

Telicity, Teleological Modality, and (Non-)culmination

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1. Introduction

The property of **telicity** characterizes predicates of eventualities which have an inherent end or culmination point. This excludes the ‘homogeneous’ aspectual classes (*states* and *activities*; Vendler 1957), and includes both punctual *achievements* (instantaneous transitions such as *recognize*, *arrive*)¹ and durative **accomplishments** (*write a novel*, *run a marathon*), which involve stages leading to a specific **culmination**. The semantics of telicity have long been a topic of interest in the literature on aspect (see, e.g., Krifka 1998), with particular attention given to how the link between stages and their associated culmination is encoded in the lexical representation of accomplishments. Prevalent theories of lexical aspect capture this link by taking accomplishments to pick out eventualities which can be viewed as consisting of stages leading to some inherent endpoint, so that an eventuality in the denotation of a telic predicate *P* necessarily includes the associated culmination.

This approach, however, notoriously gives rise to the **imperfective paradox** (Dowty 1979; or ‘partitive puzzle’, Bach 1986): progressives of accomplishments can be felicitous even when the culmination point can never be reached, as in (1). Progressive (1a) is acceptable in the given context, but its simple past correlate (1b) is not, because it requires that a complete tenth symphony came into existence.

- (1) *Context*: Gustav Mahler died after beginning a tenth symphony, but prior to its completion.
- a. Mahler was writing a tenth symphony (when he died). *progressive*
 - b. #Mahler wrote a tenth symphony. *simple past/perfective*

Prominent solutions to the imperfective paradox maintain that uninflected telic predicates denote culminated eventualities and rely on an intensional analysis of the progressive operator, on which a qualifying (i.e., culminated) eventuality is instantiated in a modal alternative to the evaluation world (Dowty 1979, Asher 1992, Landman 1992, Bonomi 1997, a.o.). The central challenge for these accounts—and one which has so far resisted a fully satisfactory resolution—is to constrain the modal relationship between evaluation world and culmination alternatives in such a way that the evaluation world nevertheless realizes an eventuality which ‘counts’ (in an intuitive sense) as a stage leading to the relevant culmination.

This paper presents an alternative to intensional analyses of the progressive. While we agree that the imperfective paradox is due to a modal element in the interaction between grammatical aspect and telicity, we argue that this element lies in the semantic structure of telic predicates. We thus propose to revise the notion of telicity so that an uninflected telic predicate denotes a set of eventualities with a mereological structure enriched by assumptions stemming from the semantics of teleological modals. Specifically, we propose that a telic predicate can apply to non-culminated as well as culminated eventualities; eventualities denoted by uninflected telic predicates are unified by a shared (modal) relationship to a **culmination condition** (cf. Kratzer 2004), rather than by a culmination requirement (entailment), as is often assumed.

This approach has several positive consequences. First, we derive imperfective paradox effects with a simple extensional semantics for the progressive. Secondly, by appealing to **maximality** operators

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¹ Following Bach (1986), achievements can be subdivided into ‘happenings’ (e.g., *recognize*, *notice*) describing potentially unexpected state transitions, and ‘culminations’ (e.g., *arrive*, *reach the summit*), which describe transitions occurring as the end of extended processes. Culminations sometimes pattern with accomplishments under aspectual modification, and their semantic structure is thus of relevance to the investigation of (non-)culmination and telicity. We focus only on accomplishments here, leaving (non-)culmination in inflected achievements for future investigation.

(cf. Filip & Rothstein 2005, Altshuler 2014), we can account for the non-culminating perfectives of accomplishments observed across a range of languages (see Martin 2019). Finally, by establishing a semantic connection between the endpoint-orientation of telic predicates and the goal-orientation of teleological modalities, our approach opens the door to a unified treatment of telic predicates' **culmination entailments** and the phenomenon of **actuality entailments** from ability modals (Bhatt 1999).

