Events in Time: On the Difference Between Telos and Endpoint

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Paradoxes of Essential Content

Consider verb meanings, as represented by roots, or more concretely in the form of non finite participles.

The paradox presented to semanticists is to represent the meanings of these forms in terms of the events that inspire them in the world, but *without necessarily entailing the existence of particular events in any specific context*.

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(2) a.   John closed the door.
    b.   John is closing the door.
    c.   The door is closed.

The Imperfective Paradox

(3)   John is drawing a circle.

How do we express the truth conditions of (3) in terms of particular situations of circle drawing? Especially since John may never finish drawing that circle, and even under conditions where we *know* that he is inevitably not going to finish it.

The Imperfective Paradox

The participle V-ing denotes the In-progress state s, of the telic event V(e), even though an e that could be so described might never get instantiated in the actual world.

Modality and the English Progressive

he dominant analysis of the progressive in English and the "imperfective paradox" it gives rise to involves intensionality in the form of inertial worlds (Dowty 1979), or event continuation branches (Landman 1992).

(4) *Landman's (1992) Semantics*:
    $[[\text{Prog}(e,P)]]_{w,g} = 1$ iff $\exists f \exists v :< f, v > \in CON(g(e), w)$
    and $[[P]]_{v,g}(f) = 1$.
    where $CON((g(e), w)$ is the continuation branch of $g(e)$ in w.

Core Semantic Features of the Progressive

The progressivized eventuality is related in an organic way to its non-progressivized counterpart, but does not actually entail it (in the actual world) at a future time.

The perceived relationship between a progressivized event and the event simpliciter is not mere epistemic uncertainty, but gives rise to variable judgements across speakers. Further, *internal properties of the participants and their intentions*, and the *nature of the process evidenced* seem to be more important than external circumstances.

Possible World Treatments of the Progressive

All of the possible worlds accounts on the market fall short of complete objective explicitness when it comes to the points above.

In all cases, the appeal to possible worlds still leaves an unexplained residue completely independent of the possible worlds mechanisms themselves. In the case of Landman (1992) it is his appeal to the 'stage-of' relation built into the notion of continuation branch, in Portner (1998) it is the relativization to event descriptions, in Hallman (2009) situational version it is the relation R 'the relevant subpart relation'.

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The essential question of "What does it mean to be an in-progress version of an event?" remains a primitive.

The Participle in -en and the Resultative Paradox

The imperfective paradox is a famous problem in the history of formal semantics, but it is less often noticed that the non-finite forms in -en throw up exactly the same *kind* of problem, but with respect to the telos portion of a complex eventuality. Consider the following data from Embick (2004)

(5) a. The door opened.
    b. The door was opened.
    c. The open door.

(6) a. The door closed.
    b. The door was closed.
    c. The closed door.

The Participle in *-en* and the Resultative Paradox

The participle in *-ed/en* is morphologically and conceptually tethered to the verb *close*, so it some sense it is semantically related to events of that type. But it is important to note that these 'event implications' need not be extensional, or actualized.

The problem here is that the door can be called 'closed' even if it was built closed.
(also the 'broken' device, the 'flattened' cardboard boxes etc.)

Kratzer on Target States

Kratzer (2000) gives truth conditions for target states like *cooled*, where they differ from simple adjectival states like *cool*, in being explicitly related to a previous event of 'cooling',

(7) a.   *cool*: $\lambda x \lambda s[\text{cool}(x)(s)]$
    b.   *cooled*: $\lambda x \lambda s \exists e[\text{cool}(x)(s) \wedge s = f_{target}(e)]$

But is is important to see that this cannot literally be correct, rather, it may be correct for *cooled*, but it does not generalize. This is because the formula existentially quantifies over those lead-in events.

The 'Perfective' Paradox

Kratzer's denotation entails the existence of a prior process. As we have argued, this is not correct for Target states. In fact, what we have here in the denotation of the *-en/ed* participle target state is the analogous problem to the imperfective paradox. We can call it the Perfective paradox for parity, and it goes like this:

The Perfective Paradox
The participle V-ed/en denotes the result state s, of the a telic event V(e), even though e might never have been instantiated in the actual world.

