively used as historic present or as indicating immediate future" (1967:103). Thus **Now he wins the match** is not used to report an actual finding but rather to predict that he is going to win; instead one has to use **Now he has won the match** or **At this moment he has won the match** to report the actual winning.

However nice at first sight, this criterion is not very convincing: one broadcast of a game will do to convince oneself that reporters very often use the simple present in Achievement situations (catch the ball, hit the ground, score, etc.). In a game, the loser can give up saying **You win** rather than **You have won**. In the linguistic

literature, facts like these are well registered, and take away much of the force of Vendler's contention. But I would like to counter Vendler not on the basis of observational adequacy. So let us agree with him, for the sake of the argument, that the present perfect is more appropriate than the present perfect in pairs like (26):

(26) a. ?She wins (now)
      b. She has won (now)

But then the question arises: what about the pairs in (27)?

(27) a. ?She hates him up till now
      b. She has hated him up till now
      c. ?She walks already for an hour now
      d. She has walked already for an hour

These are cases in which the Present Perfect reports an actual hate (State) or walk (Activity) more appropriately than the Simple Present. The phenomenon that the Present Perfect pertains more appropriately to the present situation than the Present itself, is not restricted to Vendler's Achievement terms only. A possible answer to my objection here is that the sentences in (27) contain adverbials which are absent in (26), but note that (27b) and (27$_d$) report on an actual state and activity, respectively, both taking place at the moment of speech as in (26b).

In addition to these objections, I would like to discuss here a counterargument against **PPN** based on modern technology, because it shows that some intriguing problems of lexical semantics are involved in Vendler's analysis. Compare (28a) with (28b).

(28) a. Now John types/has typed the letter p
      b. Now John types/has typed that (business)letter

To type x means that x is made visible by print or on the screen of a word processor, say. I can safely assume that Vendler -applying **PPN** - would characterize **type the letter p** as an Achievement, whereas **type that letter** in (28b) would be taken as an Accomplishment, just like **write a letter**. Vendler says:

(29) When I say that it took me an hour to write a
      letter (which is an accomplishment), I imply that
      the writing of the letter went on during that hour.
      This is not the case with achievements. Even if one
      says that it took him three hours to reach the

summit, one does not mean that the "reaching" of
the summit went on during those hours (p.104)

According to (29), if one says that it took him five
minutes to type the letter **p**, one does not mean that the
"typing" of the letter went on during those minutes,
whereas if one says that it took him five minutes to type
that (business) letter, one could very well mean that the
"typing" of the letter went on during those five minutes.
Note also that another one of Vendler's criteria applies to
(28a) and not to (28b): **At what time did you type the
letter p? At noon sharp** as against **At what time did you
type that** (business) **letter? *At noon sharp.** According to
Vendler the difference between these pairs would have to be
taken as an indication that **type the letter p** is an
Achievement term. Applying **PPN**, if we give a report about
John's actual typing of the **p** in a split second, we could
use the Present Perfect, probably even better than the
Simple Present. This does not hold for (28b) if John is
typing a letter that Sue gave to him to type and mail.

However, in modern technology the reverse argument is
also possible in two respects: (a) the typing of the letter
p on the screen of a word processor can take a while due to
some *Please Wait* command so that it takes time before the
p has become visible and has been typed out; (b) the typing
of a business letter may take just a moment: if it is
standard, it can be produced by hitting one single key. If
things are going that quickly it would mean that both **type
a letter p** and **type a (business) letter** are members of one
and the same category and that they manifest themselves as
either Achievement terms or Accomplishment terms dependent
on something which has nothing to do with language itself.
One can easily imagine situations in which writing and
typing a letter is a very heterogeneous process of
assembling all sorts of information stored in a data base.
In that case, writing or typing a letter would have a
structure like reaching the top of a mountain or winning a
race: only at a certain point the letter is can be said to
be written or produced. But sentences like (28) can also
pertain to the old-fashioned typewriting. On Vendler's ac-
count each of them would be ambiguous: he would have to put
type, and **write** in both two of his classes.

Perhaps it is worthwhile (and necessary) to apply the
same argument to the well-known Vendler-example **draw a
circle**, because this example has received a great deal of
attention. I would say that one can draw a circle without
actually drawing its parts with a pencil. If one has a
sophisticated computer there are keys to touch in order to

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reach a result. One does not even have to see an incomplete circle on the screen. By hitting the last key in a series of tasks on the keyboard, the circle can be produced at once, which would make it analogous to **reach the top**, or **win the race**. On the other hand, by introducing logical names one can easily draw a circle by hitting one key only. In one of the recent ads for computers one can see someone drawing a circle in this way. **PPN** would certainly apply positively if we have to report about what is happening on the screen in these split seconds. I think it might be mistaken to restrict the meaning of **draw a circle** to the way we learn about drawing circles with the help of a pencil or with the help of compasses (which can be turned around very quickly). After all, all sorts of new techniques can be introduced changing the sort of muscular actions involved but leaving intact the concept of drawing, which might turn out to be focussed on the product rather than on the use of arms or pencils to bring the drawing about. I am afraid that Vendler's use of the example **draw a circle** concerns the 1950's stereotype of the verb **draw** rather than its real range of possibilities. We do not assign new meanings to words like **type, draw, write**, etc., if we use them in connection with new technological techniques, unless there is too much of a tension between the old technique and the new one, as in the case of **write** and **type(writing)**, some decades ago. We do not use the phrase **draw a circle** figuratively if we produce a circle on the screen with the help of a cursor or an instruction on the Apple mouse. The meaning of verbs like **draw, write**, etc. is rather such that new techniques can be captured by them, indicating that it was accidental up till now that **draw a circle** pertains only to events taking more than one moment. The length of the event in question does not seem to be of importance at all if an event is conceived of as taking time.

In Verkuyl(1972), I distinguished between two sorts of perfective aspect: terminative aspect (Accomplishment) and momentaneous aspect (Achievement), following linguists like Streitberg (1889) and Poutsma (1926). However, in later work I became convinced that the momentaneous and terminative aspects should be combined. My change of mind is based on considerations that are being discussed here: there are no decisive criteria for Achiemevementhood.

To summarize, I think that the validity of Vendler's criterion, which I dubbed **Present Perfect Now**, is damaged by observational problems - there are a great many cases where the Simple Present can be used to report actual winnings and findings. But it also suffers more serious

setbacks due to the fact that from the point of view of
language the **length** of (a time unit involved in) an event
does not qualify as a meaning element that distinguishes
certain verbs from others. Thus there is no reason to
distinguish **to walk a mile** from **to walk a yard**
linguistically on the ground that a mile consists of feet,
whereas a foot does not consist of miles, or on the ground
that one can walk a foot in a split moment. One need not
introduce giants (who can walk a mile in a second) and
dwarfs (who -I am told - need time to walk a foot) to
compress miles to points and extend feet to long distances.
My typewriting example shows that it is not necessary to
step into the world of fiction to make this point. In other
words, the opposition between a point and interval as far
as length of temporal units is concerned, is not identical
to the opposition between a instant and a stretch from the
point of view of one unit taking time as against a set of
units taking time.

Given these considerations I would conclude that there
is no ground for distinguishing Achievement terms from
Accomplishment terms.

3.4. Conclusion.

Reconsidering the nice quadripartition in Table 3, one
would have wished that Vendler had been using formulations
that had precisely cut the set of verbs on the basis of two
binary oppositions. By adding a new sort of parameter based
on length, he created redundancy problems, as shown in
Table 3a. From the point of view of aspectual analysis,
Vendler's use of the criterion **T**, deprived him of the
possibility of really contributing to aspectual theory: he
did not recognize that his Achievements should take time in
order to receive the proper aspect. Again the notion of
length seems to play a negative role here: Vendler deprived
Achievements of length by compressing moments into points
to widen the gap with Accomplishments. In doing this he
mixed up two parameters. Whereas Vendler's one-sidedness
with respect to agentivity can be repaired by adding non-
agentive counterparts (as in Mourelatos (1978) and Dowty
(1979), the double-sidedness with regard to the Process-
parameter cannot be repaired without changing the essential
features of his classification.

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4. Partial orderings.

In this section, I shall discuss some proposals that have been made since Vendler's paper appeared. I shall first pay attention, in section 4.1, to some proposals introducing a partial ordering of the classes and then proceed to discuss in section 4.2, the classification made by Dowty, which I would analyse as a partial ordering, though it can be argued that it is intermediate between a partial ordering and a matrix.