2. Two approaches to the imperfective paradox

The relationship between an accomplishment predicate (e.g., *write a novel*) and its associated endpoint (here, the coming into being of a complete novel) is often realized as a **culmination entailment**:

- (2) Maya wrote a novel. *entails*: A complete novel by Maya came into being.

On a standard approach to grammatical aspect, culmination entailments motivate an account of uninflected telic predicates as denoting sets of exclusively culminated eventualities.² Couched in an event semantics framework, an aspectual operator composes with a predicate P by instantiating a P -eventuality relative to the reference time supplied by tense. The English simple past, as in (2), is typically treated as combining past tense with a perfective (PFV) that 'includes' event time ($\tau(e)$; Krifka 1998) in reference time (t). If all P -eventualities contain their culminations, the entailment follows immediately.

- (3) $\llbracket \text{PFV} \rrbracket := \lambda w \lambda t \lambda P . \exists e [\tau(e) \subseteq t \wedge P(e)(w)]$
 (4) (2) $\equiv \llbracket \text{PST}(\text{PFV}(\text{Maya write a novel})) \rrbracket^{w, t^*} = \exists e [\tau(e) \subseteq t \{t < t^*\} \wedge \text{write-novel}(M)(e)(w)]$
 ~ *There is an eventuality e contained within a past time t such that e is an evaluation-world eventuality of Maya writing a complete novel.*

Extending this account to progressive accomplishments produces the imperfective paradox. (1a), repeated below, shares with atelic progressives reference to a stage of a P -eventuality that is ongoing at some reference time. This can be captured by inverting the relationship between event time and reference time, so that PROG instantiates a P -eventuality as 'including' the reference time, as in (5).

- (1a) Mahler was writing a tenth symphony (when he died).
 (5) $\llbracket \text{PROG} \rrbracket := \lambda w \lambda t \lambda P . \exists e [\tau(e) \supseteq t \wedge P(e)(w)]$

The consequence of (5), in combination with a telic predicate P that denotes only culminated eventualities, is the expectation that $\text{PROG}(P)$ is true at a reference time t just in case t is part of a larger interval at which the corresponding non-progressive is true. (1a), however, shows that telic progressives can be true even when no interval verifies the non-progressive. The 'paradox' arises in the clash between the assumption that telic predicates denote culminated eventualities and the observation that telic progressives refer to evaluation-world non-final stages of P -eventualities. *A priori*, the problem can be solved either by allowing telic predicates to denote non-culminated as well as culminated eventualities, or by redefining PROG so that it makes reference to evaluation-world non-final stages of P -eventualities, linking them only intensionally to culmination.

Proponents of the first approach, which is compatible with an extensional progressive, include Bach (1986), Parsons (1990), and Szabó (2004).³ The challenge is to explain what qualifies a truncated eventuality as an instance of some accomplishment predicate P : that is, to establish what non-culminated

² The need to use data like (2) to motivate assumptions about the structure of uninflected telic predicates is a consequence of what Zucchi (1999) calls *the problem of indirect access*: lacking intuitions about uninflected telic predicates, their structure must be inferred from patterns arising in their aspectually-modified interpretations.

³ Landman (1992) includes Bach's approach in a class of *part-of* proposals, according to which $\text{PROG}(P)$ is true just in case some actual event realizes "sufficiently much" of a P -type event. While this is potentially compatible with an extensional PROG, the partitive approach it suggests must be coupled with a precise characterization of the properties constituting "sufficiently much". Our view is that any suitable characterization will require an intensional view of the relationship between non-culminated and culminated accomplishments, along the lines proposed here.