It seems obvious that the solution to this paradox will have to follow along the same lines as the 'solutions' to the imperfective paradox discussed previously.

Intensional Accounts of Telos

Indeed there have been some intensional accounts of telos in the literature (not for the target state problem specifically), but for cases of perfectives in Russian (Tatevosov 2018) and nonculminating accomplishments (Martin and Schäfer 2014, Kratzer 2004)

But even this move, as with the imperfective paradox in the previous section, doesn't add any formal explicitness. This is because there is no real way of making sense of the notion of 'subpart of an event' without making reference to teleological intentions and mentalist conceptual characterisations related to the *very lexical items* used as categorization devices.

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> The Essential Content Problem
> The meanings of lexical items cannot be adequately proxied by extensions (see also Chomsky 1995 and Pietroski 2018)

Our extensional toolbox connects tensed verbs, and assertable propositions to truthmakers, but they do a much worse job when it comes to contentful lexical items in isolation, or indeed verbal roots or participles.

Essential Meaning of -*en* Participle

(8) **The Meaning of** *V-en/ed*
V-en/ed expresses a *stative* eventuality that gives
cognitive/perceptual evidence for essential
descriptive-classificatory content corresponding to the
result state part of V.

We seem to need V's descriptive content to be part of its 'essential
nature' (in the sense Fine 2005) and *not* defined in terms of the
set of eventualities it is true of.

Telos vs. Endpoint

We thus need to distinguish two things, one of which I will name TELOS, and the other of which I will name ENDPOINT.

TELOS is intended to refer to the state that is teleologically an organic part of a particular event description. It is part of the *essential* content of certain verbal symbol/LI and it cannot be cashed out in terms of extensions (even using possible worlds marchinery).

ENDPOINT in intended to refer to the final moment in the run time of an eventuality that is asserted to instantiate a particular verbal symbol/LI.

Main Claim

If we want to understand I-Semantics, we cannot deflect or defer this problem—- mental representations of content (as embodied both in the lexicon and in intermediate compositional products containing lexical items) are the explanandum. Truth conditions are just a tool that have been convenient in formalizing outputs, but are rather indirect indicators of mental products and processes.

Formal Semantics and Psycholinguistics

•Formal semantics/pragmatics has embraced the experimental turn, and is increasingly turning to psycholinguistic methodologies to gather fine grained data about human judgements and inferencing.

•But so far very little of this work has extended to sentence internal compositional processes. Nor has this work really embraced the idea of probing mental representations. These two things are related.

•So far formal semantic theories, or even theories of the syn-sem interface do not generate predictions or expectations about mental representations of semantic content, or how it dynamically unfolds. In fact, the assumption is that there is nothing interesting or competence-related here that is not already captured by truth conditions.

Using New Methodologies to Ask New Questions

In the second half of this talk, I will present an experiment that we performed recently on comparing completion entailments in English and Russian, and matching those up to speakers' behaviour in an eyetracking experiment.

The results have profound implications for how we classify perfectivity, and the role of truth conditional judgements in that classification.

When is a Past Tense Perfective?

The following tests are the ones that are classically thought to be definitional of perfectivity:

- Entailment tests: Infelicity of denying the completion entailment (Giorgi and Pianesi 1997)
- Narrative Progression: Ability to advance the reference time in narrative progression (Kamp and Rohrer 1983)

The Kleinian Definition

Intuitively, aspectual distinctions correspond to different *ways* of viewing an eventuality and linking it to the anchoring point/interval (Comrie 1976, Smith 1995). Most modern aspectual semanticists implement this using a classical Kleinian analysis building on basic intuitions of Reichenbach 1947 (see Klein 1991, Klein 1994). This introduces a topic interval R into the mix, and the traditional aspects relate the topic interval to the event time in different ways. In this view, given an eventuality E, a situational perspective taken on it R, and an anchoring interval S, perfective and imperfective viewpoints differ in the following way:

- A **perfective** viewpoint corresponds to R holistically including E: $[_R [_E]]$;

- An **imperfective** viewpoint corresponds to R being contained in E: $[_E [_R]]$

Aktionsart

This definition of viewpoint aspect is distinguished from *lexical aspect* or *aktionsart* which is traditionally cashed out in terms of different event internal topologies of dynamicity, duration, transition, and sometimes result or telos (Vendler 1967, Dowty 1979, Smith 1995, Pustejovsky 1995).

