1 Telicity and culmination

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

- **excludes**: states \((\text{be tall}, \text{know})\) and activities \((\text{sleep}, \text{push a cart})\)
- **includes**: achievements
  - culminations (Bach 1986): preparatory phase leading to instantaneous change and result state \((\text{die, reach the top, arrive})\)
  - instantaneous changes \((\text{recognize, notice})\)
  (Bach’s ‘happenings’)
- **includes**: accomplishments \((\text{eat a cookie, run a marathon})\)
  - 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:

\[(1) \quad \begin{align*}
\text{a. Kim built a house.} & \quad \rightarrow \ A \ \text{complete house came into being} \\
\text{b. Des ran a marathon.} & \quad \rightarrow \ She \ \text{covered the full race path/distance}
\end{align*} \]

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):

\[(2) \quad \begin{align*}
\text{[PFV]} := \lambda w \lambda t \lambda P. \exists e [\tau(e) \subseteq t \land P(e)(w)] \\
\text{PST} \quad \text{[PFV(Des run a marathon)]}
\end{align*} \]

(Bhatt & Pancheva 2005)
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.
   \[ \n   \neg \text{A complete tenth symphony came into being}\n   \]

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

\[
\text{[PROG]} := \lambda w \exists t \lambda P . \exists e [\tau(e) \supseteq t \land P(e)(w)]
\]

- 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 $[P]$ 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 PFV₁, no culmination entailment
  
  (Singh 1991, 1998; Arunachalam & Kothari 2011)

(6) \( \text{maayaa-ne biskuT-ko khaa-yaa par use puuraa nahiin khaa-yaa} \)
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) \( \text{maayaa-ne biskuT-ko khaa-yaa, #aur use ab-tak khaa rahii hai.} \)
Maya-erg cookie-acc eat-PFV₁, #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. \([\text{PFV}_1] := \lambda w \lambda t \lambda P. \exists e [\tau(e) \subseteq t \land e \in w \land \text{MAX}(w, e, P)]\)

b. \(\text{MAX}(w, e, P) = 1 \text{ iff } P(e) \land \forall e' \in w \[(P(e') \land 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)

4.2 Culmination as absolute maximality

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

(9) a. \([\text{PFV}_2] := \lambda w \lambda t \lambda P. \exists e [\tau(e) \subseteq t \land e \in w \land \text{MAX}_{\text{abs}}(e, P)]\)

b. \(\text{MAX}_{\text{abs}}(e, P) = 1 \text{ iff } P(e) \land \forall e' \in w \[(P(e') \land 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) \( \text{maayaa-ne biskuT-ko khaa liyaa, #par use puuraa nahiin khaa-yaa.} \)
Maya-erg cookie-acc eat PFV₂, but it.acc whole not eat-PFV₁
‘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 (∼ 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 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: as spectual 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 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)
References