# **Lexical Semantics**

Advanced/Aufbau/Masterseminar

Heinrich Heine University at Düsseldorf WS 2013-14

# **TOPIC 1:**

## **Aspectual Classes: Basic meaning components**

# **Empirical background**

# & Classical Extensional Mereology (CEM)

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Main goals:

(1) Empirical grounding for the typology of aspectual classes

Foundational assumption: Every *V*, *VP* and *S* can be categorized into aspectual classes according to certain correlated semantic and grammatical properties.

- There are certain aspectually relevant semantic properties that every V, VP and S has.
- Pretheoretically, the notion of a 'part' emerges as their natural key organizational principle.
- Such aspectually relevant semantic properties are 'grammatically relevant' in so far as they correlate with other properties that *V*, *VP* and *S* have (e.g., combinatorial properties, entailments)
- (2) Theoretical grounding of aspectual classes in the theory of CLASSICAL EXTENSIONAL MEREOLOGY (CEM)
  - Precursors: Bennet and Partee 1972 (interval semantics, subinterval property), Taylor 1977, Mourelatos 1978/81, Bach 1981.
  - Early formal mereological approaches to aspectual classes: Bach 1986, Krifka 1986, 1989, 1992; Filip 1993/99.
  - Further extensions in Krifka 1998, Filip 2008, Beavers 2012, Kennedy 2010, among others.
  - (Other CEM work not focusing on aspect: Champollion 2010, Grimm 2012)

# NON-PROG(P) versus PROG(P) in English

• Contrasts between simple non-progressive and progressive sentences traditionally motivated the typology of aspectual classes:

see the foundational studies of Vendler (1957), Kenny (1963), Dowty (1972, 1977, 1979), Bennett and Partee (1972), Taylor (1977), Vlach (1981), Mourelatos (1978/81), Bach (1981, 1986)

## Test 1: Compatibility of NON-PROG(P) with time point ADVs

- Key semantic property (A): 'true at a particular moment of time'.
- Key grammatically relevant property: sounds odd or gets a special reinterpretation when combined with time-point ADVs.
- (1) a. The light flashed at 9 p.m.
  - b. John hit a tree at 9 p.m.
  - c. John won at 9 p.m.
  - d. The train arrived at 9 p.m.
  - e. John died at 9 p.m.
- (2) a. # John composed a symphony at 9 p.m.
  - b. (#) John wrote an email at 9 p.m.
- (3) a. (?) John ran at 9 p.m.
  - b. (?) It rained at 9 p.m.
- '#' barring unusual fictitious contexts, video games, magic, etc.
- '(#)' acceptable if writing of an email is understood as culminating in the moment when the 'send' button is pressed
- '(?)' acceptable if understood as meaning that John started to run at 9 p.m., it started to rain at 9 p.m., i.e., under the inchoative interpretation.

## Semantic property (A): 'true at a particular moment of time'

related to the meaning component of 'momentaneous change of state'

- flash, hit, win, arrive, die, reach the top ...
  - can be true of entities at a particular moment of time
  - denote eventualities that are characterized by a transition into a new state of affairs that we conceive of as happening at a single moment
  - a punctual adverbial like 9 p.m. specifies the time of such a 'momentaneous' transition between two states of affairs
- compose a symphony, write an email, run, rain, ...
  - are true of entities only over an interval of time
  - denote eventualities that consists of successive stages spread over an interval of time

#### Correlation: 'time-point ADV' test and semantic property (A)





- find, recognize, notice, ...
- hit, flash, knock, kick, slap, blink, flash, ...
  - SEMELFACTIVES
  - Talmy (1985): 'full-cycle resettable' verbs, namely verbs which describe situations that end with the return to the initial state

arrive, die, reach the top, win, ...