4.1. Taylor (1977), Mourelatos (1978).

Actually, Kenny (1963) was the first one who ordered his classes partially. He made a split between verbs having non-continuous tense (States) and verbs having continuous tense (Activities and Performances). Somewhat anachronistically, one could say that Vendler partitioned the Performances and put the resulting class of Achievements in the category having non-continuous tense rather than making a simple differentiation in the set of Performances. In this sense, Kenny is much more faithful to Aristotle's division in Metaphysics IX 1048, 18-35, who distinguishes States from 'Processes' and then subdivides these into 'Movements' and 'Actualities' (ed. Ross).

Both Taylor and Mourelatos accept this partial ordering. Let us first introduce Taylor's tripartition in (30). I will give the definitions in a general quasi-formal dress to avoid explanation of Taylor's specific (Davidsonian) formalism:

(30)
   a.   **State:** 'if t is a period and φ is true at t' is equivalent to saying that for all moments t' of t, φ is true at t';

   b.   **Energeia:** if φ is true at t, then t is a period and there is an open-fronted interval t' to which t belongs at which φ is also true and for every subperiod t'' of t φ is true.

   c.   **Kinesis:** if φ is true at t, then t is a period and there is no subperiod t' of t such that φ is true at t'

The label 'E(nergeia)-verbs' is used to pertain to Activity verbs, whereas 'K(inesis)-verbs' pertain to Kenny's Performances. Both (30b) and (30c) begin with 'if φ is true at t, then t is a period'; together with the fact that the truth of φ is determined with respect to subperiods of t, this puts them in one category.
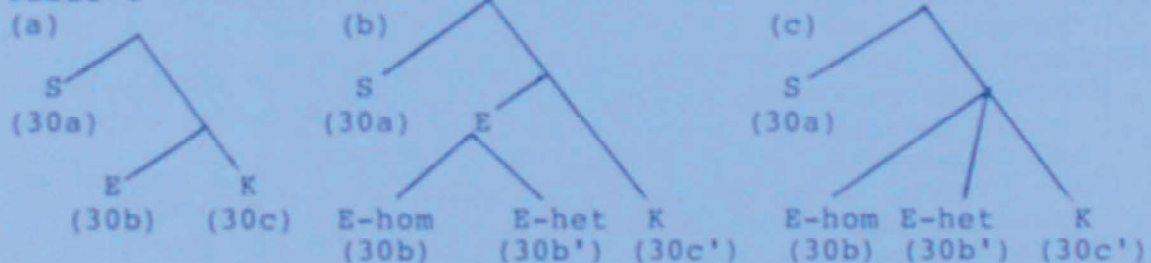
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However, Taylor sets out to modify (30) by subdividing the set of E-verbs into homogeneous E-verbs such as **fall, move, ponder, blush,** etc. and heterogeneous E-verbs such as **walk, talk, chuckle, giggle,** etc. The former meet (30b), but the latter have to meet postulate (30b') in view of which (30c) is changed into (30c'):

(30b')   if φ is true at t, then t is a period and there is a maximal period p(t is a subset of p) such that φ is true at p and there are minimal subperiods of p where φ is true and for all subperiods p' of p **φ is true** means that there is at least a minimal subperiod p'' of p' at which φ is true

(30c')   if φ is true at t, then t is a period and there is a maximal period p(t is a subset of p) such that φ is true at p and there are minimal subperiods of p where φ is true and for all minimal subperiods p' of p there are (larger) proper subperiods p'' of p, such that φ is not true at p''

The definitions (30) do not require much explanation but perhaps the notion of 'minimal period' does: if φ is true for a minimal period p, there is no proper subperiod p' of p at which φ is true.

The differentiation of the E-verbs into two subsets appears to me to involve more than just a subdivision as shown in Table 4.

Table 4

(a)
S'
(30a)
E
(30b)   K
(30c)

(b)
S
(30a)   E
E-hom   E-het   K
(30b)   (30b') (30c')

(c)
S
(30a)
E-hom   E-het   K
(30b)   (30b') (30c')

In his original analysis, Taylor offers a partial ordering along the line of Aristotle and Kenny. Thus, his modifications seems to lead to the same division, just adding a local subdivision shown in Table 4b: on this view E-verbs are homogeneous and E-heterogeneity is just a form of homogeneity. E would be -Heterogeneous and K +Heterogeneous. However, there is another interpretation: by casting (30b') and (30c') in the same mould, Taylor can be argued to propose an ordering like Table 4c. In view of

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the analysis proposed in Verkuyl(1978) where homogeneity was treated as a gradual concept, I would like to interpret Taylor in this way, but I am not sure about it.
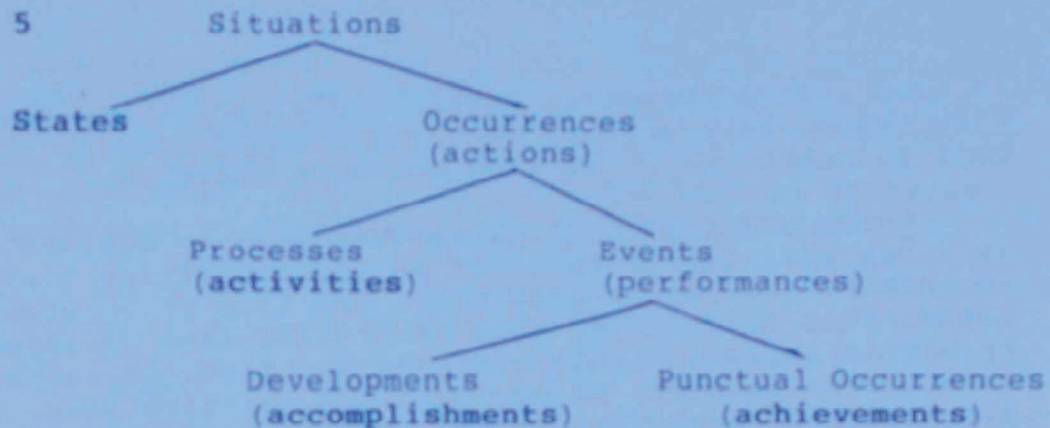
Which are the exact parameters used by Taylor? As far as I can see, Taylor focussed on the opposition 'Interval vs. Moment': K- and E-predicates are true at intervals rather than at moments. That is, taking time is interpreted by him in terms of truth assigned to intervals rather than to progress in time, to moving along the time axis, to dynamicity or whatever metaphor can be used. In this sense, Taylor is part of a tradition invoked by Bennett & Partee (1972).

The second parameter is also part of this tradition. It applies only to non-States. The opposition involved concerns the question whether or not the truth of a predicate with respect to the whole interval carries over to parts of it. Of course, Vendler's Definiteness parameter is related to this opposition, but only secondarily. In Taylor (1977), Mourelatos (1978), Ter Meulen (1983;1984) the 'Homogeneity'-parameter is given a more dominant place than in Vendler, who stressed the necessity of having " a set terminal point" (1967: 100), so that the time stretch can be located on the time axis. As I pointed out in Verkuyl (1978), homogeneity can indeed be accounted for as a secondary lexical parameter as part of the thematic analysis of verbs expressing change. But as such I see no room for it at the structural level, certainly not as a primary aspectual parameter. Is it accidental that in the literature the philosophers have been focussed on homogeneity? It seems to me that homogeneity should be treated as an ontological category, that is, primarily at the lexical level.

As said, Mourelatos(1978) also focusses on the matter of homogeneity, though he relates this concept more straightforwardly to the distinction between Mass and Count. Essentially, Mourelatos does three things: (a) he merges Vendler and Kenny into one division of situational types; (b) he proposes a classification applying both to agentive and non-agentive cases; and (c) he coined very useful terms of a language, but for situational types corresponding with sentences. His proposal is captured by Table 5.

Table 5

```
                    Situations
                   /         \
         States              Occurrences
                             (actions)
                            /          \
              Processes              Events
             (activities)          (performances)
                        /          \
              Developments          Punctual Occurrences
            (accomplishments)         (achievements)
```

The merger of Vendler and Kenny is more Kennyan than
Vendlerian: the Kenny-tree of the form given in Table 4a is
simply extended with Accomplishments and Achievements as
subclasses of the performances. However, Mourelatos rightly
undid Vendler's analysis from its agentive bias by
distinguishing supersets in which Vendler's non-States
would fit as proper subsets. And finally, he proposed that
the main partition in Table 5 involve States, Processes and
Events, suggesting that the distinction between
Developments and Punctual Occurrences is at least a
secondary division.

