Telicity, teleological modality, and (non-)culmination

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1   Telicity and culmination

Telicity characterizes predicates of eventualities that are associated with a 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 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

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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. $\rightarrow$ *A complete house came into being*
 b. Des ran a marathon. $\rightarrow$ *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) $\llbracket \text{PFV} \rrbracket := \lambda w \lambda t \lambda P . \exists e[\tau(e) \subseteq t \wedge P(e)(w)]$
           (Bhatt & Pancheva 2005)

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

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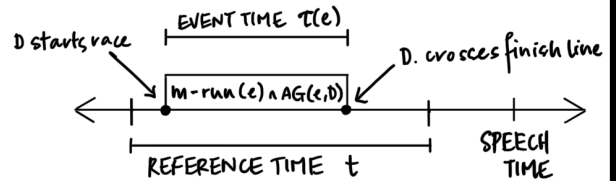
2   The imperfective paradox

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**

    (3)   *Context:* Mahler died while writing his tenth symphony
        a. **Progressive:** Mahler was writing a tenth symphony.   ✓
                                      $\nRightarrow$ *A complete tenth symphony came into being*
        b. **Perfective:** Mahler wrote a tenth symphony.   ✗

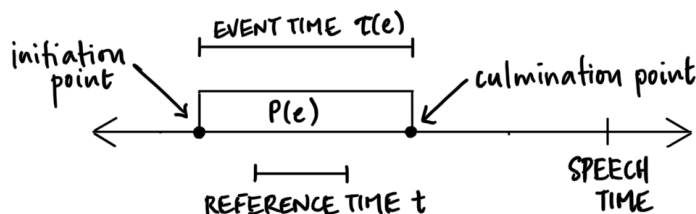- given the facts, (3a) is true, but the corresponding perfective (3b) is false

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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 can instantiate an 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 limit/goal) takes place in a modal alternative to the evaluation world
   – **challenge:** identifying the appropriate the 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 $[\![P]\!]$ 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 $[\![P]\!]$ 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 Fintel & 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, $[\![P]\!]$ 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, ...
- $e \in [\![P]\!]^c$ 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
- $e_1, e_2 \in [\![P]\!]^c$, $e_1 \sqsubseteq e_2$ iff e_2 is an uninterrupted causal continuation of e_1 and $\exists e_3 \in [\![P]\!]^c$ 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$_1$, **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$_1$, but it.ACC finish not eat-PFV$_1$
'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$_1$, #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. $[\![\text{PFV}_1]\!] := \lambda w \lambda t \lambda P \,.\, \exists e[\tau(e) \subseteq t \wedge e \in w \wedge \text{MAX}(w, e, P)]$
   b. $\text{MAX}(w, e, P) = 1$ iff $P(e) \wedge \forall e' \in w\,[(P(e') \wedge e \sqsubseteq e') \to e' = e]$

- PFV$_1$ 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$_1$ 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. $[\![\text{PFV}_2]\!] := \lambda w \lambda t \lambda P \,.\, \exists e[\tau(e) \subseteq t \wedge e \in w \wedge \text{MAX}_{\text{abs}}(e, P)]$
   b. $\text{MAX}_{\text{abs}}(e, P) = 1$ iff $P(e) \wedge \forall e'[(P(e') \wedge e \sqsubseteq e') \to e' = e]$

- $\text{MAX}_{\text{abs}}(e, P)$ 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$_2$, but it.ACC whole not eat-PFV$_1$
'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_1, PFV_2)
  (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 prejacent 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_2 **culmination entailments**
- **prediction:** where weak PFV_1 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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