

# Telicity, teleological modality, and (non-)culmination

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## 1 Telicity and culmination

**Telicity** characterizes predicates of eventualities that are associated with an endpoint:

- *excludes*: states (*be tall, know*) and activities (*sleep, push a cart*)
- *includes*: achievements
  - culminations (Bach 1986): preparatory phase leading to instantaneous change and result state (*die, reach the top, arrive*)
  - instantaneous changes (*recognize, notice*) (Bach’s ‘happenings’)
- includes: **accomplishments** (*eat a cookie, run a marathon*)
  - eventualities whose progress over time can be measured by changes in/related to the referent of a ((Strictly) Incremental) Theme argument
  - relevant endpoints: coming into existence/destruction of an object, arrival at a limit/goal

The relationship between **telic predicates** and their endpoints is often realized by means of a **culmination entailment**, as in the English simple past:

- (1) a. Kim built a house. → *A complete house came into being*  
 b. Des ran a marathon. → *She covered the full race path/distance*

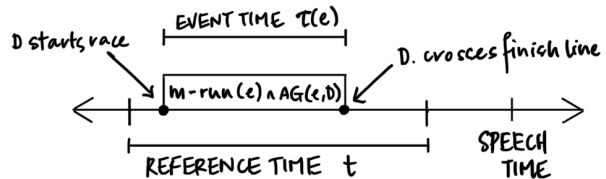
**Culmination entailments** are straightforward on a theory of aspect/aspectual class where:

- (i) a **bare (uninflected) telic predicate**  $P$  denotes only culminated eventualities (e.g., Dowty 1979, Landman 1992)
- (ii) English simple past has the semantics of **perfective aspect** (e.g., Landman, i.a.)
- (iii) **perfective aspect** contributes an ‘included’ relation (Klein 1994), bounding event time within the reference time provided by tense.

**A common way of analyzing (1b):**

- (2)  $[[\text{PFV}]] := \lambda w \lambda t \lambda P. \exists e [\tau(e) \subseteq t \wedge P(e)(w)]$   
 (Bhatt & Pancheva 2005)

(1b)  $\equiv \text{PST}(\text{PFV}(\text{Des run a marathon}))$



## 2 The imperfective paradox

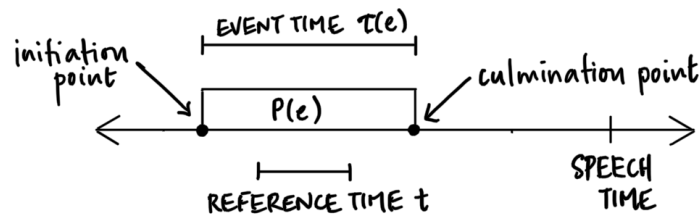
The assumption that telic predicates denote only culminated eventualities leads to the well-known **imperfective paradox**: (Dowty 1979)

- **progressives** of accomplishment predicates **lack culmination entailments** in the actual (evaluation) world
  - (3) *Context*: Mahler died while writing his tenth symphony.
    - a. **Progressive**: Mahler was writing a tenth symphony. ✓  
 ↗ *A complete tenth symphony came into being*
    - b. **Perfective**: Mahler wrote a tenth symphony. ✗
- given the facts, (3a) is true, but the corresponding perfective (3b) is false

**The paradox:**

(also **partitive puzzle**; Bach 1986)

- the sense that a  $P$ -eventuality is ongoing is captured by an ‘including’ PROG
  - (4)  $[[\text{PROG}]] := \lambda w \lambda t \lambda P. \exists e [\tau(e) \supseteq t \wedge P(e)(w)]$
- but this **mandates a real-world, culminated  $P$ -eventuality**, contra (3a)



**Two approaches to the paradox:**

- (I) **Extensional** PROG (e.g., Parsons 1990)
  - uninflected telic predicates denote both culminated and non-culminated eventualities
  - PROG instantiates a non-culminated eventuality
- (II) **Intensional** PROG: (Dowty 1979, Landman 1992, Bonomi 1997, Portner 1998, a.o.)
  - uninflected telic predicates exclusively denote culminated eventualities
  - PROG only instantiates the onset of a  $P$ -eventuality in the evaluation world
  - culmination (with respect to an inherent endpoint/limit/goal) occurs in a modal alternative to the evaluation world
  - **challenge**: identifying the appropriate modal relationship between culmination world(s) and the evaluation world (not uncontroversially captured by notions of ‘normality’, ‘inertia’, ‘reasonable’ continuations, etc)