P-eventualities share with culminated eventualities, and what differentiates them from similar ‘process’ eventualities lacking a “target state” (e.g., what differentiates a non-culminated street-crossing from the activity of walking in the street; Szabó: 46). Bach observes a parallel between nominal partitives and partial realizations of accomplishments, so that the progress of (some) accomplishments can be measured by some extent of a (strictly incremental) theme. (1a), for instance, might make reference to the score that Mahler was writing when he died; this same score may also be described as *part of Mahler’s tenth symphony*, even though there is no complete symphony of which it is a part. Parsons builds on this to qualify a ‘partial’ eventuality as an instance of *P* by virtue of a partial realization of *P*’s theme. The chief objection to a Parsons-style account is that it cannot apply across the board. Landman (1992: 8–9), for instance, points out that (6) does not commit us to the existence of even a partial unicorn, but only to the actualization of some process that might (pre-theoretically) have led to the existence of a unicorn.

(6) God was creating a unicorn, when He changed his mind.

The alternative—and by far the more prevalent—type of solution maintains the assumption that telic predicates denote culminated eventualities, and instead shifts the burden of partial realization to an intensional progressive. The basic idea, due to Dowty (1979), is to focus on the modal relationship between evaluation and culmination worlds, whereby the progressive refers to an ongoing evaluation-world eventuality which ‘counts’ as an in-progress *P*-eventuality.

Dowty attempts to capture the appropriate relationship in terms of *inertia*, based on the intuition that an in-progress *P*-eventuality is one which ‘naturally’ (under ‘inertial’ conditions) continues to develop to the culmination point. The set of *inertia worlds* is projected from a world-interval pair $\langle w, t \rangle$, and contains those worlds identical to *w* up to the reference interval *t*, and which then develop in the way “most compatible with the past course of events” (1979: 148). This proposal—as noted by Vlach (1981)—takes too global of a perspective: admitting the entire history of the evaluation world necessarily admits any ongoing processes on a course to interrupt the development of the target *P*-eventuality, and would thus (incorrectly) predict the automatic falsity of a progressive like (1a) (at least, in the context as given in 1).

Refinements to the intensional approach try to solve this problem by restricting the notion of inertial (natural or normal) developments to those which follow from a circumscribed set of facts (a particular situation or *perspective*; Asher 1992). These revisions have their own drawbacks, however. Asher’s proposal, which relies on a framework for ‘default’ inference to make the truth of the progressive depend on the normal (expected) developments of salient facts, cannot explain the acceptability of telic progressives like (7), where successful culmination is understood to be an extremely unlikely outcome.

(7) Maya was crossing a minefield.

Landman’s (1992) proposal, which eschews a role for ‘normality’ in favour of the possibility of the evaluation world eventuality continuing (in stages) across a sequence of reasonably-similar modal alternatives, has no problems with (7), but makes the wrong predictions for cases like (8), where the outcome of an ongoing course of events is underdetermined at reference time (Bonomi 1997).

- (8) *Context*: Maya is driving from Monterey towards San Jose. Her intention is to go to either San Francisco or Sacramento, but she has not yet decided which. (modified from Szabó 2004)
- a. Maya is driving to San Francisco or Sacramento.
 - b. ?Maya is driving to San Francisco
 - c. ?Maya is driving to Sacramento.

On Landman’s analysis, (8a) is true if and only if there is a continuation branch of Maya’s current actions which ultimately has her arriving in either San Francisco or in Sacramento. But this requires that one of (8b) or (8c) is both acceptable and true, which is not the case.

Bonomi (1997) argues convincingly that both Asher’s and Landman’s proposals suffer from the lack of a mereological theory of (accomplishment) eventualities: that is, a theory which both explains why Maya’s first steps into a minefield (assuming her intention to cross) can qualify as a part or stage of a minefield-crossing, while at the same time explaining why her northward drive from Monterey cannot

(yet) qualify as a stage of a journey to San Francisco or a stage of a journey to Sacramento. For reasons of space, we are unable to discuss Bonomi's solution here. However, he provides a clear motivation for our upcoming proposal. If a rich mereological theory is in any case needed (supplementary to an intensional progressive) to resolve the imperfective paradox, it is well worth exploring whether that mereological theory can be made responsible for the intensional components of the analysis as well.

