

## **The Lexical Semantics of Verbs II: Aspectual Approaches to Lexical Semantic Representation**

### **1 Aspectual Approaches: An Introduction**

As verbs denote events that take place in time, can verbs be differentiated according to how the events they denote take place in time?

THE PROPOSAL: The ontological types of events are determined by their temporal contours. That is, aspectual notions are critical to structuring lexical semantic representation.

THE BIG QUESTIONS:

- How are verbs classified with respect to the internal temporal structure of the events they denote?
- What evidence is there for determining a verb's class membership?
- What is the best characterization of the relevant aspectual notions?

### **2 From Hitting and Breaking to Lexical Aspect**

In fact, *hit* and *break* — and means/manner vs. result verbs, more generally — denote events that indeed differ as to how they take place in time.

- (1) a. Kim wiped the counter.  
b. Kim cleaned the counter.
- (2) a. Sam poured the milk.  
b. Sam filled the pitcher (with the milk).

- Most means/manner verbs describe events that take time but have no inherent temporal endpoint built into them; these events could go on indefinitely — at least, if real world limitations or conventions weren't a consideration.

Such events are known as ACTIVITIES.

- Most result verbs also describe events that take time, but these events have an inherent temporal endpoint: the time when the result state comes about. The duration of the event up to the endpoint is taken up by the process that leads up to this result state, though it is left unspecified by the verb; it is this process that a means/manner verb names.

Such events are known as ACCOMPLISHMENTS.

- (3) a. I hit the tabletop. (once or repeatedly)  
b. I broke the tabletop.

- Some means/manner verbs, such as *hit*, describe events that are punctual — they take no more than a moment in time (Engelberg 2000)— but as with the events described by durative means/manner verbs there is no result state that follows. Such verbs can name a single hit or a series of hits; on the latter interpretation, there is again, no inherent endpoint specified to the hitting.

Such events are known as SEMELFACTIVES.

- Some result verbs, such as *break*, describe events that are punctual, but the moment described involves the transition to the result state, and there is often a sense that an accompanying process is presupposed.

Such events are known as ACHIEVEMENTS.

### 3 Lexical Aspectual Classes of Verbs

ASPECTUAL NOTIONS INTRODUCED SO FAR:

- duration/punctuality
- telicity, i.e., having a culmination or endpoint

ONE OF THE MOST BASIC ASPECTUAL NOTIONS: Stativity or its inverse, dynamicity

- events that involve change: activities, accomplishments, achievements, semelfactives  
*run, walk, sleep, sweep, reach, win, break, knock, hit*
- events that do not involve change: states  
*hate, know, believe, be red*

THE RESULT: FIVE major aspectual classes.

THREE DESCRIPTIVE PROPOSALS CONCERNING HOW BEST TO CHARACTERIZE STATES

- Statives, unlike nonstatives, can be judged true at a moment in time (Dowty 1979)  
INADEQUATE: so-called “interval statives”: spatial configuration verbs such as *sit, stand, lie*.

- (4)
- a. My keys are sitting on the shelf.
  - b. The statue of George Washington stands in the Common.

- Stative verbs involve no change, nonstative verbs do (Dowty 1979, Kearns 1991, McClure 1994); i.e., activities are iterated changes.

- (5) The general observation is that states have no essential changes or transitions, from which it follows that they are continuous and are not essentially bounded. (Kearns 1991:116)

- Nonstates, but not states, require energy input to maintain event (Comrie 1976:48).

#### 3.1 A Caution: What Is Being Classified?

POSSIBLE ANSWERS: The verb, the VP, the sentence, the event(uality)?

A restatement of the question: Does a verb have a basic aspectual class?

THE COMPLICATING ISSUE: Aspectual class shifts (also called event-type shifts)

- (6) a. I ran.  
 b. I ran. (in the sense of a specified distance)  
 c. I ran to the lake.

### 3.2 Systems of aspectual classification

There are various aspectual classification systems, though they make essentially the same distinctions, collapsing some or subdividing others (Bach 1981, 1986, Dowty 1979, Mourelatos 1978, Vendler 1957).