It is interesting to see that Mourelatos focussed more
on the Progress-parameter than Taylor: non-States occur,
they take time, but in a more dynamic way. As far as
Vendler's Definiteness-parameter is concerned, Mourelatos
interprets this in terms of an opposition +Count, where
+Count is similar to Vendler's +Definiteness, but -Count
applies only to Processes. Mourelatos seems to concentrate
on the quantification over temporal entities: events can be
counted, processes cannot. Mourelatos' analysis can be
compared with Vendler's by considering the Tables 3a and
3b.

Table 3b

	Occur (progress)	Count (def.)	Punctual (momentary)
States	–	∅	∅
Processes (activ.)	+	–	∅
Developments (accompl.)	+	+	–
Punctual occurrences (achiev.)	+	+	+

The striking difference is of course the value assigned to
Achievements in the leftmost column of the two tables.

4.2. Dowty (1979).

Making them far more explicit, Dowty reproduced Vendler's criteria in a more linguistic fashion, presenting them in a very systematic and neat way. Though he sees many observational problems with respect to the criteria proposed by Vendler, Dowty ends up by accepting them as basically sound.

Dowty acted as a grammarian by trying to represent the aspectual classes, as he called the Vendler-classes, as part of grammar. He proposed a "reductional analysis". The analysis is reductional because Activity verbs, Accomplishment verbs and Achievement verbs are constructed out of one or more Stative predicates which directly underlie State verbs, and operators.

Extending Vendler's system, Dowty distinguishes agentive from non-agentive classes. He does so because he observed that many criteria given by Vendler have to do with agentivity, control, animacy or other agentive and quasi-agentive notions. But Dowty did not draw the conclusion I drew in section 3, namely that the criteria given by Vendler are mixed up and that in this mixture they cannot be used to determine aspectual oppositions. They mix up agentivity and phasal constituency. However, agentivity is not essential to aspect, as I said earlier, even though it is a very important ingredient in most of the sentences expressing aspect due to the fact that we often talk about human or animate actions. Thus, Dowty adopts a "broad perspective" by dealing with aspect in terms of both agentive factors and non-agentive temporal factors. In this section I want to do two things. Firstly, I would like to describe how Dowty incorporates Vendler's proposal in his grammatical system. Secondly, I would like to show that the final aspectual classification offered by Dowty is in fact a major deviation from Vendler's quadripartition.

4.2.1. A reductionist analysis of aspectual classes.

Dowty's position with respect to the relationships between the aspectual classes, can be captured by the following characteristics:

(a) each verb can be represented as a propositional function containing (at least) one predicate which is assigned one or more arguments;
(b) each stative verb can be taken as a stative predicate;
(c) non-stative verbs are constructed from stative predicates and specific operators: **DO, BECOME,** and **CAUSE** .

The notion of stative predicate is primitive. Compared with predicates expressing change, they need only one point of evaluation. Those who are familiar with the thematic approach of Gruber (1976) or any localistic case theory will easily associate Dowty's notion of stativity with the notion of a Theme being in a Location.

Change predicates need two points of evaluation: the location of a Theme is checked at two points. Dowty does not deviate here very much from analyses of state and change such as in Jackendoff (1976) Verkuyl (1972;1978), Platzack (1979), these all being based on the Von Wright-pTq-analysis of change, where change is taken as a transition from a state p to a state q (cf. also Kamp 1980). Table 6 shows how Dowty starts out to order the Vendler-classes with respect to each other. P and R are stative predicates.

Table 6

a.	States:	$P(x_1,\ldots,x_n)$
b.	Activities:	$DO(x_1,P(x_1,\ldots,x_n))$
c.	Accomplishments:	$CAUSE(BECOME\ P(x_1,\ldots,x_n),$
		$BECOME\ R(y_1,\ldots,y_n))$
d.	Achievements:	$BECOME\ P(x_1,\ldots,x_n)$

Restricting ourselves to the non-problematic part of Table 6, we should add that both Accomplishments and Achievements can occur non-agentively, as shown here, or they can be agentive. In that case, a predication of the form $BECOME\ q$ is extended to $BECOME\ [DO(x_1,\ \phi)]$, where ϕ contains x_1 as an argument holder.

Dowty gives exact modeltheoretic interpretations to structures of the form $BECOME\ \phi$ and $CAUSE(p,\psi)$. These represent a change structure: both involve two points of evaluation. Making some notational adaptations to cut out unnecessary information, I shall give these interpretations in (31a) and (31b), given Table 7:

Table 7

S	G

(31) a. **BECOME** ϕ is true at the interval (S,G) iff (a) ϕ is false at some interval containing S; (b) ϕ is true at some interval containing G and (a) and (b) do not hold for any proper subinterval of (S,G).

b. **CAUSE** (φ,ψ) is true at the interval (S,G) iff (a) φ
is true at some interval containing S; (b) ψ is true
at some interval containing G; (c) conditions (a)
and (b) do not hold for any proper subinterval of
(S,G); and (d) there is some causal connection
between φ and ψ.

Clause (d) in (31b) is formulated far less precisely than
in Dowty's exposition, but for my exposition no more detail
is required.

With respect to DO, Dowty remains very vague, to his
own dissatisfaction. All he wants to say about it is that
DO(x,φ) always represents a relation between an agent x and
a proposition φ such that φ is under the immediate control
of x. However, the notion of immediate control is unclear
as is the notion of agentivity.

It is important to observe that in Table 6 the **DO**-
predicate is inherent to the class of Activities, as
indicated in Dowty's Aspect Calculus (p.124), where no
Activities without **DO** occur. Later on, however, Dowty
allows for non-agentive Activity terms such as **make noise**,
rain, **roll**, etc. without clearly correcting Table 6b.

As far as I can see the correction he makes has the
following form. In discussing Taylor (1977), Dowty seems to
adhere to a so-called Activity Postulate saying that
Activities should be conceived of as a movement of some
(Theme) x during some interval I such that x is at a
location at the lower bound of I, say Q(x) holds there,
that differs from its location at the upper bound of I,
where -Q(x) holds (1979:168-9). In other words, Activities
too receive a sort of BECOME-analysis, which is also
expressed by Meaning Postulate 3 on page 362. I said "a
sort of", because there is a difference: BECOME φ expresses
a "definite change", whereas the simple change from Q(x) to
-Q(x) in the case of Activities is called "indefinite
change". But it should be understood that Dowty is not very
clear about this, as becomes clear if we compare (31a) with
his remarks about the change from Q(x) to -Q(x). He does
not come forward with an explicit representation of
Activities after the one offered in Table 6.

As to States, Dowty even allows for agentive State
terms such as **sit**, **stand**, etc., without adding a **DO**-
predicate to Table 6a. This takes away much of the
attractive part of his analysis, as it is not clear how
non-agentive Activities and agentive States should be
represented. MPl (p.361) does not give any indication.

In any case, Dowty distinguishes agentive and non-agentive subclasses of each of the four aspectual classes, which gives him eight classes. He also subdivides States into two subcategories by introducing an opposition 'Interval vs. Momentary'(p. 173- 180). This splits up the class of States: a subset of the State predicates, such as **know, be a hero, hate,** etc. is +Momentary, whereas another subset containing **stand, lie, sit,** etc. is -Momentary together with non-States. However, habituals in all classes are -Momentary.
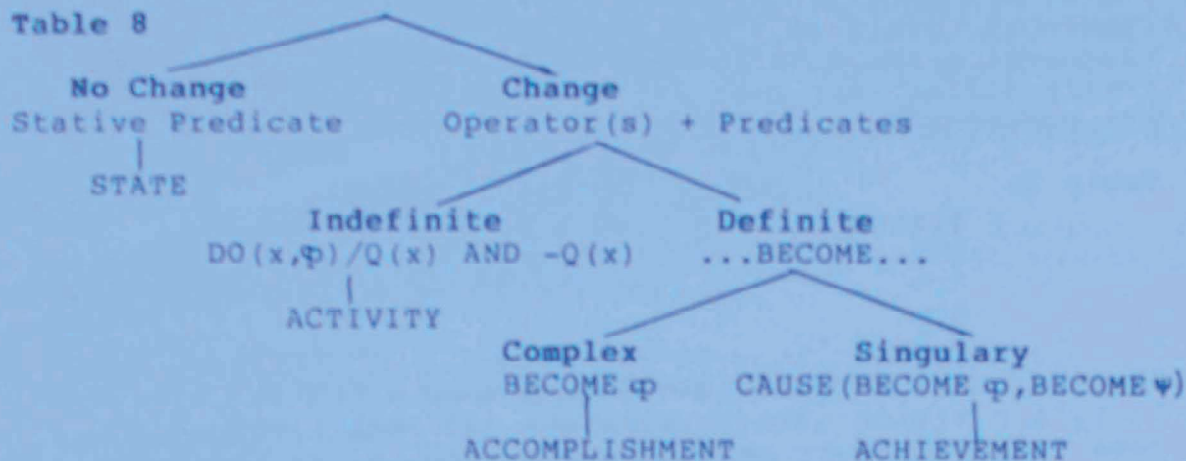
4.2.2. A partial ordering of Dowty's aspectual classes.

