Measurement and Intensionality in the Semantics of the Progressive

Cleo Condoravdi
PARC and Stanford University
Based in part on joint work with Stefan Kaufmann, Northwestern University

1   Introduction

Goals of this talk:

- Look at implications of partial realization associated with the progressive
- Argue that such implications do not tell against an intensional analysis for the progressive
- Connect the interpretation of the progressive to non-veridical (esp. "counterfactual") uses of *'before'*
- Propose an analysis of the progressive

    - an extension and refinement of Landman's (1992) analysis
    - reconstructs Landman's notion of stage
    - has a hook for context-dependency

- Separate the intensional component of the meaning of the progressive from default, expectation-based inferences about completion

Focus for this talk:
  - The modal dimension of the progressive on the 'event in progress' interpretation.

1.1   The Imperfective Paradox

- How to relate the meaning of the progressive to the meaning of the non-progressive
- Account for the entailment patterns of activity vs. accomplishment predicates

Activity predicates

(1)   John was swimming in the lake.
  $\Rightarrow$ John swam in the lake.

(2)   *Past*(*Prog*(John swim in the lake))
  $\Rightarrow$ *Past*(*Pfc*(John swim in the lake))

Accomplishment predicates

(3)   John was swimming across the lake.
  $\not\Rightarrow$ John swam across the lake.

(4)   *Past*(*Prog*(John swim across the lake))
  $\not\Rightarrow$ *Past*(*Pfc*(John swim in the lake))

Implications of continuation and (non-)completion

(5)   Mozart was working on the Requiem when he died.
⤳*Had he not died when he did Mozart would have continued working on the Requiem.*

(6)   Last time I saw her, she was writing her thesis.
⤳ *She may or may not have finished.*

(7)   Last time she was seen, she was crossing a minefield. She most likely never made it across.

(8)   Last time she was seen, she was climbing the mountain in a blizzard. She most likely never made it all the way up.

Implications of existence and partial realization

(9)   John is building a house.
⤳*No house at utterance time but there is something that is a house part*

(10)   John is baking a cake.
⤳*No cake at utterance time but there is something that is becoming a cake*

(11)   John is baking potatoes.
⤳*There are potatoes that are becoming baked*

(12)   John is eating the cake.
⤳*Cake not complete at utterance time*

(13)   John is filling the tank with water.
⤳*The tank contains some water but it is not full*

(14)   John is walking from Stanford to Menlo Park.
⤳*John has covered part of some path that overlaps (the physical location of) Stanford and Menlo Park.*

(15)   John is swimming across the lake.
⤳*John has swam across part of a cross-section of the lake.*

- With event types and thematic relations that do not satisfy mapping to objects based on a mereological 'part-of' relation, partial realization implications are not easy to pin down.

(16)   Rebecca was synthesizing a new chemical element when she gave it all up.
⤳*No new chemical element*

(17)   Rebecca was developing an AIDS vaccine when she changed fields.
⤳*No AIDS vaccine*

Effect of Plural Arguments

- Plural arguments affect the implications of existence or partial realization

    - (19) is consistent with some soldiers having crossed the bridge at the time of the explosion

- Bare plural arguments

    - Van Geenhoven 2005: with intensional verbs like *seek, look for* a bare plural complement gets only an opaque reading but "a bare plural complement of a verb of creation always entails existence, even of complete objects"

(18)   John is uprooting the weeds in the garden.
⤳*Some of the weeds are not rooted in the ground anymore*

(19)   The soldiers were crossing the bridge when the bomb exploded.
⤳*At least some of the soldiers had gone across at least part of the bridge at the time of the explosion*

(20) a.   Ed is looking for books on Cretan cuisine.
    b.   When Ed came home, his daughter was drawing circles on the wall.

Verbs of selection

(von Stechow 2001, McCready 2006, Kratzer 2007)

(21) a.   Ed picked out a pumpkin.
        ⤳*There is a pumpkin that John has picked out.*
    b.   Ed is picking out a pumpkin.
        Consistent with there being no pumpkin that Ed is picking out.
    c.   Ed is picking out pumpkins.
        Consistent with some pumpkins having been picked out by Ed.