SOME MAJOR DIMENSIONS OF VARIATION:

- Semelfactives are often neglected and subsumed under achievements, as they also are punctual.

THE CONSEQUENCE: Many systems of aspectual classification recognize only four aspectual classes, the so-called Vendler classes: activity, accomplishment, achievement, state.

- Some researchers privilege the distinction between verbs denoting events with an inherent endpoint (telic) and those without (atelic) over other aspectual distinctions.
- Some researchers argue that the accomplishment/achievement distinction is pragmatic and not linguistic, thus collapsing these two classes (e.g., Verkuyl 1993).

- (7) a. Taylor ate a peach.  
 b. Taylor ate a grape.

- Some researchers recognize two subclasses of achievements: achievements with an associated process and purely “lucky” achievements.

- (8) a. The climber reached the summit.  
 b. The train arrived at the station.  
 c. The balloon popped.
- (9) a. The student won the lottery.  
 b. My mother missed the bus.  
 c. Cameron recognized a movie star.

### 3.3 Diagnostics for Aspectual Classification

A variety of diagnostics have been proposed to determine aspectual classification. Perhaps the most cited collection is from Dowty (1979).

(10) Dowty Tests for Aspectual Verb Categories (Dowty 1979: 60)

	<b>Criterion</b>	<b>States</b>	<b>Activities</b>	<b>Accomplishments</b>	<b>Achievements</b>
1.	meets nonstative tests	no	yes	yes	?
2.	has habitual interpretation in simple present tense	no	yes	yes	yes
3.	$\phi$ for an hour, spend an hour $\phi$ ing:	OK	OK	OK	bad
4.	$\phi$ in an hour, take an hour to $\phi$ :	bad	bad	OK	OK
5.	$\phi$ for an hour entails $\phi$ at all times in the hour:	yes	yes	no	d.n.a.
6.	$x$ is $\phi$ ing entails $x$ has $\phi$ ed:	d.n.a.	yes	no	d.n.a.
7.	complement of <i>stop</i> :	OK	OK	OK	bad
8.	complement of <i>finish</i>	bad	bad	OK	bad
9.	ambiguity with <i>almost</i> :	no	no	yes	no
10.	$x$ $\phi$ ed in an hour entails $x$ was $\phi$ ing during that hour:	d.n.a.	d.n.a.	yes	no
11.	occurs with <i>studiously</i> , <i>attentively</i> , <i>carefully</i> , etc.	bad	OK	OK	bad

OK = The sentence is grammatical, semantically normal.

bad = The sentence is ungrammatical, semantically anomalous.

d.n.a. = The test does not apply to verbs of this class.

A CAUTION: Aspectual diagnostics have to be applied with care:  
cf. the notion of repair readings (Kearns 2000).

AN EXAMPLE: *in* phrases actually have an ‘after’ interpretation with achievements, rather than a duration of the event interpretation as they do with accomplishments.

- (11) a. Smith climbed the mountain in six hours. (event took six hours)  
b. Smith reached the summit in six hours. (‘reached after six hours’)

NOTE: *reach* is an achievement with an associated process; “lucky” achievements are often odd with *in* phrases. More generally, the two types of achievements can pattern differently with respect to certain aspectual diagnostics.

### 3.3.1 Two Aspectual Diagnostics Exemplified: *finish* and *stop*

• Only accomplishments can be found as complements to *finish*. That is, *finish* requires that its complement describe an event that involves both a process and a culmination (see Kearns 2000:214).

- (12) a. Kim finished writing the letter. (accomplishment)

- b. ?? Dana finished pushing the cart. (activity)  
(This sentence is ok on the “repair” reading which presupposes a specific distance that the cart is supposed to have been pushed, but this reading involves the reinterpretation of the activity as an accomplishment.)
- c. ?? Kelly finished blinking. (semelfactive)
- d. ?? Ashley finished noticing the spot. (achievement)
- e. ?? Pat finished being hot. (state)

• Only achievements cannot be complements of *stop*, though semelfactives are best as complements to *stop* on the iterated interpretation. That is, *stop* requires its complement to have duration.

