

(Non-)culmination inferences and teleological modality in telic predicates

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Telicity and culmination

Telicity characterizes predicates of eventualities that are associated with an inherent or natural 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 change (*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 referent of ((Strictly) Incremental) Theme arg
 - ▶ relevant endpoints: coming into existence/destruction of an entire object, reaching of limit/goal

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

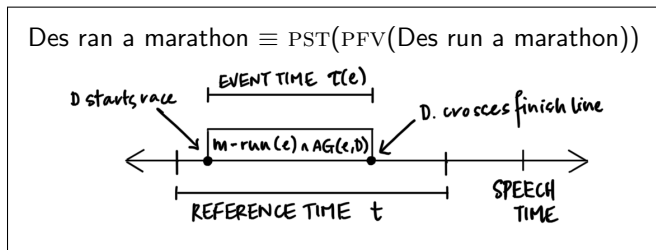
- (1) a. Kim built a house. → *A complete house came into being*
b. Des ran a marathon.
→ *She traversed the full race path/distance*

Culmination entailments

Culmination entailments are straightforwardly explained on a theory of aspect and aspectual class in which:

- (i) the **denotation of a bare (uninflected) telic predicate P** contains only culminated eventualities (e.g., Dowty 1979, Landman 1992)
- (ii) the English simple past, as in (1)a-b, is taken to have the semantics of **PF** aspect (e.g., Landman, i.a.)
- (iii) **PF** aspect contributes an 'included' relation (Klein 1994), bounding event time within the reference time provided by tense. A common way of analyzing (1b) is as follows:

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



The imperfective paradox

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

- ▶ **progressives** of accomplishments **lack culmination entailments**

(3) *Context*: Mahler died while writing his tenth symphony

- Progressive**: Mahler was writing a tenth symphony. ✓
↯ A complete tenth symphony came into being
- Perfective**: Mahler wrote a tenth symphony. ✗

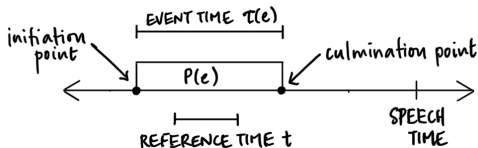
- ▶ (3a) is true, given the facts; the corresponding perfective (3b) is false

The paradox:

- ▶ the 'ongoing' sense is captured by an 'including' semantics for PROG

$$(4) \llbracket \text{PROG} \rrbracket := \lambda w \lambda t \lambda P. \exists e [\tau(e) \supseteq t \wedge P(e)(w)]$$

- ▶ but this **mandates a real-world, culminated P-eventuality**



(also **partitive puzzle**;

Bach 1986) 

The imperfective paradox: two approaches

(I) **Telic (uninflected) predicates denote culminated & non-culminated eventualities** (e.g., Parsons 1990)

- ▶ PROG can instantiate an non-culminated eventuality
- ▶ typically an **extensional approach** to the analysis of PROG

(II) **PROG is an intensional (modal) operator**
(Dowty 1979, Landman 1992, Bonomi 1997, Portner 1998, a.o.)

- ▶ telic (uninflected) predicates denote only culminated eventualities
- ▶ only the initial portion of a *P*-eventuality need be instantiated in the evaluation world; culmination wrt an inherent limit/goal is a part of a **modal alternative**
- ▶ **challenge:** the modal relationship between culmination world(s) and the evaluation world (not uncontroversially captured by notions of 'normality', 'inertia', 'reasonable' continuations, etc)

The choice between (I) and (II) is not obvious, since we have access only to intuitions about inflected predicates (**problem of indirect access**; Zucchi 1999)

A new approach

Idea: while imperfective paradox (non-culmination) effects *do* have an intensional explanation, intensionality is not located in PROG, but is instead embedded in the denotation of telic (uninflected) predicates

An intensional view of telicity:

- ▶ telic (uninflected) *P*s denote both culminated and non-culminated eventualities (see e.g., Parsons 1990)
- ▶ eventualities in $\llbracket P \rrbracket$ involve an inherent limit, often an upper-bound, i.e., **télos** here taken in the widest sense 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:

- ▶ captures important intuitions of intensional-PROG accounts
- ▶ obviates the imperfective paradox while offering an **extensional account of grammatical aspects**
- ▶ ... which can be extended to **non-culminating perfectives** in, e.g., Hindi (Singh 1991, 1998), and Slavic languages (Filip 1992, 2000)

Telicity and intensionality

"[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)

Complete and incomplete accomplishment eventualities are unified by a **culmination condition (CC)**, **not** a culmination entailment

- ▶ CC specifies the limit at which a P -eventuality necessarily ends; i.e., "what has to be the case if the events in question culminate"

(Kratzer 2004)

Proposal: CC structures the denotation of a telic predicate P in a way akin to that in which a goal structures a set of **teleological alternatives**:

- (5) Given a goal G , modal base f , ordering source g , and evaluation world w , the set of teleological alternatives in w is given by:
- $$\{w' : \text{Best}_{g(w)}((\cap f(w)) \cap G)\} \quad (\text{cf. von Stechow \& Jäger 2005})$$

- ▶ f is **circumstantial**, picking out propositions which describe goal-relevant circumstances at a particular point in time
- ▶ g is **stereotypical**, picking out a set of **causal laws** describing relationships between (relevant) propositions in a **causal model**