Two views on the progressive

> **intensional view:** the progressive relates an event in progress and a corresponding complete event that may be non-actual (Dowty 1979, Landman 1992, Asher 1992, Bonomi 1997, Portner 1998, Zucchi 1999, Higginbotham 2004, Fernando 2008, among others)
>
> **extensional view:** the progressive turns a complete event into an incomplete event, an event in progress (Parsons 1989, 1990, Van Geenhoven 2005, Szabó 2008, among others)

2   An Argument for an Extensional Analysis

- Szabó (2008): the semantic establishment vs. the semantic rebels

- Szabó defends an extensional analysis of the progressive based on the implications of existence associated with it and appealing to events and objects in progress

- "By contrast, the modal analysis of the progressive is designed to explain one thing: the slogan that nothing is happening unless it can eventually happen." (p. 504)
- "The fundamental problem with all intensional accounts is that they fail to explain why the objects of progressive accomplishments are specific. " (p. 500–501)
- "I claim that existential generalization from the direct object position of a progressive sentence is valid, but the predicate within that position cannot be freely exported. If Esther is building a house there is a thing she is building—a house in progress." (p. 515)
- "A house in progress is as real as a finished house – it is a concrete entity available for demonstrative reference with a determinate location in space. " (p. 515)
- "the building processes play a crucial role in individuating houses in progress. This is enough to ensure that there cannot be a simple reduction of houses in progress to other, allegedly less suspicious objects." (p. 516)

(22) a. Esther was building a house.
  b. $\exists e((\text{IP(building)})(e)$ & AGENT(e, Esther) & THEME$(e, \text{a IP(house)}))$

(23) a. Mary was crossing the field.
  b. $\exists e((\text{IP(crossing)})(e)$ & AGENT(e, Mary) & THEME$(e, \text{the field}))$

(24) a. Mary crossed the field.
  b. $\exists e((\text{IP(crossing)})(e)$ & AGENT(e, Mary_i) & THEME$(e, \text{the field}_j))$ &
    $\exists s(\text{being-across}(s)$ & IN(s, Mary_i) & THEME$(s, \text{the field}_j)$ & CAUSE$(e, s))$

- inferences associated with progressive sentences can be read off their logical form
- the incompleteness of the event description *Esther-build-a-house* is captured via the two separate IP predicate operators but they are not independent of one another: a building event is incomplete by virtue of the fact that it is incomplete as a building of a house
- the incompleteness of the event description *Mary-cross-the-field* is captured via one IP predicate operator plus the missing formula about the result state
- ➡ it would seem that an IP-type operator ought to take event descriptions in its scope, not just sortal predicates of events or individuals

---

3 Intensional Analyses

3.1 Normality

Dowty (1979):

(25) *Prog*(ϕ) is true at $\langle I, w \rangle$ iff for every $w' \in Inr(\langle I, w \rangle)$, there is an interval I' with I as a non-final subinterval, $I \subset_{nf} I'$, and ϕ is true at $\langle I', w' \rangle$.

- For an accomplishment predicate like *swim across the lake* whether the sentence in the progressive entails the sentence in the perfective depends on whether $w \in Inr(\langle I, w \rangle)$.
- Activity predicates like *swim in the lake* satisfy the subinterval property so the sentence in the progressive entails the sentence in the perfective.
- For an activity predicate whether the sentence in the progressive entails that the described event went on past the reference time depends on whether $w \in Inr(\langle I, w \rangle)$.

Normality and Interruptions

Inr **is too global:** all the facts of w at time I determine $Inr(\langle I, w \rangle)$ (see e.g. Vlach 1981, Abusch 1985, Asher 1992, Landman 1992)

- Suppose that the most likely course of events given everything that holds true at the reference time is for the interruption to occur
- Suppose that if both Mary's crossing and the truck moving follow their natural course, then collision is inevitable. Still (26) is judged to be true in that situation
- In a two truck scenario (27) and (28) both can be judged true.

(26) Mary was crossing the street when the truck hit her.

(27) Mary was crossing the street when the first truck hit her.

(28) If the first truck hadn't hit her, the second truck would have.

3.2 Actual Facts and Reasonable Options

Landman 1992:

"Thus, if an accomplishment manages to get completed, it is unproblematic to assume (in retrospect) that the progressive is true during the development stage ... This is the case even if the event gets completed *against* all odds." (p. 14)

- Scenario 1: no miracle, Mary drowns. Scenario 2: miraculously, Mary swims across the Atlantic.
- (29) is false on Scenario 1 but true on Scenario 2.
- The fact that Mary actually manages to cross the Atlantic is taken into account in the evaluation of the progressive.
- Landman argues that some form of normality is necessary to distinguish between (26), on the hand, and (30), (29), on the other.

(29) Mary was crossing the Atlantic.   *[false on Scenario 1/true on Scenario 2]*

(30) Mary was wiping out the Roman army.

Landman's Event Stages

- An event e is a stage of another event e_1 if e_1 can be regarded as a more developed version of e, that is, if e_1 is the same event in a further stage of development.
- Let e be an event that goes on at i in w. Let e_1 be an event that goes on at j in w and $i \subset j$.

  - e_1 is a continuation of e iff e is a stage of e_1.

- Let j be a non-final interval [*sic*].

- e_1 stops at j in w iff no event of which e_1 is a stage goes on beyond j in w.
  - Let P be an activity or accomplishment predicate, where $P(e_1)$, and e a stage of e_1.
    - e is a process stage of e_1 iff e has the same process characteristics as e_1.