- (13)
- a. ?? Ashley stopped arriving at the station. (achievement)
  - b. Kim stopped writing the letter. (accomplishment)
  - c. Dana stopped pushing the cart. (activity)
  - d. Kelly stopped blinking. (semelfactive — iterated)
  - e. Pat stopped being hot. (state)

### 3.3.2 Diagnostics for States

The most referenced discussion of stativity tests is Lakoff (1966); see also Dowty (1979:55-56).

• Progressive: only nonstatives are found in progressive.

- (14)
- a. \* I am knowing the answer.
  - b. I am running.

• Only nonstatives occur as imperatives.

- (15)
- a. \* Know the answer!
  - b. Run!

• Only nonstatives occur with adverbs like *deliberately* or *carefully*.

- (16)
- a. \* She knows the answer carefully.
  - b. \* She writes carefully.

• Only nonstatives occur as complements of *force/persuade*.

- (17)
- a. \* The teacher forced her to know the answer.
  - b. The teacher forced her to write.

- Only nonstatives occur in the pseudo-cleft construction.

- (18) a. \* What Sally did was know the answer.  
 b. What Sally did was write.

- Simple present refers to the present with statives, but has a habitual interpretation with nonstatives.

- (19) a. I know the answer. → refers to present with statives  
 b. I run. → habitual interpretation with nonstatives

- Only nonstatives appear in *What happened/occurred/took place was ...* (from Jackendoff 1983)

- (20) a. \* What happened was Sally knew the answer.  
 b. What happened was Sally wrote.

#### REAPPRAISING STATIVITY TESTS

- Carlson (1977) on the progressive:

This diagnostic actually distinguishes stage- from individual-level predicates.

- (most) individual-level predicates are stative, i.e., permanent states
- most stage-level predicates are nonstative, but not all of them are: temporary states, including interval statives

- (21) a. My socks ??lie/are lying under the bed.  
 b. New Orleans lies/??is lying at the mouth of the Mississippi.

- Several purported stativity tests are agentivity tests; see below.

- Evidence bearing on the two most robust diagnostics for the stative/nonstative distinction:

- (22) The interpretation of the simple present:

- Kim knows the capitals of all 50 states.  
(interpreted as referring to what Kim knows now; a state)
- Kim rides a bicycle to work.  
(interpreted as habitual; activity)
- Kim writes the mayor.  
(interpreted as habitual; accomplishment)
- Kim taps on the glass (once).  
(interpreted as habitual; semelfactive)
- Kim notices the hole in my shoe.  
(interpreted as habitual; achievement)

- (23) The *what happened was ...* frame:

- \* What happened was Kim knew the capitals of all 50 states. (state)
- What happened was Kim rode a bicycle. (activity)
- What happened was Kim wrote the mayor. (accomplishment)
- What happened was Kim tapped on the glass (once). (semelfactive)
- What happened was Kim noticed the hole in my shoe. (achievement)

### 3.4 The Bottom Line in Determining Aspectual Classification

The aspectual classification of a verb and its arguments can be determined in two ways:

- by making reference to the presence of the appropriate temporal properties defining an event of that aspectual type.
- by applying an aspectual diagnostic or a set of aspectual diagnostics that reveal the precise aspectual type of that event.

A CAUTION: Since the temporal properties of an event are not always so easy to identify or agree on, it is often tempting to resort to diagnostics. But diagnostics are of limited value without a full theory of aspect in which to ground them.

## 4 A Feature Definition of Aspectual Classes

Several researchers (Kearns 2000, Olsen 1994, 1997) have tried to characterize the aspectual classes in terms of a small set of features.

Although this approach is probably too simplistic to really explain all facets of aspectual behavior, it is useful for getting a basic grasp of the aspectual classes and the relations between them.

A POSSIBLE SET OF DEFINING FEATURES:

- DYNAMIC (sometimes “change”)
- DURATIVE
- TELIC (sometimes “bounded”)

A sample classification, where these features are defined privatively; the use of privative features better captures the aspectual potential of verbs with multiple aspectual classifications since it allows for certain properties to be underspecified and to be more fully specified in a larger context.