Telicity and intensionality

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

Given a context-dependent causal model D encoding causal relationships between propositions (Pearl 2000, Kaufmann 2013) and a context k :

- ▶ $e \in \llbracket P \rrbracket^k$ if e is a **continuous causal development** of a particular starting situation $s \subseteq k$ in a teleological alternative for CC ; s does not exhaust its causal consequences, given D
- ▶ s provides the modal base, containing (CC -)relevant propositions specifying participants' circumstances, semantic roles (cf. Krifka 1989), intentions, capacities, momentum, ...
- ▶ teleological alternatives are those causally-optimal worlds, given s which (eventually) verify CC at a time t_f
- ▶ the smallest P -eventuality contains s at a starting time t_0
- ▶ 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 CC
- ▶ maximal P -eventualities run from s at t_0 end at t_f , verifying CC
- ▶ $e_1, e_2 \in \llbracket P \rrbracket^k$, $e_1 \sqsubseteq e_2$ iff e_2 is an uninterrupted causal continuation of e_1 and $\exists e_3 \in \llbracket P \rrbracket^k$ such that $e_1, e_2 \sqsubseteq e_3$, and e_3 verifies CC (at t_f)

Telicity and intensionality

No imperfective ‘paradox’ with extensional PROG: telic P denotes both culminated and (related) non-culminated eventualities

$$(4) \quad \llbracket \text{PROG} \rrbracket := \lambda w \lambda t \lambda P . \exists e [\tau(e) \supseteq t \wedge e \in w \wedge P(e)]$$

We capture important insights from the intensional approaches:

- ▶ the denotation of a telic predicate P is sensitive to the utterance context
- ▶ only the causal consequences of s are considered; P -eventualities are thus *inertial* with respect to s (cf. Dowty, Landman)
- ▶ whether CC is possible at all (a ‘reasonable option’; Landman) depends on the participants’ circumstances, dispositions, intentions, abilities, etc
- ▶ these circumstances also govern the way in which s can develop towards CC
- ▶ whether e counts as a P -eventuality (belongs to a teleological alternative for 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 a starting situation (e.g., knowledge of a roadblock/obstacle that might be ‘invisible’ from the perspective of an eventuality-internal agent) (Asher 1992, Landman)
 - ▶ ... in turn affecting what is considered ‘normal’ or ‘expected’ with respect to causal developments

(A conceptually similar modal view of the structure of uninflected accomplishments has been suggested for Thai; Koening & Muangsewan 2000)

Non-culminating accomplishments

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

(see also 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 PFV₁, **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-PFV₁, but it.ACC finish not eat-PFV₁
'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
Maya-ERG cookie-ACC eat-PFV₁, #and it.ACC now-until eat PROG
hai.
PRES
'Maya ate the cookie, #and she is still eating it.'

Cessation as local maximality

Given our enriched predicate denotations, **cessation** can be captured by adding a **local maximality requirement** to an ‘included’ perfective:
(also Koenig & Muansewan 2000, Filip & Rothstein 2005, Altshuler 2014 on **MAX**)

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

- ▶ **PFV₁** 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 **PFV₁** instantiates a non-culminated *P*-eventuality, we get **cessation without culmination**, as with Hindi **simple perfective** in (6)

- (6) maayaa-ne biskuT-ko khaa-**yaa** par use puuraa nahiin khaa-**yaa**
Maya-ERG cookie-ACC eat-**PFV₁**, but it.ACC finish not eat-**PFV₁**
'Maya ate the cookie, but did not finish it.'

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**:

- (7) a. $[[PFV_2]] := \lambda w \lambda t \lambda P. \exists e [\tau(e) \subseteq t \wedge e \in w \wedge MAX_{abs}(e, P)]$
b. $MAX_{abs}(e, P) = 1$ iff $P(e) \wedge \forall e' [(P(e') \wedge e \sqsubseteq e') \rightarrow e' = e]$

- ▶ $MAX_{abs}(e, P)$ 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
Maya-ERG cookie-ACC eat **PFV₂**, but it.ACC whole not
khaa-**yaa**.
eat-**PFV₁**

'Maya ate the cookie, #but did not finish it.'

(Arunachalam & Kothari)

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, PFV₁, PFV₂)
 - (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 & (non-)maximality requirements: range of aspectual operators, within-language pragmatic effects
(see also Gyarmathy & Altshuler, t.a.)
- ▶ unifying culmination & **actuality entailments (AEs)** (Bhatt 1999)

Looking ahead: AEs as culmination entailments

PF ability modals **entail 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**, ability is a subclass (Mari 2016)
- ▶ **claim:** teleological modals are **hypothetical accomplishments**
 - ▶ **stativity + telicity:** a potential action H initiates a process leading to realization of a goal (prejacent for ability, Nadathur 2019; else purpose clause)
- ▶ composing with PFV neutralizes stativity: **aspectual coercion** (de Swart 1998, a.o.) forces instantiation of H (Nadathur 2019 on ability)
- ▶ AEs result from instantiating H , as strong PFV₂ culmination entailments
- ▶ **prediction:** where weak PFV₁ composes with teleological modals, we **predict ambiguity between actuality & counterfactuality** (i.e., cessation without culmination)
- ▶ **actuality/counterfactuality ambiguity reported:** Spanish (Borgonovo & Cummins 2008, Vallejo 2017), Br. Portuguese (Alxatib 2016), Albanian, & others (Hacquard 2009)

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