Let us now consider the interrelationships between the classes. The basic division seems to be the one between States, which have just one point of evaluation, and non-States which have two points. This distinction is given its shape by the absence or presence of the operators DO, BECOME and CAUSE. Note that Dowty assigns two points of evaluation to Achievements, thus changing the minusvalue in Table 3a into a plusvalue, just like Mourelatos. Thus, he seems to do what everybody has done: to distinguish between Progress/Occurrence/ Taking time/ Change and Interval/Period. His idea seems to be that processes going on in time are changes, but that the concept of change between two points of evaluation cannot be equated with the concept of the length of a stretch between two points.

The second division involves the parameter Definiteness: a change can be indefinite. In this case an agent relates to a stative predication, or there is a $Q(x)$ to $-Q(x)$ transition, if we follow MP 3, as pointed out earlier. Definite changes are characterized by their having a BECOME-operator, which makes the interval of change closed. Dowty's Definiteness-parameter does not deviate crucially from Vendler's.

The third division involves the presence or absence of CAUSE together with BECOME, which is also maintained in the later revision, as can be seen in MP4. Accomplishments require that these two operators go together, which accounts for the label '+Complex' to characterize this class, Achievements being Singulary or -Complex. The resulting classification has the structure of a partial ordering as can be seen in Table 8 which is constructed from three of the "five partially cross-classifying semantic distinctions" underlying Dowty's final scheme that is seen by him as a revision of Vendler's Verb-classification (p.184) .

Table 8

```
                                    _____
                                   /                   \
        No Change                      Change
   Stative Predicate            Operator(s) + Predicates
        |                          /              \
      STATE                       /                \
                 Indefinite                  Definite
            DO(x,φ)/Q(x) AND -Q(x)           ...BECOME...
                  |                          /          \
               ACTIVITY                     /            \
                              Complex                  Singulary
                            BECOME φ          CAUSE(BECOME φ,BECOME ♥)
                                |
                          ACCOMPLISHMENT              ACHIEVEMENT
```

It does not incorporate the agentivity parameter, but it is easy to double Accomplishments and Achievements as I have indicated: any φ of the form **BECOME φ** can be taken as the second argument of a **DO(x,φ)**-predication. And according to Dowty, States and Activities can be doubled as well.

Dowty considers the fifth parameter a major one: in his view it opposes momentary States to non-States and it opposes habituals from processes and events actually taking place. The criterion used to support the distinction, is **ProgF**. Predicates that are positive, are -Momentary. Though Dowty accepts the Progressive Form in **She is knowing that,** he does only so at the Carlsonian "stage level"; that is, to express some very ephemeral state of knowledge. It cannot apply to her at the object-level, say to the body of knowledge that is stored in her memory. Recall our **The village was lying in the valley**-example in section 3.2.

However, "habituals" - as Dowty calls them - in all classes are negative to **ProgF**: one cannot say **The ball is rolling** or **He is drawing a circle** to describe a habitual disposition of some body or somebody. Thus, on his own account, the division between stage (token) and object (type) runs through all categories, since "habituals" are situations taken at their object-level. Hence, on this account the Momentary parameter subdivides each aspectual class and it is unnecessary to incorporate them in Table 8.

As far as I can see, the Momentary-parameter does only pertain to durative aspect. In the Slavonic literature, it appears as the distinction between several ways the imperfective aspect can manifest itself (cf. Forsyth 1970). Thus, though the opposition between an actualized and a habitual process (= state) asks for an explanation, it does not bear on the opposition between terminative(perfective)

aspect and durative aspect (imperfective) aspect.   If we
leave out agentivity, Dowty's final position can be
represented as in Table 3c. Mourelatos and Dowty do not
really differ very much as far as the first three columns
are concerned.

Table 3c		Change	Definite	Complex	(Momentary)	
	States	-	∅	∅	+/-	+/-
	Act	+	-	∅	-	+/-
	Acc	+	+	+	-	+/-
	Ach	+	+	-	-	+/-

The fourth column of Table 3c represents the unclarity of
Dowty's position. The left column reflects his scheme on
page 184, the right one the explanation of the parameter on
the same page. In the former case, the Momentary parameter
require the matrix in Table 3c, but note that it is a
strange matrix, having neutral values due to a partially
ordered substructure. In the latter case, Dowty's position
is the one given in Table 8.

4.3. The explanatory value of Dowty's aspectual classes.

   The classification of predications in Table 6 tends to
enrich Dowty's descriptive potential considerably. It must
be acknowledged that he presented one of the most detailed
and precise grammars of the English verbal system thus far.
Whatever its merits may be, the question must be raised
whether the incorporation of the Vendler-classes in his
grammar provided it with more explanatory value than it
would have without them.

      I think it does not. The places to look for are
sections in which each of the classes is used to explain
certain aspectual phenomena assuming a one-one relation
between an aspectual class and a certain aspectual
phenomenon that asks for an explanation. There are no such
places.

      I shall clarify this point. In aspectual theory, the
difference between the a-and b-sentences of (32) - (34)
must be explained:

   (32) a.   John slept for an hour
        b. *John slept in an hour

   (33) a.   John awakened in an hour
        b. #John awakened for an hour

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(34) a. John discovered treasures in his yard for six
         weeks
     b. #John discovered the treasure in his yard for six
        weeks

Dowty(1979:332-336) gives a very precise formal description
of sentences like (32a) and (33a), which I shall represent
here by giving the exact paraphrases:

(32a') There is a time t (an interval) in the past and
        at that interval t which is an hour it is the
        case that for all subintervals t' of t it was
        true that John slept at t'

(33a') There is a time t (an interval) in the past and
        at that interval t which is an hour, it is the
        case that there is a unique subinterval t' at
        which John becomes awake.

Dowty admits that there are problems with (32b) because
this sentence seems to have an inchoative reading which
might require there to be two verbs **sleep**. But leaving that
problem aside, one can say that, in their formal dress, the
representations (32a') and (33a') reach a level of
descriptive adequacy which beyond any doubt exceeds
competing analyses. However, Dowty says:

  Thus the semantics given here for **for**-adverbials and **in**-
  adverbials explain why **for**-adverbials are appropriate for
  states and activities (i.e. both these classes of
  predicates are true of most or all subintervals of an
  interval of the predicate's truth) but not for
  accomplishments and achievements (since they are "non-
  subinterval predicates") and, conversely, why **in**-
  adverbials are appropriate for accomplishments and
  achievements (since they can satisfy the "uniqueness"
  requirements in the semantics of **in**) but not for
  activities and states (except with the inchoative reading
  just mentioned) -p.336.

This passage shows clearly that Dowty appeals to a division
between Activities and States on the one hand, and
Accomplishments and Achievements on the other. But we have
seen from Tables 7 and 8, that Activities and States do not
form a natural class. Table 2 shows that the division
itself can be made without any appeal to Vendler-classes at
all. So, again we are in a situation where aspectual
phenomena do not call for Vendler-classes.

The sentences in (34) are discussed by Dowty. He explains the difference along the following lines, staying unclear about the representation of (34a). But the idea seems to be that there is no quantifier, because **the treasure** is a definite description. The durative interpretation of (34b) is explained in terms of scope. Dowty is quite explicit at this point, saying: "There may be reason to assume that indefinite plurals and mass nouns are to be logically represented as variables whose binding existential quantifier lies within the scope of the time quantifier or the surface sentence in which they arise" (ibidem). Thus he assigns (34a) the logical form (34a') and (34b) the logical form (34b'):

(34a')   (Vt:t e 6 WEEKS) AT(t, BECOME[John knows ...])
(34b')   (Vt:t e 6 WEEKS)($\exists$x)[AT(t,BECOME[John knows
                                                     ...x...])]

Since the existential quantifier in (34b') is in the scope of the universal quantifier, "the value for **x** may differ from one **t** to the next and indeed will have to to avoid contradiction"(p.80).