(24) A feature characterization of aspectual classes (e.g., Olsen 1994, 1997):

	Dynamic	Durative	Telic	
Accomplishment	+	+	+	<i>draw, build</i>
Activity	+	+	0	<i>run, chat, play, gurgle</i>
Achievement	+	0	+	<i>notice, recognize, win</i>
Semelfactive	+	0	0	<i>jump, hit, tap, cough</i>
Temporary State	0	+	+	<i>be sick/available</i>
(Permanent) State	0	+	0	<i>be tall, know, contain</i>
[UNATTESTED]	0	0	+	
[UNATTESTED]	0	0	0	

NOTES ON THE TABLE:

- The two unattested feature combinations are probably unattested because they would give rise to types of events that are “unimaginable” in the actual world.
- Usually, the term “state” is used to refer to permanent (i.e., individual-level) states, rather than temporary (i.e., stage-level) states, such as *be sick* or interval states like *sit* and *stand*.
- Means/manner verbs are dynamic atelic verbs and result verbs are dynamic telic verbs.

## THE ADVANTAGE OF PRIVATIVE FEATURES

Privative features allow monotonicity to be maintained:

additional linguistic material adds meaning, but does not take it away.

- Naturally captures activity-to-accomplishment shifts:

*run* is considered an activity verb basically, but it can be found with an accomplishment interpretation even when in isolation in appropriate contexts or when accompanied by a modifier which adds an endpoint to the event.

- (25) a. I ran. (telic when there is a set distance to run)  
b. I ran a mile/to the store.

This shift is not unexpected if *run* is [0telic] and modifiers can give this feature a plus value.

- Naturally captures semelfactive-to-activity shifts:

Semelfactives can naturally receive an interpretation where the relevant action is iterated, as well as one where the relevant action is performed only once.

Contrast other types of dynamic events, which require a “bare plural” argument (a plural NP without a determiner) to get an iterated interpretation.

- (26) a. Ashley noticed spots.  
b. Inspectors noticed the spot.  
c. Kim wrote letters.

Furthermore, on the iterated interpretation semelfactives are still understood to describe a single situation, while iterated accomplishments/achievements are understood as describing multiple events.

Iterated semelfactives are indistinguishable from activities with respect to aspectual diagnostics. In a sense a semelfactive verb names a minimal sequence that need not be iterated, but may be. Contrast semelfactive *step* and *hit* with activity *walk* and *beat*.

This property is not surprising if semelfactives differ from activities only in being [0durative], and the iteration basically contributes the feature [+durative], the value associated with activities.

- (27) The distraught visitor knocked. (once or repeatedly)

Grammatically/semantically, semelfactive verbs pattern as activities, not achievements (Levin 1999).

— Semelfactives, like activities, are means/manner verbs, not result verbs.

— Semelfactives, like activities, allow various kinds of nonsubcategorized objects, as in reflexive resultatives and *out*-prefixation.

- (28) Reflexive Resultative:

- a. We curled up together like lost children who have finally cried themselves quiet. (K. Kijewski, *Katwalk*, St. Martin's, New York, 1989, p. 68)

- b. “Don’t use my name,” I said, blinking myself awake. (L. Matera, *Havana Twist*, Simon and Schuster, New York, 1998, p. 56)
- c. By that time Sophie had swept and scrubbed herself into a state when she could hardly move. (D. Wynne Jones, *Howl’s Moving Castle*, Greenwillow Books, New York, 1986, p. 43)
- d. At his current pace, however, Sauerbrun would kick himself into the NFL record book with 120 punts over the course of the 16-game season . . . (S. Mickles, “Murray Ready to End Davis’ Reign”, *The Advocate*, Baton Rouge, LA, October 10, 1997, p. 1D)

(29) *Out*– Prefixation:

- a. Here was a young girl who could out-strut anything on two legs. (G.F. Edwards, *A Toast Before Dying*, Doubleday, New York, 1997, 169)
- b. Stockowski and Dixon were outjumped by bigger, stronger girls . . . (J.C. Cotey, “Parents Enjoy Sweat Rewards”, *St. Petersburg Times*, July 10, 1999, p. 7C)
- c. “. . . They outhit us and outplayed us. . . .” (D. Ventura, “School Sports; Division 2 North; Danvers Dances”, *The Boston Herald*, June 13, 1999, p. B46)
- d. Whereupon their American Security Bank teammates calmly outtugged their obviously straining opponents . . . (P.S. Canellos, “Jocks of All Trades; Playing the Corporate Games”, *The Washington Post*, July 14, 1986, p. C1)

Furthermore, Each verb class in (30) contains verbs that pattern together according to Levin (1993), despite differences as to whether these verbs are necessarily durative or not.