3. Telicity and teleological modality

"[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: 146)

The above quote from Vendler anticipates our proposal. Put more formally, the idea is that the mereological structure of a telic predicate stems from the 'logical necessity' of its terminus, construed as a *télos*. We refer to the crucial element as a **culmination condition (CC)**: a CC is distinct from a culmination entailment in that it simply specifies "what has to be the case if the events in question culminate" (Kratzer 2004: 4). Given a world w , a context $s \subseteq w$, and a time t , a CC "casts its shadow backwards" by defining a set of alternatives in which culmination is realized (the CC is satisfied). Roughly, whether an eventuality e belongs to the denotation of a telic predicate P is determined by its similarity to the course along which s develops in culmination alternatives. In other words, the structure of P is determined—with reference to $s \subseteq w$ and t —by the structure of a set of teleological alternatives for the CC of P .

3.1. Teleologically-optimal worlds in a causal perspective

Teleological modal claims are evaluated with respect to a set of (teleologically-optimal) modal alternatives which crucially realize a relevant goal proposition G (cf. von Stechow & Iatridou 2005):

- (9) Given a goal G , circumstantial modal base f , stereotypical ordering source g , and evaluation world w , the set of teleological alternatives for G in w is given by: $\{w' : \text{Best}_{g(w)}((\cap f(w)) \cap G)\}$

We derive the ordering source from a contextually-developed **causal model** (Pearl 2000). A structural equation model (SEM) for causal relationships encodes the specifics of causal influences among a finite (salient) set P of propositional variables, allowing us to calculate the causal consequences (*normal causal developments*) of a situation s , where s is a 0-1 valuation of variables from P . Kaufmann (2013) describes how the information encoded in a SEM can be converted into a set of propositional causal laws to be returned by a stereotypical conversational background. In this framework, the teleological alternatives for G , relative to $f(w)$, are then those circumstantially-accessible worlds which develop 'normally' (with respect to the underlying model), and which also (eventually) realize G . The courses of events in these alternatives provide a set of maximally causally normal pathways to G , from the perspective of $f(w)$.

We use the same idea to build the mereological structure of a telic predicate. Given a telic predicate P with culmination condition K , we can project a set of teleological alternatives for K 's truth with respect to a world w , context $s \subseteq w$, time t , and a causal model D (including K as a dependent variable). The modal base is provided by s , a set of facts that are determined at reference time and which crucially contain K -relevant propositions specifying participants, their semantic roles (cf. Krifka 1989), intentions, capacities, momentum, and so on. We further assume that s does not exhaust its own causal consequences in D . An eventuality e belongs to the denotation of P if e is a *continuous causal development* of s in a teleological alternative for K : $e \in \llbracket P \rrbracket^s$ minimally verifies s at time t and maximally includes any normal causal developments of s up to the time at which K is realized. Intermediate P -eventualities thus form 'nested temporal slices' of optimal worlds: given $e_1, e_2 \in \llbracket P \rrbracket^s$, $e_1 \sqsubseteq e_2$ iff e_2 is an uninterrupted causal continuation of e_1 and $\exists e_3 \in \llbracket P \rrbracket^s$ such that $e_1, e_2 \sqsubseteq e_3$, and e_3 develops up to the point where $K = 1$.

Thus, on this approach, 'partial' (non-culminated) eventualities (akin to Landman's *stages*) qualify as P -eventualities on the basis of a modal relationship to K : they are explicitly defined as parts of the "backwards causal shadow" cast by P 's culmination condition.

3.2. Consequences for progressives

Given this mereological structure, the denotation of a telic predicate P now contains both culminated and non-culminated eventualities. Consequently, composition with an extensional progressive like (5) no longer leads to a ‘paradoxical’ culmination requirement. What telic progressives require—inherited from what qualifies an eventuality as a member of $\llbracket P \rrbracket^s$ —is simply that the reference time t is included in an evaluation-world eventuality which develops in the same way as a teleological alternative for K .