Attractiveness of the Mereological Approach

The attractiveness of the Kleinian analysis is that it seeks to derive both core diagnostics of the perfective from the same representation. It handles performance on the entailment tests because in the case of accomplishment, any event that contains a telos as a subpart will always have that telos instantiated in the perfective condition where the reference interval completely includes the event. In the case of narrative progression, the encapsulation of event time inside the reference time enforces discreteness when reference times are ordered.

English Past as a Perfective Past

    (9)   Kogda ja pro-čita-l   knigu, po-zvoni-l
          when I PFV-read-PST.M.SG book PFV-ring-PST.M.SG
          telefon.
          phone
          'When I read the book, the phone rang.'

   (10)   Kogda ja čita-l   knigu, po-zvoni-l
          when I read.IMP-PST.M.SG book PFV-ring-PST.M.SG
          telefon.
          phone
          'When I was reading the book, the phone rang.'

English Past as a Perfective Past ?

While the data seem unproblematic at first blush, it should be noted that an account of the English simple past form as a perfective is only possible by systematically excluding its use on states. When a stative verb is in the simple past, it produces narrative overlap with any preceding eventuality, as the following example shows.

(11) When I owned those shares, the stock prices went up and down many times.

Perfectivity and Entailments

Telic predicates marked with perfective aspect have traditionally been taken to trigger entailments of event completion (Smith 1991; Klein 1994; see e.g. Dowty 1979; Parsons 1990 on the English simple past).

Event with TELOS + perfective aspect $\rightarrow$ ENDPOINT

English Past Tense: Strong Perfective?

Both English and Russian, have been classified typologically as having 'strong' perfective forms, i.e. *by default* triggering culminating inferences with accomplishments (Altschuler 2014, Martin and Gyarmathy 2019).

Let's take a look at the facts.

Non Culmination Contexts in English

Some predicates in English have been claimed to be lexically ambiguous between telic and atelic readings. For instance, Martin 2019 argues, following Pancheva 2003, that the predicate *read the book* in the following example is genuinely ambiguous between an accomplishment and an activity reading.

(12)　John read the book for two hours/John read the book in two hours.

Non Culmination Contexts in English

Furthermore, there are predicates that we may still want to call accomplishments that get a default inference of culmination, but where the culmination entailment can 'disappear' in a certain contexts. For example, it has been argued in a class of lexically modalized predicates the internal modal operator is responsible for non-culmination in examples such as (14) (Martin and Schäffer 2017).

(13) Mary taught the song to John but he could not get it into his head.

Non Culmination Contexts in English

The subclass of *gradable* accomplishments when modified by durative adverbials can assert a maximal stage of an event that is nevertheless not 'complete' (Rappaport Hovav 2008, Piñon 2008, Kennedy 2012, Deo and Piñango 2011).

  (14)   John ate a sandwich for several minutes until he found a
         bug in it. (example from Wright 2014)

  (15)   John built a sand castle/ baked a cake for an hour.
         (example from Deo and Piñango 2011)

We could think of these cases as simple cases of coercion (Moens and Steedman 1988, de Swart 1998), or alternatively as triggered by the existence of covert degree operators that are either simple existential, or maximal as in analyses for English by Piñon 2008 and Kennedy 2012.

Non Culmination Contexts in English

Yet another sub-case of non-culminating accomplishments in English has been argued by Martin 2019 to rely on indeterminacies/vagueness in the interpretation of (in)definite descriptions, so that the object is not completely affected at one level of granularity, but *is* fully affected at a looser level of granularity sufficient to license the use of the 'perfective' past tense.