- (30)
- a. VERBS OF IMPACT: bang, batter, beat, hit, kick, pound, rap, slap, smack, tap, thump, thwack, whack, . . .
  - b. VERBS OF LIGHT EMISSION: flash, flicker, gleam, glitter, shine, sparkle, . . .
  - c. VERBS OF SOUND EMISSION: bang, buzz, creak, hum, jingle, squeak, . . .
  - d. VERBS OF SUBSTANCE EMISSION: gush, ooze, puff, spew, spurt, squirt, . . .

- This privative feature approach assumes that a verb has a basic aspectual classification.

## 5 Aspectual Classification and Agentivity

A QUESTION: Is there any interaction between the notion “agent” and aspectual classes?

Dowty (1979) shows that agentivity crosscuts aspectual classes: there are agentive and nonagentive members of each class even though there may be tendencies within specific classes.

### 5.1 Agentivity and accomplishments and activities

Accomplishments, activities, and semelfactives are often agentive, but there are nonagentive accomplishments, activities, and semelfactives.

- (31) a. The sun has evaporated 4 gallons of water. (accomplishment)  
 b. The ball rolled. (activity)  
 c. The bell tolled. (semelfactive)

The name “accomplishment” suggests agency, though Mourelatos (1978) prefers “development”.

## 5.2 Stativity and Agentivity

As Lakoff himself acknowledges, three of his purported stativity diagnostics really diagnose agentivity: the *persuade*, adverbial, imperative, and pseudo-cleft diagnostics.

Clearly nonstative verbs with inanimate — and hence necessarily nonagentive — subjects fail these three diagnostics, but not other ones:

- (32) a. \* I persuaded the rock to roll down the hill.  
 b. \* The rock rolled down the hill carefully/deliberately.  
 c. \* Roll down the hill, rock!
- (33) a. The rock was rolling down the hill.  
 b. What the rock did was roll down the hill.

Why were these diagnostics included with the stativity diagnostics?

Stative verbs with animate subjects tend to be nonagentive, so stativity implies lack of agentivity. However, as shown, nonstativity does not imply agentivity: there are nonstative, nonagentive verbs.

Are statives necessarily nonagentive? The answer is unclear.

- Temporary (or “stage-level”) states may show properties of agentivity:

- (34) a. My brother was deliberately (being) noisy.  
 b. Stand in the corner!

- A subset of statives, experiencer subject psych-verbs, vary as to potential agentivity, and even those verbs that seem least agentive, pass agentivity diagnostics when negated (DiDesidero 1999).

- (35) a. ? Blake studiously abhorred mushrooms.  
 b. ? Blake deliberately feared snakes and insects.  
 c. Blake deliberately admired the gallery’s new acquisition.  
 d. Don’t fear snakes and insects!

## 5.3 Achievements and agentivity

Agent-oriented adverbs are odd with achievements (Smith 1991, Piñón 1997)

- (36) a. ?? Kerry deliberately lost the game.  
 b. ?? Kerry deliberately hit the target.  
 c. Kerry deliberately missed the target.

Achievements are often not controllable events; that is, the actual change of state cannot usually be completely willed or controlled; possibly, one can deny control of event with *accidentally*.

- (37) Kerry accidentally lost the game.

Why are achievements nonagentive?

- Agent-orientation of adverbial may be incompatible with focus on state change or result state.
- Piñón (1997) proposes that intuitively intentional activities take time, so instantaneous events lack the necessary temporal extent to be intentional;  
 e.g., manner adverbials modify an “earlier” unlexicalized stage in the causal chain.

## 6 Variable Telicity

Certain verbs can be used to describe telic events when their objects are count NPs, but atelic events when their objects are mass NPs.