I have severe difficulties with this explanation. First of all, Dowty is wrong in opposing Indefinites (and Mass Nouns) to Definites, as shown by the following sentences:

(35) a.   For hours Judith ate sandwiches
     b. #For hours Judith ate three sandwiches

(36) a.   He discovered cockroaches for hours
     b. #He discovered some cockroaches for hours

(37)   #He heard for hours that John is ill

In sentence (35b), the NP **three sandwiches** is indefinite, but yet it pertains to a specified quantity of sandwiches. Dowty would be forced to analyze (35b) analogously to (34b), which is wrong, be- cause (35b) is on a par with (34a). The same applies to indefinite NPs such as **some cockroaches**, in (36b). The very notion of Definiteness as an aspectual feature can be proven to be wrong if one observes that embedded sentences like **that John is ill** cause repetition, when combined with verbs like **hear**. Would Dowty say that **that is ill** is +Definite? Are there indefinite clauses?

Facts like these were observed and discussed extensively in Verkuyl (1972:54-73), but it took a while

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before I was able to delimit accurately the factor
'Specified Quantity of A' where A is the amount of
sandwiches in (35), the amount of whisky in (36) and the
amount of information in (37). But in Verkuyl (1986), I
think, I have given the precise definition of the factor at
issue and it is clear that this semantic factor
contributing to terminative aspect has nothing to do with
Definiteness in the Dowty's sense.

In the latter paper, I have also shown that in Dutch
the position of durational adverbials like **een uur lang**
(for an hour) in S-structure can influence aspect.

(38) a. ?Een uurlang fotografeerde hij veel kinderen
         ?For an hour he photographed many children
     b. #Veel kinderen fotografeerde hij een uurlang
         #Many children he photographed for an hour

Sentence (38a) does not make much sense in Dutch nor in
English. It cannot mean that he photographed many
individual children repeatedly, whereas (38b) has a forced
repetitive reading: from a set of children there were many
which were photographed repeatedly. The same scope
differences occur with **de meeste** (most of the), **enkele**
(several), **alle** (all), etc. They do not occur with
quantified NPs such as **dat glas** (the glass), **de drie glazen**
(the three glasses), etc. I have no explanation for this
fact, but it ruins Dowty's proposal because Dowty puts
durational adverbials in front of the representation to
obtain the (for him) proper scope.

4.4. **Conclusion.** The above considerations show, I think,
that the incorporation of Vendler-classes in the grammar
given in Dowty (1979) did not pay off. It caused more
problems than it solved and it did not contribute to the
explanatory power of his aspectual theory. More generally,
I have the feeling that all the proposals made in this
section suffer from the partial ordering they imposed on
situational types: States are separated from non-States,
thus severing a natural aspectual tie between States and
Activities (Processes), namely that they are durative.

I would like to add that in Dowty (in preparation)
there is in this respect an important difference with Dowty
(1979): he accepts a hinge ordering as in Table 1D rather
than the partial ordering in Table 8 or the ordering in
Table 3c. It is my impression that Dowty must always have
had this view, but that the incorporation of Vendler-
classes in his grammar simply blocked it, as can be deduced
from Table 8 and Table 3c.

5. Generalized Quantification and temporal structure.

In this section I shall discuss two proposals trying to accommodate the four Vendler-classes by appealing to the theory of generalized quantification as developed by Barwise and Cooper (1981), Keenan and Stavi (1986), Van Benthem (1983), Zwarts (1981;1983), among others. They differ in their treatment of the Vendler-classes: Ter Meulen (1983;1984) orders them hierarchically, as illustrated in Table 1C, whereas Hoeksema (1984) follows Vendler by giving a cross-classification, as in Table 2. In section 5.1, I shall first discuss some aspects of the theory of generalized quantification to facilitate the comprehension of the proposals at issue, proceeding then to discuss Ter Meulen in 5.2 and Hoeksema in 5.3.

5.1. Temporal structure.

Both Ter Meulen and Hoeksema extend the application of the theory of generalized quantification in such a way as to include temporal phenomena. In the non-temporal domain this theory treats the interpretation of an NP having the syntactic form [Det N] as a collection of sets. Set theoretically this means a second order approach: an NP like **both children** does not pertain to two individual children in a given domain, but to a set containing all the sets containing both children. Likewise, **several children** has as its interpretation a collection of all sets X such that the intersection of X and the set of children in the domain contains at least two children. If the interpretation of N in [Det N] is a set A, (39) contains some general definitions of atemporal quantifiers in a more formal dress, assuming, as in De Jong & Verkuyl (1985), interpretations to be partial rather than total:

(39)

a. $[\![both]\!](A)$ $= \{X \subseteq E: A \subseteq X\}$ Presupposition: $|A| = 2$
b. $[\![all]\!](A)$ $= \{X \subseteq E: A \subseteq X\}$ Presupposition: $|A| \geq 1$
c. $[\![the\ (sg)]\!](A)$ $= \{X \subseteq E: A \subseteq X\}$ Presupposition: $|A| = 1$
d. $[\![several]\!](A)$ $= \{X \subseteq E: |A \cap X| > 2\}$
e. $[\![no]\!](A)$ $= \{X \subseteq E: A \cap X = \overline{\emptyset}\}$
f. $[\![exactly\ 2]\!](A) = \{X \subseteq E: |A \cap X| = 2\}$

Suppose we have a model consisting of a set of individuals E and an interpretation function $[\![\ \ ]\!]$, where $E = \{a,b,c,d\}$, $B = \{a,b,c\}$ and $C = \{d\}$. Then the following interpretations would hold for E:

(40)

```
a. [both](B)        = uninterpretable because |B| = 3
b. [all](B)         = {{a,b,c}, {a,b,c,d}}
c. [the](C)         = {{d}, {a,d}, {b,d}, {c,d}, {a,b,d},
                      {b,c,d}, {a,b,c,d}}
d. [several](B)     = {{a,b}, {b,c}, {a,c}, {a,b,d}, {b,c,d},
                      {a,c,d}, {a,b,c}, {a,b,c,d}}
e. [no](B)          = {∅, {d}}
f. [exactly 2](B)   = {{a,b}, {a,c}, {b,c}, {a,b,d}, {a,c,d},
                      {b,c,d}}
```

Generalized quantifiers are distinguished from one another in a quite systematic way. For example, there is a clear difference between (39a) - (39d) on the one hand and (39e) on the other. The former belong to the family of so-called monotone increasing quantifiers, which meet the following (equivalent) conditions:

(41) a. $\forall X, Y \subseteq E, (X \in Q \ \& \ X \subseteq Y) \rightarrow Y \in Q$
      b. $\forall X, Y \subseteq E, X \cap Y \in Q \rightarrow (X \in Q \ \& \ Y \in Q)$

One can easily check this. Monotone increasing quantifiers always have E as a member. Quantifiers like (39e) are monotone decreasing. They meet condition (42a) and if they meet it, they have also the property of closure under finite intersection in (42b):

(42) a. $\forall X, Y \subseteq E, (X \in Q \ \& \ Y \in X) \rightarrow Y \in Q$
      b. $\forall X, Y \subseteq E, (X \in Q \ \& \ Y \in Q) \rightarrow X \cap Y \in Q$

Proper quantifiers are characterized by their not being empty or being the power set of E: they must select a proper nonempty subset of the power set of E (cf. B&C's notion of sieve). Given some reasonable provisions with respect to properness, monotone decreasing quantifiers can be argued to be characterized by their containing the empty set ∅ (De Jong & Verkuyl 1985:25ff.), whereas monotone increasing quantifiers do not contain ∅. The quantifier in (39f) is neither monotone increasing nor monotone decreasing.

There is a further split: (39a) - (39c) can be distinguished from (39d) by meeting both (41b) and (42b). Thus, they can be regarded as filters which are defined as their conjunction:

(43) $\forall X, Y \subseteq E, (X \in Q \ \& \ Y \in Q) \leftrightarrow X \cap Y \in Q$

There is one further refinement: (39b) is called an ultrafilter. It not only meets (43), but also meets the condition that for all $X \in Q$ the complement of X may not be a member of Q. NPs that are interpreted as ultrafilters are considered uniquely referring expressions, such as (40c) or proper names. Though further refinements can be made, this explication should suffice here.

5.2. Ter Meulen (1983;1984).

Ter Meulen assigns to all verbs of a language a set of processes: "primitive, unstructured chunks of the temporal domain" (1983:179) from which VP-interpretations are constructed, which are intervals and moments. She characterizes the four Vendler-classes at the VP-level by interpreting every VP as a set of subsets of P ($[\![VP]\!] \subseteq POW(P)$), where P is the set of processes p partially ordered by a strict precedence relation $<$. A process p_1 is part of p_2 ($p_1 \leq p_2$) if p_1 is located in the partial order on P within the "bounds" of p_2: a day is a part of a week; writing the letter **p** is part of writing the word **part**, etc.