#### Momentaneous events - Happenings (term: Bach 1986)



- (1) b. John hit a tree at 9 p.m.
- *P* denotes events which as a whole
  - are virtually instantaneous (i.e., their starting and end points are viewed as falling into a single moment of time), and therefore
  - lacking proper parts.
- Two main kinds of *P*'s of this type:
  - find, recognize, notice, ...
  - SEMELFACTIVES: *hit, flash, knock, kick, slap, tap, blink, flash, ...* Talmy (1985): 'full-cycle resettable' verbs, namely verbs which describe situations that end with the return to the initial state

#### Momentaneous events - Culminations (term: Bach 1986)



- (1) d. The train arrived at 9 p.m. [at some place p]
- Higginbotham (2009, Ch. "Accomplishments") "*arrive* as a predicate applying to (instantaneous) events of being at a place, which constitute the terminus or telos of events of journeying to that place."
- asserts that at all times before 9 p.m. (*t1* in the schema above) John had not arrived at some place *p*, and at all times at or after 9 p.m. John had arrived at some place *p*.

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- (3) a. (?) John ran at 9 p.m.
- odd, because strictly speaking it is not true that what we identify as running happens at a single indivisible moment of time. If we take the predicate *run*, and a moment of time within some interval *I* of running (between t0 and tn), then the predicate *run* will NOT hold for its argument at that moment. See:
  - the **MINIMAL PART PROBLEM** related to processes like *run, walk* (Taylor 1977, Mourelatos 1978/81, Bach 1981)
  - below 'weak homogeneity'
- okay, if the sentence is understood as meaning that John started running at 9 p.m. (inchoative interpretation)

## Test 1: Compatibility of NON-PROG(P) with time point ADVs

- (3) a. (?) John ran at 9 p.m.
  - b. (?) It rained at 9 p.m.

'(?)' means that the above sentences are acceptable if understood as 'John started to run at 9 p.m.' and 'It started to rain at 9 p.m.', i.e., if they are coerced into the inchoative interpretation

- FUNCTOR-ARGUMENT CLASH: [at\_9\_pm [run(John)]]
- COERCION: [at\_9\_pm [CINCHOATION [run(John)]]]

**C\_INCHOATION** coercion operator: a function from sets of processes (or states) eventualities onto sets of their onsets.

 Aspectual coercion: Moens (1987), Moens & Steedman (1988), Parsons (1991), Pulman (1997), Jackendoff (1996), de Swart (1998), Zucchi (1998); and also related work of Pustejovsky (1995) (see de Swart 2011 for an overview). **Protracted Events** (term: Bach 1981) (aka 'accomplishments', Vendler 1957)



(2) a.' # John built a/the house at 9 p.m.

- odd, because we cannot narrow down precisely the moment at which the change from a house not existing to its being in existence actually took place
- See Dowty's (1979, pp.139ff.) discussion of the truth conditions for [BECOME  $\phi$ ]
  - During the building of a house there is a period of time when it is no longer false that a house exists on the building site but when it is not yet true either.
  - Question: Is such a truth value gap a part of the truth conditions for sentences like (2a') (related to [BECOME Φ] in Dowty's decompositional analysis) or should it be interpreted as a felicity condition on assertions which follows from some Gricean conversational maxim? (Dowty 1979, p.141).
  - Dowty's tentative answer: "If we take this position [= the latter], then we do not have to appeal to a truth value gap to justify every sentence which asserts that a change of state took place over an interval longer than two moments. Rather, it may be that because of the limits of our knowledge we cannot narrow down precisely the interval at which the change actually took place (for it may be that it would be irrelevant to our interlocutors ot know this)."

- (2) a. # John composed a symphony at 9 p.m.
  - b. (#) John wrote an email at 9 p.m.
  - c. John ate a cookie at 9 p.m.
  - John ate the last stuffed olive in one gulp at 9 p.m.
     [imagine an eating competition where a certain amount of food must be consumed by at 9 p.m.]
- Dowty's observations related to the oddity of time point adverbials with predicates of protracted events (aka accomplishments) (see previous slide) make sense for sentences like *John built a house* and also for (2a), but not necessarily for the class of protracted events (aka accomplishments) as a whole.
- (2b) is acceptable if writing of an email is understood as culminating in the moment when the 'send' button is pressed.
- (2c) and (2d) allow for the modification with a time-point ADV. However, some speakers may prefer to use *swallow* instead of *eat* here (lexical preemption).
- (2d) is perfectly fine, since due to the additional lexical material *in one gulp* the events described by *eat* are understood as instantaneous HAPPENINGS (in the sense of Bach (1986) (an instance of an 'aspectual shift' in the sense of de Swart 1998, 2011).