- (38) a. Sam ate ice cream. (mass NP object; activity/atelic)  
 b. Sam ate an ice cream cone. (count NP object; accomplishment/telic)
- (39) a. Cory wrote poetry. (mass NP object; activity/atelic)  
 b. Cory wrote a poem. (count NP object; accomplishment/telic)

The (temporal) boundedness of an event denoted by one of these verbs depends on the (physical) boundedness of the verb’s object.

Not all transitive verbs show this pattern: many are atelic, even with a count NP object.

- (40) a. Dana pushed the cart. (count NP object; activity/atelic)  
 b. Brett stirred the batter. (count NP object; activity/atelic)

## 7 Aspectual Shifts and Argument Alternations

Certain argument alternations have been revisited in the context of aspect, with van Hout (1996) proposing alternations represent event type-shifting:

- alternations between direct object and oblique realizations reflect alternations between telic and atelic uses of verbs;
- alternate choices of direct object reflect alternate choices of the argument which determines the telicity of the sentence.

- (41) a. Kelly ate the sandwich. (telic)  
 b. Kelly ate at the sandwich. (atelic)
- (42) a. The farmer loaded the truck with the hay.  
 b. The farmer loaded the hay on the truck.

## 8 Analyses of Telicity

Two analyses of telic predicates:

- Telic predicates are analyzed in terms of result states.
- Telic predicates are analyzed in terms of an argument-to-event homomorphism.

### 8.1 Analyses in Terms of Result States

Based on the discussion in Dowty (1979, Chapter 2), many researchers identify the notions “accomplishment” and “causative”, among them Sybesma (1992), Van Valin and colleagues (see Foley & Van Valin 1984; Van Valin 1990; but contrast Van Valin & LaPolla 1997).

This move is appealing because the notion “accomplishment”, given its temporal grounding, provides a way of understanding the nature of complex events and the hard-to-pin-down notion of “causative event”.

The identification of “accomplishment” and “causative” is made possible because Dowty’s (1979) aspectual calculus represents a merger of two traditions: the lexical decompositions of generative semantics, and the logical analysis of predicate types in the Aristotle-Kenny-Vendler tradition. The two traditions are actually concerned with different sets of phenomena.

- Generative semantics decompositions are motivated mainly by lexical entailments, shared selectional restrictions and the existence of systematic morphological correspondences between word classes.

- (43) a. The soup was cool.  
 b. The soup cooled.  
 c. John cooled the soup.  
     ‘John caused it to come about that the soup became cool.’

- Aristotle-Vendler-Kenny classes are based on the distribution of temporal modifiers and of tenses (e.g., simple present, progressive) and entailments (e.g., progressive to perfect).

Link which brings the two traditions together:

- (44) But every performance must be ultimately the bringing about of a state . . . One performance differs from another in accordance with the differences between states of affairs brought about: performances are specified by their ends. (Kenny 1963: 178)

This motivated the introduction of the operators BECOME and CAUSE in Dowty (1979), which combine with result states.

Many have adopted the reinterpretation of the predicate decompositions of generative semantics as reflecting the Vendler aspectual classes in Chapter 2 of Dowty (1979), including Foley & Van Valin (1984) (but see Dowty's own discussion in Chapter 3).

### 8.1.1 Challenges for the Result State Analysis

However, although the operators BECOME and CAUSE are well-motivated for the reasons set out by the generative semanticists, various subsequent studies affirm that they are independent of temporal properties (Abusch 1986; Hay, Kennedy & Levin 1999; Pustejovsky 1991; Van Valin & LaPolla 1997).

- *Not all causatives are accomplishments (or even telic)*

Causation cannot be reduced to any aspectual notions (McCawley 1976).

Verbs of every aspectual type have related causatives (Van Valin & LaPolla 1997), and specifically, causatives of certain atelic non-change of state verbs are also atelic.

- (45) a. Robin flew a kite for an hour/#in an hour.  
b. Pat bounced the ball for ten minutes/#in ten minutes.

- *Not all accomplishments are causatives*

(i) Manner of motion verbs with goal phrases, as in *Kim jogged to the station*.