Table 9 shows how Ter Meulen conceives of the relationships between the Vendler-classes, where $X \subseteq P$:

Table 9

States   a. $\forall x \in X \quad \forall y \in P (x \leq y \rightarrow y \in X)$

Activities   a. $\forall x \in X \quad \forall y \in P (x \leq y \rightarrow y \in X)$
                     b. $\forall x, y \in X \exists z \in X (z \leq x \& z \leq y)$

Accomplishments: a. $\forall x \in X \quad \forall y \in P (x \leq y \rightarrow y \in X)$
                     b. $\forall x, y \in X \exists z \in X (z \leq x \& z \leq y)$
                     c. $\forall x \in X (if x = x_1 \cup x_2 \quad either \; x_1 \in X \; or \; x_2 \in X)$

Achievements: a. $\forall x \in X \quad \forall y \in P (x \leq y \rightarrow y \in X)$
                     b. $\forall x, y \in X \quad \exists z \in X (z \leq x \& z \leq y)$
                     c. $\forall x \in X (if x = x_1 \cup x_2 \quad either \; x_1 \in X \; or \; x_2 \in X)$
                     d. $\forall x \in X \quad \forall y \in P (y \leq x \rightarrow y \in X)$

I have three sorts of objections to make. Firstly, there is hardly any linguistic argumentation for this division. Secondly, the idea of an hierarchy is implausible in view of the negation of non-States, and thirdly the classification does not explain anything.

Ter Meulen adduces hardly any linguistic problem that might be solved by her choice of temporal structure, thus

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encouraging the idea that she is offering an ontological classification. The scarce linguistic evidence adduced is based upon entailment. In defense of her monotone increasing definition of States she says that (44a) holds as a property of States (1984: 267).

(44)

a. John was ill last week |= John was ill on Wednesday.
b. John was ill on Wednesday |= John was ill last week.

However she also says: "if some state holds in a part of a temporal domain p_1, it continues to hold in p_2, that has p_1 as part" (1983: 180). This is a rather unclear formulation. It looks as if Ter Meulen is defending here the validity of (44b) which she probably will not do if **last week** is to mean 'the whole week that preceded this one'. Presumably Ter Meulen means that if John was ill last Wednesday, then one can say that John was ill **during** some time last week. What she really seems to be saying is that if something holds at a certain time, it will also hold as part of a larger period. But this holds for non-States as well. If I say that his car hit that pole on the 18th of March 1985, then his car hit that pole in 1985 and in the eighties of this century, and so on. Is persistency, then, what States are about?

Galton(1984) makes it clear that "the distinction between states and events is not a distinction inherent to what goes on, but rather a distinction between two different ways we have of describing it" (1984:24). In this context he observes: "a state is **dissective** in the sense that any stretch of time in which a particular state obtains can be broken down into substretches in each of which that state holds" (1984:24), an opinion also held by Vendler, Taylor (1977), and Hoeksema (1984). That is, the view upon states is "downward", as in (44a); that is, monotone decreasing.

Why is it upward in Ter Meulen's view? I think, because she has been caught by the prima facie attractiveness of "filtering down" to an ultrafilter. Her analysis is primarily preoccupied with the notion of homogeneity, a notion which is only relevant to non-States. Activities are relatively homogeneous, condition c makes Accomplishments more heterogeneous, because it says that no part of a set of processes X has the same structure as X. Condition d is simply putting a heavier constraint on this by requiring that X is not divisible. In this sense, Ter Meulen is close to Taylor (1977). However, by her wish

to "filter all the way down" from States to Achievements, she is forced to define States in such a way that condition a in Table 9 carries over to Activities.

Let us have a brief look at Table 9, where States are defined as monotone increasing. Activities are on a par with structures having the same properties as [**several N**] in (1d), and (45):

(45) $Q_A = \{\{b\}, \{a,b\}, \{a,b,c\}, \{b,c,d\}, \{a,b,c,d\}\}$

This means that they are weaker than filters: (45) is not closed under finite intersection, because {b,c} is not an element of Q_A. Again, there is not one argument explaining why or making it plausible that Activities should be weaker than filters.

Condition c leaves structures like (1d) behind, but it still allows for (45). Thus, Accomplishments do not meet the requirements for filters. Condition d, an existential version of monotone decrease, makes Achievements filters, but also ultrafilters.

The second type of objection is the following. As observed in Verkuyl (1972) negation of nondurative aspect blurs the very distinction between nondurative and durative aspect, as shown in:

(46)   a. She has lived there for years
        b. She has not run for years
        c. She has not eaten one single sandwich for days
        d. She has not won for months

This fact brings Ter Meulen into severe problems, because if monotone increase is part of non-States, then negation of these three classes cannot result in monotone increase. One may rather expect monotone decrease. This is a problem for all classifications discussed thus far.

Finally, Ter Meulen's proposal lacks any explanatory value. It does not contribute to a better understanding of what aspect is about. None of the four classes is used to explain a linguistic phenomemon. And if so, then one starts to be puzzled. For example, Ter Meulen(1984:270) points out that "conjunction and disjunction of indivisible entities have all the expected Boolean properties:

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(47)   John and Peter walked to school |= John walks to
       school and Peter walks to school

(48)   John walked to school |= John or Peter walked to
       school

If **walks** in (47) is read as **walked**, (47) surely is valid.
But if one drops **to school** in this entailment to obtain
Activities, its validity will not change. And if one adds
like to before the verb **walk**, to get a State, the
entailment still holds.

     My conclusion is that Ter Meulen's proposal fails to
make clear why a Vendler-classification based on hierarchy
in this way could possibly be of interest for aspectual
theory.

5.3. Hoeksema (1984).

     Hoeksema's enterprise can be characterized as an
attempt to give an exact interpretation of Vendler's cross-
classification in Table 3. There are terminological
differences: +Definiteness is taken as +Count,
+Process/Interval as +Duration. Hoeksema assumes models
containing a set I of individuals, a set W of so-called
possibilities (actual and possible events) and a set
E-(W U I) of quantities. The summation operation + is
defined on E-(W U I) set and on W giving join-semilattices
$(x+x = x; x+y = y+x; x+(y+z) = (x+y)+z)$. The corresponding
partial order is defined by assuming that $x \subseteq y$ holds iff
$x+y = y$. Given these provisions, Hoeksema defines four
features as in (49), where $X \subseteq W$:

(49)   - Count : $\forall x,y \in W ((x \subseteq X \ \& \ y \in X) \to x+y \in X)$
       + Count : $\forall x,y \in W ((x \in X \ \& \ y \in X) \to x+y \notin X)$

       -Duration: $\forall x,y \in W ((x \in X \ \& \ y \subseteq x) \to y \in X)$
       +Duration: $\forall x \in W ((x \in X \to \exists y (y \subseteq x \ \& \ x \not\subseteq y))$

which square as shown in Table 10.

Table 10   -Duration   +Duration

	States:	Activities:
-Count	$(x \in X \ \& \ y \in X) \to x+y \in X$	$(x \in X \ \& \ y \in X) \to x+y \in X$
	$(x \in X \ \& \ y \subseteq x) \to y \in X$	$x \in X \ \to \exists y (y \subseteq x \ \& \ x \not\subseteq y)$
	Achievements:	Accomplishments:
+Count	$(x \in X \ \& \ y \in X) \to x+y \notin X$	$(x \in X \ \& \ y \in X) \to x+y \notin X$
	$(x \in X \ \& \ y \subseteq x) \to y \in X$	$x \in X \ \to \exists y (y \subseteq x \ \& \ x \not\subseteq y)$

The -Duration feature for States seems plausible, certainly in the light of what I said in 5.2. It provides for monotone decrease, whereas -Count adds the so-called property of closure under finite union: if two sets are members of X their union is also member of X. However, monotone decrease is equivalent to (50a):

(50) a. $x+y \in X \rightarrow (x \in X \ \& \ y \in X)$
     b. $(x \in X \ \& \ y \in X) \longleftrightarrow x+y \in X$

By the conjunction of (50a) and -Duration, States are required to meet condition (50b), which makes them Ideals (cf. Zwarts 1981). Ideals are the monotone decreasing counterparts of filters. I do not know if Hoeksema is aware of this result of conjoining -Count and -Duration. He does not comment on it.

As to Activities, -Count allows that $\emptyset$ be a member of X. What +Duration amounts to is saying that $\emptyset$ may not be a member of X. So +Duration seems to have the effect of eliminating $\emptyset$. However, if one required, as in De Jong and Verkuyl (1985), that $\emptyset$ not be an element of an monotone increasing X, in order to eliminate improper structures, the impact of the feature +Duration on -Count would be empty. To my knowledge, Hoeksema (pers. comm.) wants to have his structures acting as sieves.