In addition to offering an account of what unifies culminated and non-culminated P eventualities *qua* P -eventualities, this approach makes good on several of the insights which motivate intensional progressive accounts of the imperfective paradox. First, we capture a relevant notion of ‘normalcy’ through the use of a stereotypical ordering source: in particular, the alternatives which determine the structure of qualifying P -eventualities are required to be those which develop in a way that is maximally causally normal (i.e., ‘inertial’) with respect to the starting situation s and the background model for K . Asher’s notion of perspective also plays a role, insofar as the causal model from which a stereotypical ordering source is derived is sensitive to a speaker’s epistemic state.

An important consequence of this proposal is that the teleological alternatives determining the structure of P -eventualities are distinct from purely circumstantial alternatives to the evaluation world. In other words, the truth of a progressive does not require culmination to be a ‘live’ possibility at reference time, but rather—in the same spirit as Landman’s *continuation* requirement—that the possible futures of the evaluation world at reference time allow for the possibility of an instantiated P -eventuality e to develop into a larger P -eventuality.⁴ This avoids Asher’s problem with unlikely events: after the runtime of an instantiated P -eventuality e , there are no conditions placed on the nature of potential interruptions to further development towards K . An interruption may equally well belong to the ‘normal’ course of events in the evaluation world, or be unexpected given the speaker’s reference-time causal model for K .

A further consequence of the proposal is that an eventuality e cannot belong to the denotation of a telic predicate P with culmination condition K if e contains a point at which some causally necessary condition for K (as defined by the model D) is falsified. The multiple-city problem, illustrated by (8), can be explained in terms of this requirement. The intention to go to a particular destination L is a causal necessity for the development of a *driving-to- L* eventuality. (8) establishes Maya’s intention to go to one of the two cities, which is enough to cast the driving she has so far done as belonging to a teleological alternative for K (= *Maya arrives by car in San Francisco or Sacramento*). However, she does not (yet) have an explicit intention to drive to San Francisco, nor an explicit intention to drive to Sacramento. Since these intentions, respectively, are causally necessary conditions for *driving-to-San Francisco* and *driving-to-Sacramento* eventualities to be in progress, her actions so far are not sufficient to make either destination-specific progressive true, explaining the indeterminate judgements marked in (8b) and (8c).⁵

Having examined the consequences of our proposal for progressives of telic predicates, we now turn to the consequences for telic perfectives. It turns out that, in combination with the enriched mereological structure outlined in section 3.1, a perfective along the lines of (3), which includes a qualifying P -eventuality within reference time but imposes no other constraints, does not necessarily give rise to a culmination entailment. We take up the matter of (non-)culminating perfectives in the next section, and show why this result is in fact a positive consequence of our approach.

⁴ The definition of $\llbracket P \rrbracket^s$ requires a starting situation s that is causally compatible with the realization of K . This predicts that progressives of ‘impossible tasks’, such as (i), are not false but infelicitous: since no situation can be causally compatible with the relevant culmination condition, the set of teleological alternatives for K is empty, and the progressive has nothing to instantiate.

(i) ?Maya is swimming across the Atlantic Ocean.

If, per Landman, Maya somehow succeeds in crossing the ocean, the actual course of events (always assumed to be maximally causally normal) provides the basis for a teleological alternative for K .

⁵ Bonomi (1997: 182–183) points out that the multiple-city problem has non-agentive counterparts, using the example of an avalanche which falls with equal probability into one of two valleys. Here, a destination-specific intention is replaced as a causal necessity by destination-directed momentum; the explanation is otherwise the same.

4. Perfectives of accomplishments: cessation, culmination, and maximality

There is a growing body of data which suggests that it is **cessation** (Altshuler 2014), not culmination, that is the distinguishing feature of perfectives. (10) illustrates this for the Hindi simple perfective (glossed as PFV₁), which is compatible with the non-culminated interpretation in (10a), but not with the reading in (10b), where the target event continues past reference time (Singh 1998, Arunachalam & Kothari 2011). Non-culminating perfectives are similarly observed across a wide range of languages, including Thai, Burmese, Tagalog, Korean and Mandarin Chinese (see Martin 2019 and references therein).