Conceptually, two subevents are identifiable in such examples, and some have claimed they are causally related (Croft 1991; Van Valin 1990), though see Van Valin & LaPolla (1997).

- (46) a. The boat sailed into the cave. (Croft 1991:160, (21))  
("the activity of sailing *causes* the motion to come about")  
b. Susan ran to the house.  
[run'(Susan)] CAUSE [BECOME **be-at'**(house, Susan)]  
(Van Valin 1990:224, (3d))

Reasons for rejecting a causative analysis:

— The syntax suggests a causative analysis of such examples is inappropriate:  
Observationally, prototypical causatives are transitive, and, in fact, RH&L (1998) argue for a theory of argument realization that requires causatives to be transitive.

— The subevents are necessarily temporally dependent (i.e., they unfold at the same rate), while the subevents of true causatives need not be (L&RH 1999).

- (47) a. The widow murdered the old man by putting arsenic in his coffee.  
(The act of putting arsenic in the coffee doesn't extend to the point of death.)  
b. Casey's persistent banging broke the window.  
(The banging may have been protracted, but the breaking is punctual.)  
c. Terry shocked Sandy by deciding to run for office.  
(Terry's decision could have been made long before Sandy hears of it.)

- (ii) Verbs of consumption with count noun objects, as in *Sandy ate the mango* (and, presumably, also verbs of creation).

As is well known, these verbs are atelic when objectless or when taking a nonbounded object, but telic when taking a bounded object.

- (48) a. Kelly is eating.  $\Rightarrow$  Kelly has eaten. (atelic)  
b. Kelly is eating rice.  $\Rightarrow$  Kelly has eaten rice. (atelic)  
c. Kelly eating a plum.  $\nRightarrow$  Kelly has eaten a plum. (telic)

The equation of causatives and accomplishments would support a causative analysis of these verbs when telic; however, there is evidence against a causative analysis:

— These verbs don't pattern with COS verbs, such as *break*, for which a causative analysis is uncontroversial and assumed whether their objects are bounded or not.

— Verbs of consumption show a necessary temporal dependence between their perceived subevents (e.g., in eating, the chewing/ingesting and the consuming unfold together); this dependence is not characteristic of true complex events.

It seems best to assign verbs of consumption (and creation) a simple event structure, with boundedness of the event determined by boundedness of the direct object—or more accurately, a spatial property of the object, its volume. (See also Van Valin & LaPolla 1997.)

- “Degree achievements”: *Causation and telicity are independent*

Degree achievements (e.g., *cool, lengthen, widen*) display ambiguous telicity (Abusch 1986; Bertinetto & Squartini 1995; Dowty 1979).

As shown by Hay, Kennedy, & Levin (1999), this variability is independent of transitivity.

- (49) a. The soup cooled for an hour. (atelic)  
b. The soup cooled in an hour. (telic)
- (50) a. The cook cooled the soup for an hour. (atelic)  
b. The cook cooled the soup in an hour. (telic)

Specifically, these verbs are transitive when causative and intransitive when not, and both transitive and intransitive degree achievements may be telic or atelic.

### 8.1.2 A Second Form of Result State Analysis

There is a second class of result state analyses which does not privilege causative verbs but sees telic events as involving a transition from one event to a second, often a transition from an atelic process to a result state. (cf. Pustejovsky 1991, 1995; van Hout 1996)

Its core empirical domain is different:

Compositions of a verb and a delimiting object or XP:

(e.g., *eat an apple, draw a picture, run to the store, push a cart to the store*).  
with the verb denoting a process and the object or XP adding a result.

Noteworthy property: Achievements, including noncausative change of state verbs, are also transitions and, hence, complex events.

## 8.2 Analyses in Terms of Argument-to-Event Homomorphisms

The analysis of telic predicates in terms of result states has been replaced by analyses based on argument-to-event homomorphisms (Dowty 1991, Krifka 1989, 1992, Ramchand 1997, Tenny 1992, 1994)

INCREMENTAL THEME: The name given to the NP that plays a part in determining the telicity of certain events, such as in (38) and (39).

The INCREMENTAL THEME is the element involved in defining a homomorphism from properties of an argument to properties of the event it participates in. That is, the progress of an event can be determined from its incremental theme.