#### Protracted Events (term: Bach 1981)

- (2) a. # John composed a symphony at 9 p.m.
  - b. (#) John wrote an email at 9 p.m.
  - c. John ate a cookie at 9 p.m.
  - John ate the last stuffed olive in one gulp at 9 p.m.
     [imagine an eating competition where a certain amount of food must be consumed by at 9 p.m.]

PRELIMINARY CONCLUSION: Predicates that describe protracted events are acceptable with time-point adverbials to the extent that they can shift their meaning to that of predicates of culminations or happenings ('culminations' and 'happenings' in the sense of Bach 1986).

# Test 2: Does *PROG(P)* most naturally refer to singular or plural eventualities?

- Key semantic property (B): P denotes events that as a whole are virtually
  instantaneous (i.e., their starting and end points are viewed as falling into a single
  moment of time), and therefore lack proper parts.
- Key grammatically relevant property: For all x, 'x was V-ing' strongly suggests 'x Ved repeatedly', whereby x is assigned to singular individuals.

(4)	a. b.	The light was flashing at 9 p.m. John was hitting a tree at 9 p.m.	momentaneous events	
	c. d. e.	John was winning at 9 p.m. The train was arriving at 9 p.m. John was dying at 9 p.m.	— ITERATION	
(5)	a. b.	John was composing a symphony a John was writing an email at 9 p.m	at 9 p.m. 1.	— ITERATION
(6)	a. b.	John was running at 9 p.m. It was raining at 9 p.m.		
<sup>1</sup> 'sl	ow m	otion camera', single event interpre	etation also possib	le.

- The iterative interpretation of *PROG(P)* confirms the split of the class of *Ps* denoting momentaneous events into two classes:
  - (i) Those naturally having it: happenings
  - (ii) Those lacking it: culminations

NON-PROG(P)	PROG(P)
with time-point ADV	singular e

momentaneous	HAPPENINGS: <i>flash, hit, blink</i>	$\checkmark$	—
events	CULMINATIONS: win, arrive, die	$\checkmark$	$\checkmark$
	PROTRACTED EVENTS: compose a symphony	#	$\checkmark$
	PROCESSES: run, rain	(?)	$\checkmark$

# The semantics of PROG(P)

The main function of *PROG* is to distinguish a particular time (a moment or a time interval)—i.e., reference time (Reichenbach 1947) or topic time (Klein (1994)—within a larger interval in which the corresponding *NON-PROG(P)* would be true.
 See also suggestions in Bennett & Partee 1972; Taylor 1977, p.206 couched in the INTERVAL SEMANTICS theory.



• *PROG* is a function from sets of eventualities in the denotation of *P* to sets of eventualities that are their proper parts.

See also suggestions in Krifka 1992; Filip 1993/1999 couched in the MEREOLOGICAL THEORY.

UPSHOT: The *PROG* operator requires that the non-progressive predicate *P* in its scope denotes a set of eventualities that have a temporal extent and hence proper parts (mereologically speaking).

# Test 2: Interpretation of PROG(P)

*Ps* that denote events with no proper parts clash with the input requirement of *PROG:* namely, HAPPENINGS (a subclass of MOMENTANEOUS EVENTS), which have the SEMANTIC PROPERTY (B) (see above)

- FUNCTOR-ARGUMENT CLASH: [PROG [hit (John, a\_tree)]]
- COERCION:
  - [PROG [CPLURAL [hit (John, a\_tree)]]]

CPLURAL coercion operator: a function from sets of singular eventualities onto sets of plural eventualities.

- 'slow motion camera' coercion into a single extended event interpretation
- Aspectual coercion: Moens (1987), Moens and Steedman (1988), Parsons (1991), Pulman (1997), Jackendoff (1996), de Swart (1998), Zucchi (1998); and also related work of Pustejovsky (1995) (see de Swart 2011 for an overview).

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TESTS	NON-PROG(P) with time-point ADV	PROG(P) singular <i>e</i>
HAPPENINGS	$\checkmark$	(?)
CULMINATIONS	$\checkmark$	$\checkmark$
PROTRACTED EVENTS	#	$\checkmark$
PROCESSES	(?)	$\checkmark$

#### • SEMANTIC PROPERTY of **P**

- Semantic property (A) 'P entails a momentaneous change of state' correlates with NON-PROG(P) being compatible with time-point ADVs.
- Semantic property (B) 'P denotes events with no proper parts' correlates with PROG(P) straightforwardly referring to iterated events (indicated by '(?)').