- (10) a. 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.’
 b. 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.’

The Hindi simple perfective therefore gives rise to a cessation inference—that Maya’s cookie-eating ceased within reference time—which is strictly weaker than (albeit compatible with) the culmination requirement associated with English simple past or the Hindi complex perfective (PFV₂), shown in (11).

- (11) 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.’

Combined with our enriched denotations for telic predicates, a perfective which includes an evaluation-world P -eventuality within reference time but imposes no other requirements will derive neither cessation nor culmination inferences. This is a positive consequence in the latter case, since we want to allow a ‘weak’ PFV₁ perfective to instantiate a non-culminated P -eventuality. However, to capture the cessation inference which accompanies PFV₁, we must additionally ensure that an instantiated P -eventuality is not contained in a larger evaluation-world development towards P ’s culmination condition.

We achieve this by constraining the selection of a P -eventuality for instantiation to just those which are **maximal** (in a specific sense). The inclusion of a maximality requirement is independently motivated by Filip & Rothstein (2005), and explored in Altshuler’s (2014) partitive approach to grammatical aspects.⁶ To capture cessation inferences, we require only that the eventuality instantiated by PFV₁ represents the largest evaluation-world development towards P culmination condition, K . This is formalized in terms of the ‘local’, or **termination maximizer** MAX_{trm}, which we embed in the semantics of PFV₁.

- (12) a. $\text{MAX}_{\text{trm}}(w, e, P) = 1$ iff $P(e) \wedge \forall e' \in w [(P(e') \wedge e \sqsubseteq e') \rightarrow e' = e]$
 b. $\llbracket \text{PFV}_1 \rrbracket := \lambda w \lambda t \lambda P . \exists e [\tau(e) \subseteq t \wedge e \in w \wedge \text{MAX}_{\text{trm}}(w, e, P)]$ e.g., (10a)

Finally, to capture the contrast between weak PFV₁ and strong PFV₂ perfectives, we propose that strong perfectives make use of an **absolute maximizer** in place of the termination maximizer. As given in (13a), MAX_{abs} requires not only that an instantiated P -eventuality e is the maximal reference-time development towards K but in fact that e is maximal in the denotation of P itself. This ensures that any P -eventuality instantiated by strong PFV₂ necessarily includes the realization of K ; the cessation inference which unifies strong perfectives with weak (non-culminating) perfectives follows trivially.

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

⁶ See also Krifka (1989). Notably, Koenig & Muansuwan (2000) pair a maximizing perfective with a modal account of uninflected Thai accomplishments which is conceptually similar to the mereological structure proposed here.

As noted, the idea that perfectives introduce maximality requirements is not a new idea. However, coupling a partitive approach to grammatical aspect (in the spirit of Altshuler 2014) with a modalized mereological structure for telic predicates allows us to simplify the denotation of aspectual operators over past analyses, while providing an account of the semantics of accomplishments which is applicable across culminating and non-culminating languages (see, e.g., Koenig & Muansuwan 2000 on Thai).

5. Teleological modals and actuality entailments

Our approach to telicity is motivated in part by the theoretical parallel it creates between telic predicates and teleological modals. If this approach is on the right track, then certain similarities in the interpretation of aspectually-marked telic predicates and inflected teleological modals are to be expected. In this section, we briefly anticipate one such convergence, to be investigated fully in future work.

Crosslinguistically, perfectly-marked ability modals (unlike their imperfective counterparts) entail the actualization of their prejacent (Bhatt 1999). (14) illustrates the **actuality entailment** in French:

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

One view of ability treats it as a subclass of teleological modality, in which the modal prejacent (rather than a purpose clause) represents the relevant goal (Mari 2016, Nadathur 2021). Nadathur proposes a structure for ability modals in which they express the possibility of some event *H*, presupposed to be a causal initiator of a process which leads, in causally normal worlds, to the realization of the modal prejacent. On this view, then, ability and other teleological modals are **hypothetical accomplishments**, stative insofar as they establish the latent possibility of *H*, but embedding what is effectively a telic predicate, linking the process initiated by *H* to a point of culmination.