(16) I mowed the lawn (but not all of it). (from Rappaport Hovav 2008)

(17) Mary ate the sandwich, but as usual she left a few bites. (from Hay et al. 1999)

Classifying the English simple past

•Martin (2019) assumes that the English past tense is a strong perfective, however other factors such as those described above conspire to weaken the entailment to culmination in different ways for different cases.

•A second possibility is that de Swart (1998) is right and that the English past is in fact a neutral or underspecified aspect where the aktionsart of the predicate determines the nature of the implications/entailments.

Nadathur and Filip 2021

Turns out that judgements about whether apple cores count, and what the intentional propertes of verbs like *teach* are matter more than the actual instantiation of the TELOS in real time in order to justify the use of the verbal description.

> *"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."*

The Paradoxes and Difficulties Sneak Back In!

This sounds like exactly the *kind* of primitive judgement that we needed for the progressive and resultative participles I discussed at the beginning of this talk.

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This sounds like exactly the *kind* of primitive judgement that we needed for the progressive and resultative participles I discussed at the beginning of this talk.

Claim: we need to make a principled distinction between essential content of a symbol/LI, and the events in the world that count as truthmakers (or not) for assertions based on those symbols/LIs.

Against Containment or Mereological Accounts of Culmination and Perfectivity

In general, notions of maximal event, culmination, anti-maximality etc. rely on exploiting a mereological relationship between the event time as determined by the VP and the reference time of the witness situation.

But even though it seems elegant and simple, Maximalization accounts still require 'Application Conditions', such as the one we find in Nadathur and Filip 2021. I quote Filip herself here.

> "Application conditions for MAXe determine what has to be the case for P-eventualities to reach their maximal stage, what counts as one individuable (countable) event."

This part will always be the hard part. And modal versions of it will not help.

English vs. Russian

Still, when it comes to robustly accomplishment verbs, English and Russian seem to agree on the judgements of entailment of completion in most cases.

TELIC verb + PAST → Entailment of culmination.

I will next present to you the results of an experiment where we compare English and Russian perfectives in eyetracking.

Our stimulus materials were all accomplishments. For these sentences, for both Russian and English speakers judge that there is an *entailment of culmination*.

This reports on research work published as Minor, Mitrofanova, Guajardo, Vos and Ramchand (2022).

While looking at a blank screen, the participants heard a short context sentence that located the narrative in the past:
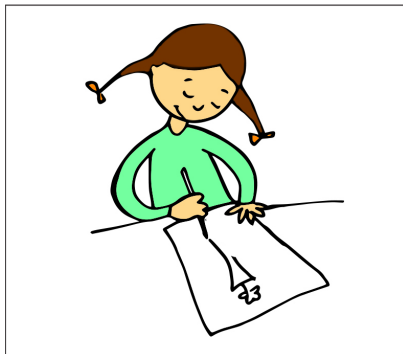
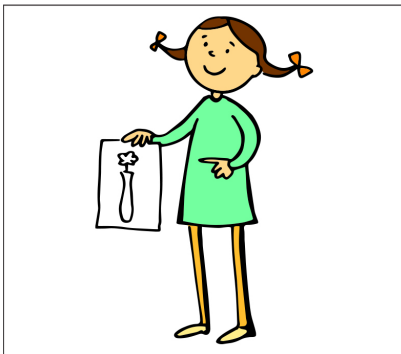*It was a bright and sunny day...*
It was the first period at school...
It was early in the morning...

An Eye Tracking Experiment

At the onset of the target sentence, the participants were given a visual display: Two pictures side by side representing an **ongoing event** (OE) and the corresponding **completed event** (= the result state that obtained once the action was complete) (CE).

(a) Ongoing Event (OE)   (b) Completed Event (CE)

An Eye Tracking Experiment

While looking at the pictures, the participants heard a test
sentence and were asked to choose which picture best matched the
sentence. We manipulated the aspect of the verb in the test
sentence.
Russian:

(18) Devočka na-risova-la/risova-la
      girl   PFV-draw-PST.F.SG/draw.IMP-PST.F.SG
      tonkuju vazu.
      thin   vase
      'The girl drew a thin vase.'
      English:

(19) The girl drew/was drawing a thin vase.