As to Accomplishments, the interaction of the features +Count and +Duration also raises problems. +Count allows only for non-monotone structures like (39f), but +Duration, in order for it to be of any use, presupposes monotonicity. I shall demonstrate this point. Suppose $x \in X$ and $y \subseteq x$ and $y \in X$. Then, of course, $x+y \in X$, because if $y \subseteq x$, $x+y=x$ and $x \in X$. Suppose now, that $x \in X$ and $y \subseteq x$, and $y \notin X$. Then there are three possible situations: $|x| > 1$ or $|x| = 1$ or $|x| = 0$. If $|x| > 1$, then +Duration is empty, because all sets having two members meet it; the same applies to $|x| = 1$, because $\emptyset \subseteq x$, and $|x| = 0$ is excluded by +Count because any summation of $\emptyset$ with an element of X is element of X. Thus, I conclude that +Duration is unnecessary as it operates trivially.

The same applies to Achievements. Again, +Count requires a non-monotone structure, which excludes any structure of the form $x \in X \ \& \ y \subseteq x$, as shown in the previous paragraph. But this means that the antecedent of -Duration is always vacuous, making the consequent always (trivially) true.

Apart from the above objections it is also hard to see how the negation of Activities, Accomplishments and Achievements would be on a par with States. Hoeksema does not seem to offer a promising route, because the very nature of a cross-classification seems to prevent negation from bringing us from three of the squares of Table 10 to the fourth one. In addition to this, it should be observed that the negation of -Count as defined in (49) is not +Count, and the same applies to the negation of -Duration.

Finally, there are some other objections that can be made. One of the virtues of Hoeksema's approach is that he set out to explain certain linguistic regularities in Dutch morphology in terms of his classification. The suffix **-ing** in Dutch differs from the prefix **ge-** aspectually as shown in (51) and (52):

(51)	*de leving (the living)	State
	de wandeling (the walk)	Act
	de ontmoeting (the encounter)	Acc
	de ontploffing (the explosion)	Ach
(52)	*het geblijf (the staying)	State
	het geren (the running)	Act
	*het gebouw van een huis	
	(the building of a house)	Acc
	*het gewin van de race	
	(the winning of the race)	Ach

However, as shown by the asterisks, the modeltheoretic explanation of this phenomenon has to appeal to sets of classes, that is, to the parameters involved rather than to pairs of features. In the case of **-ing** the generalization is that its interpretation is a function whose domain is restricted to Accomplishments, Achievements and Activities "with definite endpoints", a notion not properly defined. Given the fact that "with definite endpoints" is incompatible with -Count, the generalisation seems to be that the domain is open to +Count structures. In the case of **ge-**, the interpretation function in question is restricted to Activities, that is, to the feature -Count, as I tried to make clear.

In my view, the empirical data can be accounted for without an appeal to the cross-classification in Table 10. On the contrary, this classification seems to prevent a better understanding of the phenomena at issue, because it suggests that the Vendler-classes are of explanatory value, whereas it turns out to be the case that at best some of the features from which they are constructed contribute to

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the appropriate generalisations.2)

5.4. Conclusion.

My conclusion is that Ter Meulen's proposal does not make clear why she appeals to Vendler-classes. Hoeksema's proposal is an interesting attempt but as could be predicted from the failure of Vendler's own cross-classification, it fails because it is not classes that contribute to generalizations.

6. Aspect construction.

In this final section I shall discuss the principles underlying what I have called a 'hinge ordering' in Table 1D. In Verkuyl (1972) I have developed my compositional approach to aspect in the generative framework. I still subscribe to the views developed there, more specifically to the idea that both verb and argument-NPs contribute to aspect formation. In a number of consecutive papers I have made certain modifications and clarifications. In Verkuyl (1976) I defended my claim of 1972 that my generative-semantic formalism can easily be replaced by an interpretive one without losing anything, as also recognized by Platzack (1979). In Verkuyl (1978) I got rid of the many verbal predicates, such as PERFORM, DO,3) TAKE, etc., that I held responsible for the 'dynamicity' expressed by the verb in case of a nondurative aspect, reducing them to a CHANGE-predicate within the thematic analysis, requiring that there be two points of evaluation and proposing the concept of a thematic kernel consisting of Theme (the object that "moves" through an interval), Source (the initial point of the interval) and Goal (the final point of the interval).

Taking up from Verkuyl (1972:95f) the idea that change as expressed by verbal predication is to be conceived of as adding time units to time units (see (56) below)), I started to apply modeltheoretic insights to the analysis of aspect in Verkuyl (1986; 1987), by trying to give precise interpretations to the parameters that I hold responsible for the construction of aspect in sentences like (53) and (54): the features +ADD TO assigned to the verb and +Specified Quantity of A assigned to a NP.

(53) a. She (+SQA) ate(+ADD TO) three sandwiches (+SQA)
     b. She (+SQA) walked (+ADD TO) a mile(+SQA)
     c. She (+SQA) played (+ADD TO) that sonata (+SQA)

```
(54)  a. She (+SQA) ate (+ADD TO) sandwiches (-SQA)
      b. She (+SQA) walked (+ADD TO) miles (-SQA)
      c. She (+SQA) played sonatas
```

I also dropped the distinction between Momentaneous and
Terminative aspect that I had made earlier for reasons made
clear in section 2, using the term 'terminative' for
nondurativity. (I am using 'terminative vs. durative'
because the pairs 'nondurative vs durative' and 'perfective
vs imperfective' contain a negative prefix, which creates
some confusion if one uses features). Referring to the
papers from 1986 and 1987 for a detailed analysis of these
features, I restrict myself here to its implications for
the classification of situational types. I cannot avoid
some of the formalism proposed, but I will present only its
bare outlines here, not paying much attention to the role
of the subject-NP.

The basic idea is that terminative (perfective)
aspect in sentences like (53) is constructed in two steps:
(a) ADD TO combines with SQA. If both have a plus-value,
the VP is terminative; (b) the VP combines with the subject
SQA. If both have a plus-value, the resulting sentential
aspect is terminative. Sentence (55):

```
(55)   The students in his class played that sonata in
       order to qualify as solo players.
```

can be taken as durative if **the students in his class**
pertains to an indefinite set of students: 'whoever was his
student in that class...'. In that case the -SQA feature
blocks a terminative VP on its way to the perfective top,
so to say.

The interpretation of the feature [+ADD TO] can be
taken as a function assigned to a verb as a lexically
present meaning element. This function s is called a
'successor's function' because it mirrors a mathematical
function assigning to each natural number its successor.
And this is exactly what I wanted to express in the
following passage (56).

```
(56)   ... we could say that moving from some point $P_i$ to
       another point $P_j$, where the distance between $P_i$ and
       $P_j$ is the interval $(P_i, P_j)$, can also be conceived
       in terms of the predicate 'ADD TO'. If someone is
       walking at $P_m$, where $P_m$ $(P_i, P_j)$, ... , we can say
       that he is adding some distance measuring units to
       the interval $(P_i, P_{m-1})$. It is not possible to use
```

the sentence **Hij wandelt nu** (He is walking now) if
he is at P_i (1972:95-6)

The formal dress of this idea applied to sentences of the
form (53) and (54) is given in (57).

(57)   If the feature [+ADD TO] is assigned to a verb V,
       then there is a function **s**: $I \rightarrow I$ such that, if
       $I = (a,b)$ and X (= the interpretation of the subject
       NP) is engaged in VP-ing is true at I, then there is
       a point c $(c \geq b)$ s.t $s(I) = (a,c)$ and X is engaged
       in VP-ing is true at (a,c).

Applied to sentence (1a) **She ate three sandwiches** (57) says
that the event in question consists of successive phases
during each of which one can say that she was engaged in
eating three sandwiches. The function **s** produces structure
as illustrated in Table (11):

Table 11

Note that **s** can operate indefinitely, as it is not
restricted.   The following step of the analysis is to
involve the three sandwiches in the event so as to bring
about a termination. The idea is quite simple. In set
theory every set can be partitioned by an equivalence
relation. So, if +SQA can be said to pertain to sets and if
we find an appropriate equivalence relation, then we can
relate partitioned subsets to structures like (58). A
plausible equivalence relation is the relation 'counting as
being involved in the event during a certain interval'. In
the case of (53a), this relationship can be made more
concrete if we assume that she has first eaten two
sandwiches s_1 and s_2, and later the third one s_3. Actually
we do not know which she did, so we have to formally
account for this vagueness. But given the assumption, one
can easily think of a "participancy"-function, say **p**, which
maps partitions onto the intervals produced by **s**.