(51) Taylor ate the plum.

In (51) *the plum* is the incremental theme since every subpart of the plum that is eaten corresponds to a subpart of the event of eating that plum. When half the plum is eaten, the event is half over; when the plum is entirely consumed, the event is over.

When the incremental theme is physically bounded (e.g., a count NP such as *a plum* or *a cracker*), then the event itself is temporally bounded (i.e., telic); when the incremental theme is not physically bounded (e.g., a mass NP such as *juice* or *soup*), then the event itself lacks a temporal bound (i.e., atelic).

The label “incremental theme” reflects the observations that these NPs often bear the semantic role “theme” and that they are physically incrementally affected by the event described by the verb.

A SECOND METAPHOR: The plum may be described as “measuring out” the event (Tenny 1994).

### 8.2.1 Types of Measuring Out

(52) Three types of measuring out (Tenny 1994):

- a. Incremental theme verbs (Dowty 1991): *eat, build*  
Event’s temporal terminus “achieved by progressing incrementally through the object” (Tenny 1994:17)
- b. Change of state verbs: *ripen, redden*  
Event’s temporal terminus “achieved by progressing along measurable degrees of change in some property central to the verb’s meaning” (Tenny 1994:17)
- c. ‘Route Verbs’ with path objects (these include events or performances):  
*climb the ladder, walk the trail, play the sonata*  
Event’s temporal terminus achieved by progressing incrementally along the path object, but these objects “do not undergo change or motion during the event” (Tenny 1994:17)

(53) Differences among internal argument [=underlying object] types:

- a. Incremental-theme verbs (Dowty 1991):  
“internal argument is created or consumed over time” (Tenny 1994:18)
- b. Change of state verbs:  
“internal argument undergoes some change in a property over time” (Tenny 1994:18)

- c. Route verbs:  
“internal argument, although unchanged, provides a gradient along which the progress of the event may be measured” (Tenny 1994:18)
- (54) Measuring out without an overt measuring argument (Tenny 1994:75-76):  
Verbs of imparting motion with goal phrases: *push, pull, transitive roll*  
— Underlying object is not a measure, but rather the entity whose location changes.  
— Measure of the event is the implicit path whose endpoint is given by the goal.  
(i.e., these verbs fall into the class of measuring-out verbs with path arguments)

The implicit path is the measure of the event or the incremental theme; Dowty calls the entity whose location changes a “holistic theme”.

Adverbials as tests for measuring out:

- (55) a. Mary ate an apple halfway.  
(i.e., ‘Mary ate half an apple’; not ‘Half of Mary ate an apple.’)
- b. Susan walked the Appalachian Trail halfway.  
(i.e., ‘Susan walked half the Appalachian Trail.’;  
not ‘Half of Susan walked the Appalachian Trail.’)
- c. ? The gardener ripened the fruit halfway. (Tenny 1994:19, (19)-(21))

Hay, Kennedy & Levin (1999) propose a unified perspective on the three types of verbs. They suggest that in each case the measure involves a property of an argument of the verb. The key insight is that with traditional incremental theme verb, the property is the spatial extent of the argument, not the argument itself.

### 8.2.2 Incremental Theme and Telicity Are Independent

Contrary to what is sometimes claimed (e.g., Dowty 1991:607), events may have an incremental theme without being telic (bounded), as argued in Krifka (1992) and Ramchand (1997); see also Jackendoff (1996).

Hay, Kennedy & Levin’s (1999) analysis of degree achievements demonstrates the independence of telicity and incremental theme: degree achievements have an incremental theme — what they call a “difference value” — and their telicity depends on whether it is bounded or not.

### 8.3 The Empirical Domains of the Analyses

In reality, the class of accomplishment verbs is quite heterogeneous, and depending on their interests and goals, researchers have focused on distinct subclasses of this class, perhaps a reason for the two types of analyses of accomplishments.

Specifically, the analyses differ as to what are taken as the “core” accomplishments:  
— Result state analyses: Causative verbs of change of state (e.g., Dowty 1979)  
— Argument-to-event homomorphism analyses: *eat an apple, run to the store, widen the street*