Stativity is neutralized when an ability modal combines with perfective marking. De Swart (1998) and others argue that the perfective selects for eventive predicate, triggering a reinterpretation (via *aspectual coercion*) when it is composed with a stative. Nadathur suggests that the default reinterpretation for ability modals and other 'actionable-capacity' statives (e.g., *be fast*) is one of instantiation; coercion thus forces realization of the causal initiator *H*, which exposes the embedded accomplishment structure.

Combining this proposal with our approach to perfective operators, actuality entailments can be viewed as a consequence of composing ability modals with the absolute maximality requirement of a strong PFV₂ perfective. Where a language has a weak PFV₁ perfective, we might expect different results. In particular, application of a termination maximizer would predict the felicity of perfectly-marked ability modals not only in actualization contexts, but also in cessation contexts, i.e., where the process for the prejacent was initiated (via instantiation of *H*), but terminated prior to culmination. A two-way ambiguity of this sort—between actuality and counterfactuality—is in fact attested in Spanish (among other languages; see Hacquard 2020): Borgonovo & Cummins (2007) report that (15) is acceptable either if Pedro won the race, or if he tried and failed to do so (but crucially not if the outcome is unknown).⁷

- (15) *Pedro pudo ganar la carrera.*
 'Pedro could-PFV win-INF the race.'

Significant work remains to be done, both to flesh out the predictions for aspectually-marked modals, as well as to establish a crosslinguistic correlation between weak perfectives and ambiguity in inflected ability claims. However, even at this stage, we feel that this is a promising avenue for continued exploration, and lends some support to our proposals for telicity and for a partitive semantics for perfective operators.

⁷ We are not at this point aware of any literature which examines non-culminating accomplishments in Spanish. However, in view of a growing body of evidence that even 'strongly culminating' languages like English permit instances of non-culmination (see Martin 2019), we leave a detailed exploration of the data for future work.

6. Summary and outlook

We revise the semantics underlying telicity by imbuing the denotation of a telic (accomplishment) predicate P with a mereological structure based on the teleological modal alternatives for K , P 's culmination condition. In addition to making P 's denotation sensitive to context—including, in particular, the facts that a speaker takes to be causally relevant for K —the proposal allows P to denote both culminating and non-culminating eventualities, unifying them by their shared modal relationship to K .

This proposal allows us to explain the (non-)culminating uses of aspectually-marked accomplishments while maintaining a broadly uniform, extensional treatment of grammatical aspect. No culmination entailments are predicted from an extensional 'including' progressive; we derive the shared cessation inferences of strong and weak perfectives from the inclusion of a maximality operator, while accounting for the contrast in their culmination patterns with the contrast between termination and absolute maximizers. Finally, the structural similarity between telic accomplishment predicates and teleological modals opens up the possibility of a unified account of culmination and actuality entailments, as outlined in section 5.

There are a number of additional avenues for further investigation. If, as proposed, grammatical aspects vary not only with respect to the event time/reference time relation they predicate, but also in the function range of their maximality operators, this makes available a range of typological predictions, the consequences of which are ripe for exploration. This includes the within-language pragmatic consequences of cross-linguistic variation in aspectual inventory (see Gyarmathy & Altshuler 2020 for existing work on this topic). Finally, the consequences of our proposal for the composition of grammatical aspect with other aspectual classes remain to be explored. Questions for immediate investigation include an account of (non-)culminating behaviour in punctual telic predicates (achievements), as well as the potential role of termination and absolute maximality operators in deriving the (non-)cessation inferences of atelic predicates in the scope of a perfective operator (e.g., in Slavic languages; Filip 2000).

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