## Test 3: Entailments of PROG(P)

- Key semantic property (C): *P* is **at least weakly homogeneous**, i.e., *P* denotes ٠ eventualities that have at least some proper parts describable by P.
- Key grammatically relevant property: at least weakly homogeneous Ps often sanction ٠ the conclusion of *P* from *PROG(P)*, but non-homogeneous *Ps* never do (based on Kenny 1963).
- The light was flashing. (4) a.
  - b. John was hitting a tree.
  - John was winning. C.
  - The train was arriving. e.
  - John was dying. d.
- John was composing a symphony. (5) a.
  - John was writing an email. b.
- (6) John was running. a.
  - It was raining. b.

See related observations in Vendler (1957); and the 'subinterval' property of Bennett and Partee (1972). 20

 $PROG(P) \rightarrow P$  (provided iterative interpretation by coercion)

 $PROG(P) \rightarrow P$ 

 $PROG(P) \rightarrow P$ 

• Vendler's (1957) entailment: "[i]f it is true that someone has been running for half an hour, then it must be true that he has been running for every period within that half-hour" (Vendler 1957, pp. 145-6).



- Caveat:
  - This only holds true for every 'sufficiently large' period within that half-hour
  - see the minimal part problem related to processes like *run, walk* (Taylor 1977, Mourelatos 1978/81, Bach 1981).
- Therefore, verbs like *run* (Vendler's activities, Bach's processes) are **WEAKLY HOMOGENEOUS.**

 $PROG(P) \to P$ 



- *PROG* is a function from sets of eventualities in the denotation of *P* to sets of eventualities that are their proper parts. (See above.)
- If John was running is true at 9 p.m., then John had already run is also true at all the relevant (and sufficiently large) intervals before 9 p.m.

- Predicates like *compose a symphony* or *run a mile* (Vendler's accomplishments, Bach's protracted events) are **NON-HOMOGENEOUS** in the following sense:
- Entailment: "if it is true that a runner has run a mile in four minutes, it cannot be true that he has run a mile in any period which is a real part of that time" (Vendler 1957, p.146).



• Predicates like *run a mile* "proceed toward a terminus which is logically necessary to their being what they are. Somehow this climax casts its shadow backward, giving a new color to all that went before" (Vendler, p.146).

 $PROG(P) \longrightarrow P$ 



- *PROG* is a function from sets of eventualities in the denotation of *P* to sets of eventualities that are their proper parts. (See above.)
- The relevant proper parts necessarily exclude the reference to an inherent culmination (Vendler's "terminus") of a non-homogeneous *P*.
- Therefore, *John was running a mile* at 9 p.m. does not entail *John had (already) run a mile* at 9 p.m., nor *John ran a mile*, etc.

• *PROG(P)* −/→ *P* 

IMPERFECTIVE PARADOX (Dowty 1977) or PARTITIVE PUZZLE (Bach 1986):

PROG(P) is true at t,
P is false at t and may never be true.

I.e., a progressive sentence with a base non-homogeneous *P* is true at a given time even if the corresponding non-progressive sentence is false and never can be true.

#### **Test summary** (terminology: Bach 1981, 1986)

Tests	NON-PROG(P) with time-point ADV	PROG(P) singular <i>e</i>	PROG(P)→P
HAPPENINGS: <i>flash, hit</i>	$\checkmark$	$\checkmark$	(?)
CULMINATIONS: win, arrive, die	$\checkmark$	_	_
PROTRACTED EVENTS: compose a sympho	ony –	_	_
PROCESSES: run, rain	-	_	$\checkmark$

- The lack of  $PROG(P) \rightarrow P$  entailment
  - splits PROTRACTED EVENTS from PROCESSES
  - groups together CULMINATIONS with PROTRACTED EVENTS

•	Terminology:		
	Bach 1986	Ver	dler 1957
	PROTRACTED EVENTS	~	ACCOMPLISHMENTS
	PROCESSES	≈	ACTIVITIES

(examples next 2 slides)

- **PROG(P)** −/→ **P** ('imperfective paradox')
   where P = protracted event (accomplishment)
- (5) a. [Last night John did what he loved doing best, namely working on his music.] He was composing a symphony at 9 p.m. when the earthquake hit and gave him such a shock that he suffered a heart attack and died.
  - b. John was writing an email at 9 p.m. when his laptop crashed.Since he had not saved it, all of it was lost, and he never finished writing it.