**The problem of indirect access** complicates the choice between (I) and (II): since we have access only to intuitions about telic predicates under aspectual marking, there is no obvious way of investigating the denotation of uninflected predicates (Zucchi 1999)

### 3 A new approach to telicity

#### Main idea:

While imperfective paradox (and non-culmination) effects *are* intensional in nature, intensionality is not introduced by PROG, but instead embedded in the denotation of telic predicates themselves.

#### An intensional view of telicity:

- an uninflected telic predicate  $P$  denotes both culminated and non-culminated eventualities (cf. Parsons 1990)
- eventualities in  $\llbracket P \rrbracket$  involve an inherent limit, often an upper-bound, i.e., a **télos** (broadly construed, including upper bounds of predicates of non-intentional eventualities)
- eventualities in  $\llbracket P \rrbracket$  are **parts of teleologically-optimal worlds**

#### Enriching the mereological structure of telic predicates this way:

- allows us to capture important intuitions from intensional-PROG accounts
- obviates the imperfective paradox, while enabling a unified **extensional treatment of grammatical aspects**
- ... which can be extended to **non-culminating perfectives** in, e.g., Hindi (Singh 1991, 1998), and Slavic languages (Filip 1992, 2000)

#### 3.1 Teleological modality and culminations

*“[Accomplishments] 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 (1957; p.146)

#### Culmination conditions (CCs):

- eventualities in the denotation of an accomplishment predicate  $P$  are unified by a **culmination condition**, not by a culmination entailment
- a CC specifies where/how a  $P$ -eventuality necessarily ends; i.e., “what has to be the case if the events in question culminate” (Kratzer 2004)
- **central point**: a CC structures the denotation of a telic predicate  $P$  in a way akin to that in which a (relevant) goal structures a set of **teleological alternatives**

#### Teleological alternatives in causal terms:

- (5) Given a goal  $G$ , conversational backgrounds  $f, g$ , and an evaluation world  $w$ , the set of teleological alternatives in  $w$  is given by: (cf. von Stechow & Iatridou 2005)

$$\{w' : \text{Best}_{g(w)}((\cap f(w)) \cap G)\}$$

- modal base  $f$  is **circumstantial**, picking out propositions which describe goal-relevant circumstances at a particular point in time
- ordering source  $g$  is **stereotypical**, picking out a set of **causal laws** describing relationships between (relevant) propositions in a **causal model** (cf. Kaufmann 2013)

### 3.2 Proposal: telicity and teleological alternatives

For a telic predicate  $P$  with culmination condition  $K$ ,  $\llbracket P \rrbracket$  contains eventualities  $e$  which are **nested temporal slices** of teleological alternatives for  $K$

Given a context-dependent causal model  $D$  encoding causal relationships between propositions (Pearl 2000) and a context  $c$ :

- let  $s \subseteq c$  be a (starting) situation such that:
  - (a)  $s$  does not exhaust its own causal consequences ( $s$  is *open* with respect to  $D$ )
  - (b)  $s$  contains  $K$ -relevant propositions specifying the circumstances of participants, their semantic roles (cf. Krifka 1989), intentions, capacities, momentum, ...
- $e \in \llbracket P \rrbracket^c$  if  $e$  is a **continuous causal development** of  $s$  in a teleological alternative for  $K$ :  $s$  provides the modal base and  $D$  the ordering source (cf. Kaufmann)
- teleological alternatives are those causally-optimal worlds, given  $s$ , which (eventually) verify  $K$  (at a time  $t_f$ , where starting time  $t_0 \preceq t_f$ )
- $P$ -eventualities minimally verify  $s$  at  $t_0$  (starting time)
- larger  $P$ -eventualities run from  $s$  at  $t_0$  to  $s' \supset s$  at  $t' \prec t_f$ , tracking normal causal developments of  $s$  towards  $K$
- maximal  $P$ -eventualities run from  $s$  at  $t_0$  and end at  $t_f$ , verifying  $K$
- $e_1, e_2 \in \llbracket P \rrbracket^c$ ,  $e_1 \sqsubseteq e_2$  iff  $e_2$  is an uninterrupted causal continuation of  $e_1$  and  $\exists e_3 \in \llbracket P \rrbracket^c$  such that  $e_1, e_2 \sqsubseteq e_3$ , and  $e_3$  verifies  $K$  (at  $t_f$ )