An Eye Tracking Experiment

In each experiment there were 24 test items involving accomplishment predicates. There were also 24 filler items, where the two pictures represented different event kinds. We recorded the participants' eye-movements (SMI RED500/EyeLink Duo) and offline responses.

In their offline responses, the Russian participants exhibited an almost universal preference for the Ongoing Event picture when they heard target sentences containing an imperfective verb (98% of the imperfective trials). Conversely, they exhibited an at-ceiling preference for the Completed Event picture when presented with sentences containing a perfective verb (95% of the perfective trials).

Proportion of Looks to Target: Russian

For the imperfective trials, looks to the Ongoing Event picture were coded as Target, while looks to the Completed event picture were coded as Competitor. The opposite coding was employed for the perfective trials.
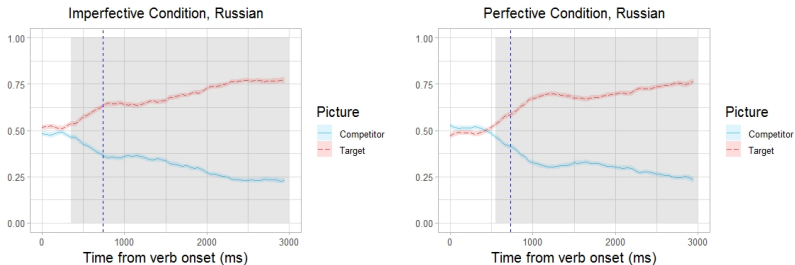

Figure: Russian experiment: proportion of looks to the Target and Competitor pictures in the Imperfective and Perfective conditions. Shading represents the time windows where the probability of looks to the Target picture was significantly above chance. The dashed vertical

Looks to Target: English

Turning now to the English participants, we found that, as expected, they exhibited an at-ceiling preference for the Ongoing Event picture in the past progressive condition (95% of the Progressive trials). However, in the simple past condition the participants did not show a strong preference for either picture, choosing the Completed Event picture in only 54% of the trials. Fig. 3 shows the proportion of looks to the Target and Competitor pictures separately for the two aspectual conditions: simple past and past progressive.
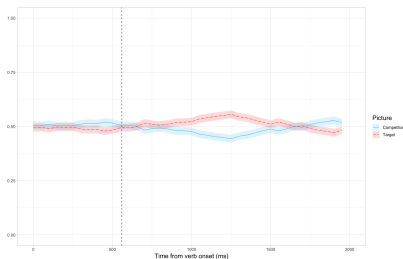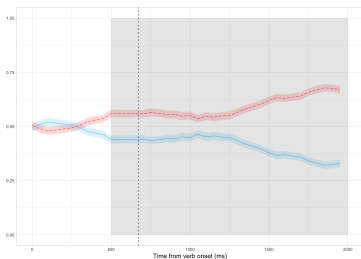
Eye Tracking Results: Summary

The results of this study for the English past tense were rather striking. Our results suggested that perfective accomplishment verbs in Russian strongly highlight the result state of the event. However, for the English, we found that that even on telic predicates, the simple past form does not encode a preferential cognitive salience for either the activity portion of an event *or* its result state.

Consequences

Even under the neutral/underspecified view of English past tense morphology, the failure of the TELOS picture to attract the focus of the attention is surprising since these were all telic verbs.

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My conclusion about Grammatical Aspect: Aspectual classification cannot be based on entailment properties alone, and certainly cannot be operationalized via a Kleinian system which just deals with inclusion relations among time intervals.

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The Russian perfective needs to represent the actualization of the telos as an explicit assertive part of its denotation, possibly by effecting a partialization of the event topology for homomorphic mapping to the time line.

Schema

NON-TEMPORAL/NON EXTENSIONAL domain: Symbolic
Event descriptions stored in long term declarative memory as LIs.
Morphemes that manipulate aktionsart.