- **PROG(P)** −/→ **P** ('imperfective paradox')
   where P = culmination (a subtype of achievement)
- (4) c. John was winning,
  - ... at 9 p.m. but just couldn't finish on top.
  - ... at 9 p.m. but then he hit a rock with his bike and fell.
- (4) e. The train was arriving at the station.
  - no iterative interpretation with a singular Theme argument
  - can be continued without a contradiction with ... when it split in two for an unknown reason and crashed.
  - does not entail
    - (i) The train had already arrived at the station.
    - (ii) The train arrived at the station.

#### Test 4: Compatibility with FOR x time

- Key semantic property (C): *P* is weakly homogeneous.
- Key grammatically relevant property:
  - For all weakly homogeneous Ps, 'FOR x time (P)' entails 'P is true of entities at all sufficiently large subintervals of x time' (3a,b)
  - for all non-homogeneous Ps, 'FOR x time (P)' sounds odd (2a,b) or gets a special reinterpretation: iterative (1a), resultant state (1b).
- (1) a. The light flashed for an hour.
   b. John arrived (?) for an hour
   ... for a whole weekend of sun and fun.
   iterative interpretation
   *FOR x time* measures
   the result state
- (2) a. ? John composed a symphony for an hour.
  - b. ? John wrote an email for an hour.
- (3) a. John ran for an hour. weakly homogeneous
  - b. It rained for an hour.

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#### Summary (so far): Correlations of tests with semantic properties

TESTS	NON-PROG(P) with time-point ADV	PROG(P) singular <i>e</i>	(i) PROG(P)→P (ii) FOR <i>x</i> time
HAPPENINGS CULMINATIONS	$\sqrt[]{}$	(?) √	(?)
PROTRACTED EVENTS	#	$\checkmark$	_
PROCESSES	(?)	$\checkmark$	$\checkmark$

#### • SEMANTIC PROPERTY of P

- Semantic property (A) 'P entails a momentaneous change of state' (and therefore 'P is true at a particular moment of time t') correlates with NON-PROG(P) being compatible with time-point ADVs.
- Semantic property (B) 'P denotes events with no proper parts' correlates with PROG(P) straightforwardly referring to iterated events.
- Semantic property (C): 'P is **weakly homogeneous**' correlates with  $PROG(P) \rightarrow P$  and compatibility with FOR x time.

#### Aspectual classes (so far, based on Bach 1986):



•	Bach's (1986) examples:		
	processes:	walk, push a cart, be mean (Agentive)	
	events protracted:	build x, walk to Boston	
	culminations:	die, reach the top	
	happenings:	recognize, notice, flash once	

#### Aspectual classes (so far, based on Bach 1986):



Terminology

Bach 1986	Vend	ller 1957, Dowty 1979	Gare	y 1957
PROCESSES	≈	ACTIVITIES	≈	ATELIC
PROTRACTED EVENTS	≈	ACCOMPLISHMENTS	≈	TELIC
MOMENTANEOUS EVENTS	≈	ACHIEVEMENTS	≈	TELIC

#### Aspectual classes (so far, based on Bach 1986):



- HAPPENINGS: recognize, notice, flash once
  - subsume SEMELFACTIVES : flash, hit, blink, wink, ...
  - The telicity status of SEMELFACTIVES is controversial (see Filip 2011 for summary, also e.g., Smith 1991/97, Levin and Rappaport Hovav 1995)

#### What about states?

- (1) a. John was intelligent.
  - b. #John was intelligent at 9 p.m.
  - c. #John was being intelligent at 9 p.m.
- Observation: *John was intelligent* implies that **at any moment** during some large period of his existence (and possibly all of his existence) John was intelligent (see e.g., Vendler 1957).