    At that point, we seem to be able to explain why
terminative aspect conveys finiteness. By connecting **p** and
s we can bring **s** to a stop. Recall that the domain of **s** is
the set of intervals I. If we define **p** in such a way that
its domain is the collection of partitioned subsets of A
and that its co-domain is I, we obtain a composite function
$t = s \circ p$. This operation can be illustrated by a split up
of the set of three sandwiches into two partitions $[s_1]$
containing two sandwiches, and $[s_2]$ containing the third

one; p operates "blindly"; we do not know which partition
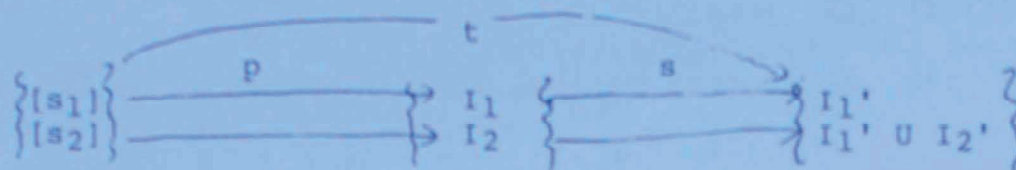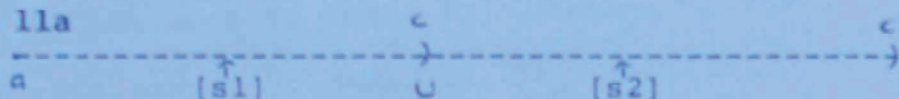was chosen. Consider Tables 12 and 11a:

Table 12

Table 11a

In Table 11a, one possible actualisation of the conjoined
operation of **s** and **p** is shown; the two partitions are
mapped onto two intervals. In this particular case, **s** can
generate just two intervals (a,c) and (a,c') coming to a
stop because the cardinality of the domain of **p** is finite.
One can easily see that in the case of (54a), this domain
is bounded: its cardinality cannot be determined, so **s** can
freely produce intervals without coming to a stop, unless
new bounding devices are put to work, such as (in English)
the past tense pertaining to a time located in a stretch of
time determined by an adverbial. Another possibility
suggested to me by Tanya Reinhart and Remko Scha (pers.
comm.) is that **s** wouldn't operate as soon as the domain of
p is unbounded.

The operation of the terminative function **t** (being the
composition of **p** and **s**) can be spelled out easily in this
specific case: $t([s_1]) = s(p([s_1]))$ and $t([s_2]) =$
$s(p([s_2]))$. In this analysis, terminative aspect is a
composite function.

As said, I have given just one arbitrarily chosen
application of the functions **p** and **s**. In sentences like **She
ate three sandwiches** the VP is to be interpreted as a **set**
of applications of **p** and **s**, where the number of possible
partitions is determined by the cardinality of domain of **p**.
Again, I have to refer to the detailed analysis in the work
mentioned above, but the sketch of the principles involved
should suffice here: as a result of the operation of the
terminative function **t** in Table 9, its co-domain has the
structure of a **filter**. That is, the intervals produced by
the restricted **s** are ordered with respect to each other in
such a way that the collection has all the properties of a
filter:

Table 13

```
-----      I1
-------          I2
-----------          I3
-------------          I4
```

We can order the intervals in Table 13 in two ways, either partially (by $\leq$) or by inclusion (_). In both cases we obtain the same result. Given inclusion, we can easily see, that (59) holds good for the filter structure in Table 13:

$$(59) \qquad I_n \cap I_{n+1} \in I \quad \langle --\rangle \quad I_n \in I \quad \& \quad I_{n+1} \in I$$

This fact makes it possible to think of s as producing structures that can be captured by the theory of generalized quantification. In terms of parameters, s can be seen as expressing change and this concept can be related to the concept of filter. -Change can be seen as the absence of s, which can be related to the concept of an ideal. The function p can be seen as expressing Boundedness if its domain is finite; if not it expresses Unboundedness.

Thus, it is possible to give a characterization of the features involved in aspect construction in terms of generalized quantification. Returning now to the so-called 'hinge ordering' in Table 1D, I will fill in Table 2 with the appropriate information, both in terms of features and in terms of their interpretation.

Table 2a

NP: -Bounded   +Bounded
        $|X| = |A/P| = $ undet. $|X| = |A/P| = n$

STATE	PROCESS	EVENT
state of no change	state of change	change of state

V: -Change(ideal)   +Change(filter)
$(x \in X \quad \& \quad y \in X \leftrightarrow x \cup y \in X$ $x \in X \quad \& \quad y \in X \leftrightarrow x \cap y \in X$

I borrow from Galton(1984) the wonderful wordplay with respect to the three classes that are distinguished. I borrow from Hoeksema his characterization of States as ideals, however without using his features -Count and -Duration. But ideals are the negative counterpart of filters, so it seems as if Table 2a contains the right suggestion with respect to the negation facts.4) As argued, both Processes and Events are filters. Thus, Table 2a provides for the close relation between Processes and Events observed by Kenny, Taylor, Mourelatos, Dowty and

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others. But it also provides for the close relation between States and Processes, which was impossible to do in partial ordered classifications.5) Finally, it is not the aspectual classes that explain the aspectual data, nor the features themselves. It is the interaction between the features that is crucial to the composition of aspect in the type of sentences under discussion.

FOOTNOTES

*I would like to thank my audience at two talks held on this subject at BBN and UMASS AMherst, and especially Emmon Bach and Roger Higgins for enabling me to improve on an earlier version of this paper. I thank Jack Hoeksema for his pers. comm. answers to questions forwarded to him.

1. Carlson (1981) distinguishes six classes on a matrix-basis. He places a class of 'dynamics' (like **stand**) between Statives and Activities, whereas his Achievements are split up in Momentaneous Achievements (like **notice, hit** and **blink**) as against Achievements proper (like **close the door, miss the ball, take off**). The Momentaneous class seems to be intermediate between Accomplishments and Achievements. The six classes are constructed with the help of three parameters. Again one can observe that it is the parameters which play a role in aspectual generalizations rather than the classes themselves. The same applies **mutatis mutandis** to Brecht (1985), who applies the Vendler-classification to the study of Slavonic aspect. Carlson rightly stresses the importance of 'additivity'(dynamicity) in the analysis of aspect, but again, this does not follow from the classification itself.

2. Hoeksema also gives an analysis of the Progressive Form, stating that his Progressive operator PROG may only apply given the (interpreted) feature +Duration. Thus, he generalizes with respect to the value of an aspectual parameter rather than to an aspectual class. Moreover, the observational objections with respect to Vendler's **ProgF** carry over to Hoeksema's analysis, as he accepts Vendler's treatment of the data.

3. In Verkuyl (1972) I also put too much emphasis on agentivity by taking DO as an underlying predicate accounting for "the fact that an event is made extended in time. It gives expanse ("Ausgedehntheit") in time to an event" (p.161). Taking DO as representative for the notion of change is somewhat misleading, so ADD TO is more in accordance with my own intentions, quoted in (56) in this paper.

4. See Togeby (1980) for an attempt to account for the ambiguity of sentences like **He didn't sleep for hours** as against the nonambiguity of **He didn't awake for hours.**

5. I am still not very happy with the Mourelatos-terminology, because the "every-day" notion of event is too far away from the notion of terminativity. Like Dowty (in

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prep.), I feel the need to speak of a terminative (or telic
or bounded) event to distinguish it from unbounded events.
In Verkuyl (1985) I used the term 'proto-event' for
Processes to stress that they are nearly Mourelatos-events.
As Dahl (1981) pointed out, there is a lot of different
terminology. I contributed to this terminological confusion
by first proposing a opposition durative vs. nondurative
(= terminative and momentaneous) aspect. By dropping the
latter distinction I was forced to choose between
nondurative and terminative. I tend to favor the latter
term because it does not have a negative affix. I do not
use the terms 'Perfective vs. Imperfective' because I want
to leave open the possibility for applying them to more
local aspectual oppositions. What some Slavonic scholars
call 'aspect' as opposed to 'Aktionsart' can be accounted
for as part of the compositional machinery described in
this section. That is, in my framework the Progressive Form
should be taken as a sort of blocking the operation of the
p-function in Table 9. This way of imperfectivizing an
otherwise terminative event is well-known in the Slavonic
literature (cf. Forsyth 1970, Brecht 1985, Timberlake
1982). However, in my framework it appears not necessary at
all to appeal to subjective notions of 'point of view' or
'situational focus'.

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