REFERENTIAL/EXTENSIONAL DOMAIN: Functional aspectual
morphology that explicitly maps those symbolic descriptions to a
time line. These mapping functions can selectively choose parts of
the event topology who will be privileged to have a temporal run
time associated with them.
Tense morphology that anchors the run time in the context.

A Visualization of Cumulative Content

Anchored Propositions

Event Particulars

Symbolic Domain Event Concepts (Atemporal)
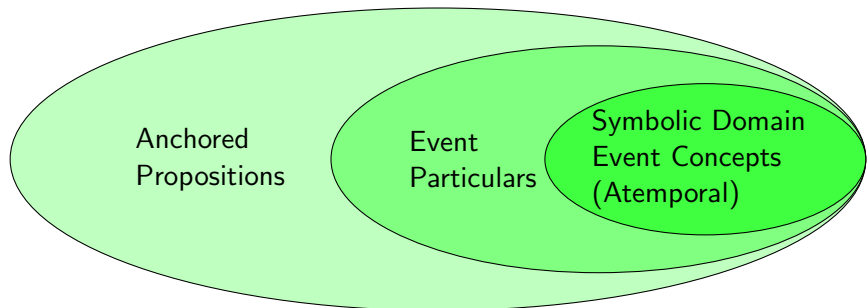
Rethinking the Toolbox

The challenging aspect about his conception of the building up of meaning is that the inhabitants of the innermost circle and the middle circle are not commensurate.

Essentially, I am claiming that one should not attempt to use direct truth making or any form of extensional meaning representations on the inner domain.

This in turn further complicates the relationship between the inner and the middle domain since they cannot be related by simple conjunction or overlap or subset etc. Instead, we have to find a way of relating the essential internalistic content represented and stored as Lexical Items to the later representations that can participate in truthmaking.

The Richness of the Internal Domain

Unlike other subjectivist approaches, I believe that the internal conceptual domain corresponding to event identity is richly structured and involves conceptual representations of abstract CAUSATION and incorporates SCALARITY in distinct property domains. The mappings between these abstract scales and the temporal scale are what have contributed to the impression that there is a mereology involved, but my hunch is that mereologies (even augmented with possible world structure) simply cannot capture either the subtleties of human truthmaking judgements, or the nature of event identity.

Digression: Two-Tier System of Meaning

Internalist vs. Externalist (alternatively Subjectivist vs. Objectivist) ways of defining meaning have led to incommensurate research agendas and a difficulty in establishing crosstalk between cognitive neuroscientists.

It is very understandable that formal semantics has maintained and promoted a consistent extensionalist toolbox. But as we have seen, it leads to persistent paradoxes in the area of lexical meaning, and relating even nonfinite forms to inflected meaning.

Two Tier System of Meaning

In a recent article Pelletier (2017) assesses this position and concludes that a two-tier approach to meaning is necessary if our theories are to meet the desiderata of the compositionality and intersubjectivity of meaning as well as the psychological reality of the basic ingredients.

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While the objectivist tradition has a good track record of understanding phenomena such as reference tracking, plurality, logical connectives and quantification, the deep questions of meaning composition involving polysemy and co-modulations are largely understudied.

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While the objectivist tradition has a good track record of understanding phenomena such as reference tracking, plurality, logical connectives and quantification, the deep questions of meaning composition involving polysemy and co-modulations are largely understudied.

The subjectivist tradition on the other hand has not tended to occupy itself with questions of general atomic primitives or systematic composition, generally preferring holistic approaches to lexical meaning. The two-tiered theory has been philosophically proposed by Pelletier and also in the work of Nicholas Asher (2011) and McNally and Boleda (2017) and (Ramchand 2018, 2019).

A Plea for Theoretical Pluralism and Collaboration

While the two-tier architecture raises many problems and research questions, they represent progress, or at least the hope of progress on the hardest questions of compositionality and creative meaning generations.

We now have tools at our disposal to begin to probe the nature of lexical storage (long term mental representations of content) as well as mental representations of intermediate products of semantic composition in real time. But we will only get collaborative science going if we are willing to ask those new research questions (instead of just using the new methodologies to garner evidence for the old ones).

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