### 3.3 Immediate consequences

**No ‘paradox’ effects are predicted:**

- since a telic predicate  $P$  denotes non-culminated as well as culminated eventualities, an extensional PROG like (4) no longer forces a culmination entailment; PROG can instantiate a non-culminated  $P$ -eventuality

**We capture important insights from the original intensional approaches:**

- the denotation of a telic predicate  $P$  is sensitive to the utterance context
- since only the causal consequences of a starting situation  $s$  are considered;  $P$ -eventualities are *inertial*, in a causal sense, with respect to  $s$  (cf. Dowty, Landman)
- whether a culmination condition is possible at all (e.g., a ‘reasonable option’; Landman) depends on the participants’ circumstances, dispositions, intentions, abilities, etc
- these circumstances also dictate how  $s$  can develop towards the CC
- whether  $e$  counts as a  $P$ -eventuality (belongs to a teleological alternative for the CC) also depends on the speaker’s epistemic **perspective**:
  - what a speaker knows/takes into consideration affects both the causal model  $D$  and what is included in  $s$  (e.g., knowledge of a potential obstacle that might be ‘invisible’ from the perspective of an eventuality-internal agent) (Asher 1992, Landman)
  - ... in turn affecting what is considered ‘normal’ with respect to causal developments

**NB:** A conceptually similar modal view of the structure of uninflected accomplishments has been suggested for Thai (Koenig & Muansewan 2000)

## 4 Non-culminating accomplishments

Many languages allow **non-culminating interpretations** for perfective accomplishments:

(see, e.g., Smith 1991, Filip 1992, 2005, Tatevosov & Ivanov 2009, Martin t.a.)

- observed in Mandarin Chinese (Zhang 2018), Thai (Koenig & Muansewan 2000), Salish languages (Bar-el, Bar-el et al 2005), Karachay-Balkar (Tatevosov 2008), and others
- Hindi **simple perfective**: weak **PFV<sub>1</sub>**, **no culmination entailment**  
(Singh 1991, 1998; Arunachalam & Kothari 2011)

- (6) *maayaa-ne biskuT-ko khaa-yaa par use puuraa nahiin khaa-yaa*  
 Maya-ERG cookie-ACC eat-PFV<sub>1</sub>, but it.ACC finish not eat-PFV<sub>1</sub>  
 ‘Maya ate the cookie, but did not finish it.’

- **weak perfectives** have **cessation inferences** (unlike progressives): (Altshuler 2014)

- (7) *maayaa-ne biskuT-ko khaa-yaa, #aur use ab-tak khaa rahii hai.*  
 Maya-ERG cookie-ACC eat-PFV<sub>1</sub>, #and it.ACC now-until eat PROG PRES  
 ‘Maya ate the cookie, #and she is still eating it.’

### 4.1 Cessation as local maximality

Given our enriched predicate denotations, **cessation** can be captured by adding a **local maximality requirement** to an ‘included’ perfective:

(see also Koenig & Muansewan 2000, Filip & Rothstein 2005, Altshuler 2014 on MAX)

- (8) a.  $\llbracket \text{PFV}_1 \rrbracket := \lambda w \lambda t \lambda P . \exists e [\tau(e) \subseteq t \wedge e \in w \wedge \text{MAX}(w, e, P)]$   
 b.  $\text{MAX}(w, e, P) = 1$  iff  $P(e) \wedge \forall e' \in w [(P(e') \wedge e \sqsubseteq e') \rightarrow e' = e]$