- *intelligent*: INDIVIDUAL-LEVEL STATE (Carlson 1977) Other examples of IL-predicates: *have long arms, know physics, love*
- **Individual-level** state *Ps* are (**strongly**) **homogeneous** in so far as they denote states that have ALL of their proper parts (down to the smallest parts) and ALL of their relevant superparts describable by the same predicate *P*. (See Rothstein for a similar use of the property 'strongly homogeneous' with respect to state *P*s.)

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#### Tests 1 and 2: Compatibility with time-point ADV and PROG

- (1) a. John was intelligent.
  - b. #John was intelligent at 9 p.m.
  - c. #John was being intelligent at 9 p.m.
- Key semantic property (D): *P* is **strongly homogeneous**, i.e., true **at any moment** of an interval at which *P* holds.
- Key grammatically relevant property:
  - *P* is odd when modified with time-point ADVs (1b)
  - *P* is odd (1c) or coerced into an episodic interpretation when used in the progressive.
- Virtually all individual-level state *Ps* are acceptable with *PROG* if they can be coerced into an episodic interpretation, as we see in (2b) (see e.g., Bach 1981)
- (2) a. (?) John was being intelligent.
  - b. At least it was funny when John thought he was being intelligent [ = was behaving in an intelligent way] when really he was showing the world what a complete moron he was.

## Semantic property 'true at any moment t' (strong homogeneity)

(1) b. #John was intelligent at 9 p.m.



Pragmatic motivation for the oddity of (1b) following a Gricean principle of economy:
 Given that John was intelligent is true **at any moment** during some large period of his existence, the time-point ADV at 9 p.m. contributes a meaning component that is not informative.

# Semantic property 'true at any moment t' (strong homogeneity)

(1) c. #John was being intelligent at 9 p.m. (when he thought that ...)



- Taylor's (1977, p.206) pragmatic motivation for the oddity of (1c):
  - The main function of PROG(P) is to distinguish a particular time which is not a time of application of P -- within a larger interval in which P would be true.
  - Consequently, this distinction is irrelevant for sentences that contain state predicates like *be intelligent*, because they hold for their arguments at *any single* moment within larger intervals at which they are true.

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#### Test 4: Compatibility with FOR x time

- Key semantic property (D): *P* is strongly homogeneous.
- Key grammatically relevant property: For all individual-level state *Ps*, 'FOR *x time (P)*'
  - is felicitous if *x time* denotes a sufficiently large interval;
  - entails 'P is true of entities at all moments of the interval specified by x time.'
- (3) a. ?For three years, Mary knew physics. Bach 1981, p.74
  - b. John loved Mary for the first five years of their marriage.

If (3b) is true, then it must be true that John loved Mary at any moment during the interval of five years.

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TESTS	NON-PROG(P) with time-point ADV	PROG(P) singular <i>e</i>	(i) PROG(P)→P (ii) FOR <i>x</i> time
HAPPENINGS	$\checkmark$	(?)	(?)
CULMINATIONS	$\checkmark$	$\checkmark$	_
PROTRACTED EVENTS	#	$\checkmark$	_
PROCESSES	(?)	$\checkmark$	$\checkmark$
STATES	#	(?)	(?)

#### Summary (so far): Correlations of tests with semantic properties

#### • SEMANTIC PROPERTY of P

- Semantic property (A) 'P entails a momentaneous change of state' (and therefore 'P is true at a particular moment of time t') correlates with NON-PROG(P) being compatible with time-point ADVs.
- Semantic property (B) 'P denotes events with no proper parts' correlates with PROG(P) straightforwardly referring to iterated events.
- Semantic property (C) 'P is **weakly homogeneous**' correlates with  $PROG(P) \rightarrow P$  and compatibility with FOR x time.
- Semantic property (D): '*P* is **strongly homogeneous**' correlates with *P* being incompatible with time-point *ADV*s and odd as an argument of *PROG*, unless it is coerced into an episodic interpretation.

#### Aspectual classes (based on Bach 1986):



STATES:	(be) intelligent, resemble x, own x, love x
PROCESSES:	walk, push a cart, be mean (Agentive)
EVENTS	protracted: build x, walk to Boston
	culminations: die, reach the top
	happenings: flash once, recognize, notice

END

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