- **PFV<sub>1</sub>** instantiates either a culminated or non-culminated *P*-eventuality
- **MAX** requires that the instantiated eventuality is the **maximal evaluation world development** towards *P*’s CC at reference time
- the requirement is trivially satisfied by a culminated *P*-eventuality
- where **PFV<sub>1</sub>** instantiates a non-culminated *P*-eventuality, we get **cessation without culmination**, as with Hindi **simple perfective** in (6)

### 4.2 Culmination as absolute maximality

**Strong, culminating perfectives** (e.g., English simple past, French *passé composé*) are captured by replacing **MAX** with an **absolute maximality requirement**:

- (9) a.  $\llbracket \text{PFV}_2 \rrbracket := \lambda w \lambda t \lambda P . \exists e [\tau(e) \subseteq t \wedge e \in w \wedge \text{MAX}_{\text{abs}}(e, P)]$   
 b.  $\text{MAX}_{\text{abs}}(e, P) = 1$  iff  $P(e) \wedge \forall e' [(P(e') \wedge e \sqsubseteq e') \rightarrow e' = e]$

- $\text{MAX}_{\text{abs}}(e, P)$  holds iff *e* represents a **maximal possible development** towards *P*’s CC; i.e., iff *e* realizes the CC
- **result**: strong perfectives necessarily instantiate culminated *P*-eventualities, producing **culmination entailments**, as with Hindi **compound perfective** in (9)

- (9) *maayaa-ne biskuT-ko khaa liyaa, #par use puuraa nahiin khaa-yaa.*  
 Maya-ERG cookie-ACC eat PFV<sub>2</sub>, but it.ACC whole not eat-PFV<sub>1</sub>

‘Maya ate the cookie, #but did not finish it.’ (Arunachalam & Kothari)

## 5 Summary and outlook

We revise the notion of **telicity to be inherently modal**:

- key insights about *inertia*, *stages* ( $\sim$  causal developments), and *perspectives* from intensional accounts of PROG are incorporated by enriching the denotation of accomplishment predicates with teleological modal structure
- complicating the denotation of telic predicates is compensated by:
  - (a) an uniform extensional treatment of grammatical aspects (PROG, PFV<sub>1</sub>, PFV<sub>2</sub>)
  - (b) a treatment of accomplishments applicable across languages  
(cf. Koenig & Muansewan on inherently modalized Thai accomplishments, Copley & Harley 2014 on *efficacy* presumptions)

**Future research directions:**

- the **typological landscape** afforded by the combination of included/including relations and (non-)maximality requirements: the potential range of aspectual operators, within-language pragmatic effects (see also Gyarmathy & Altshuler, t.a.)
- unifying culmination entailments and **actuality entailments (AEs)**

### Looking ahead: Actuality entailments as culmination entailments

Perfectively-marked ability modals **entail the realization of their complements**

(Bhatt 1999)

- (10) *Marja a pu traverser le lac à la nage, #mais elle ne l'a pas traversé.*  
'Marja could-PFV swim across the lake, #but she did not cross it.' French

- AEs affect **teleological modals**, of which ability modals are a special subclass (see also Mari 2016)
- **claim:** teleological modals can be analyzed as **hypothetical accomplishments**
  - they combine the properties of **stativity** and **telicity**
  - a potential action *H* initiates a process leading to realization of a goal
  - the goal is represented by the preajcent in ability modals (Belnap 1991, Nadathur 2019, a.o.), else by a purpose clause
- under composition with PFV, stativity is neutralized: **aspectual coercion** (de Swart 1998, a.o.) forces instantiation of *H* (Nadathur 2019 on ability)
- **AEs** result from instantiating *H*, as strong PFV<sub>2</sub> **culmination entailments**
- **prediction:** where weak PFV<sub>1</sub> composes with teleological modals, we **predict ambiguity between actuality and counterfactuality** (i.e., cessation without culmination)
- an **actuality/counterfactuality ambiguity is attested** in a number of languages: Spanish (Borgonovo & Cummins 2008, Vallejo 2017), Brazilian Portuguese (Alxatib 2016), Albanian, and more (see also Hacquard 2009)

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