Event Stages and Reasonable Options

- The set of reasonable options for e in w, $R(e, w)$, is such that $v \in R(e, w)$ iff there is a reasonable chance <u>on the basis of what is internal to e in w</u> that e continues in w as far as it does in v.
- in determining what chance a stage has of continuing ignore facts about the world that are external to the stage
- within a world look just at what happens
- construct a continuation branch by considering continuation in a given world plus counterfactual reasoning
- *PROG* as a relation between events and event properties

(31) $PROG(e, P)$ is true in w iff $\exists e' \exists v$: $\langle e', v \rangle \in Cont(e, w)$ and $P(e')$ in true in v.

Issues with Landman's analysis

- The notions of stage and continuation/development are ultimately a primitive in the theory

- The same event can be a stage of different types of possible developments in a way that is relevant to the meaning of the progressive (Bonomi 1997)

- Multiple Choice Paradox (Bonomi 1997)

- Context sensitivity and perspectives (Landman 1992, Asher 1992, Bonomi 1997)

Incompatible developments

Suppose that at 10am of June 21 I am on a boat that goes from the port of Rafina to the islands of Andros, Naxos, Paros with the intention of getting off at the Naxos port.

(32) *Said at 10am on June 21:*
    a. I am going to Naxos on the boat from Rafina. *[true]*
    b. I am going to Paros on the boat from Rafina. *[false]*

Now suppose that there was a problem at the port of Naxos so the boat couldn't stop and, as a result, I ended up on Paros.

(33) *Said on June 22:*
    a. Yesterday at 10am I was going to Naxos on the boat from Rafina. *[true]*
    b. Yesterday at 10am I was going to Paros on the boat from Rafina. *[true]*

Suppose the same scenario as before except that at 10am I have not made up my mind yet which port to get off on.

(34) *Said at 10am on June 21:*
     I am going to a Cycladic island.   *[true]*
     ⤳*There is no particular Cycladic island I am going to.*

(35) *Said at 10am on June 21:*
     a. I am going to Andros.   *[false]*
     b. I am going to Naxos.   *[false]*
     c. I am going to Paros.   *[false]*

Context sensitivity and perspectives

Suppose I board a plane headed to NYC but which is hijacked and ends up in Washington: both (36a) and (36b) can be judged true.

(36) a. I was flying to NYC.
     b. I was flying to Washington.

The set of reasonable options is too restrictive and absolute

– The counterfactual alternatives in the continuation branch of a world w are determined based on a local/limited view of the facts in w at a given time.

➠ But we need to allow for alternatives in which the 'event in progress' in w develops and culminates in different ways.

➠ We also need to introduce context sensitivity in the semantics of the progressive.

The Multiple Choice Paradox in an extensional analysis

- Szabó (2008) attributes the lack of existential generalization seen in the multiple choice paradox to the intensionality of the preposition *to*

(37) a. Leo was driving to a French town.
     b. $\exists e((\text{IP}(driving))(e)$ & AGENT$(e, \text{Leo })$ & to$(e, \text{a French town}))$

(38) a. Leo drove to a French town.
     b. $\exists e((\text{IP}(driving))(e)$ & AGENT(e, Leo) & to$(e, \text{a French town})$ &
        $\exists s(being(s)$ & at$(s, \text{a French town})$ & CAUSE$(e, s))$

4   A Certain Similarity with *'Before'*

The clausal complement of *'before'* is not entailed by the whole sentence. In contrast, the complement of *'after'* is entailed. The matrix clause is always entailed:

(39) a. *'A before B'* $\not\Rightarrow$ B   *'A before B'* $\Rightarrow$ A
     b. *'B after A'* $\Rightarrow$ B   *'B after A'* $\Rightarrow$ A

---

(40) I left the party before I got sick.   (41) Mozart died before he finished the Requiem.
    a. ⇒I left the party.   a. ⇒Mozart died.
    b. ⇏I got sick.   b. ⇏Mozart finished the Requiem.

> – Under what circumstances is *'A before B'* true when *B* is false?
> – An intuitively plausible and often observed parallelism links the truth of "counterfactual" *'A before B'* with that of the corresponding counterfactual conditional *'If had not been A, would have been B'*.
> – What exactly is implied about *'B'* depends on the context (Heinämäki 1972, Ogihara 1995, Beaver & Condoravdi 2003).

(42) a. The police defused the bomb before it exploded.
    b. If the police had not defused the bomb, it would have exploded.

Analysis of non-veridical readings

In the analysis of Beaver and Condoravdi (2003), the time contributed by the temporal clause is specified in terms of an *earliest* operator applied to the denotation of the temporal clause. When *earliest* is undefined at the world *w* of evaluation, it is relativized to a set of alternative worlds:

– Trace *w* back to the reference time t_A of *'A'* (when *'not A'* was still possible)
– Look at those courses of events that were *reasonably probable* at w, t_A
– Check whether *'B'* is consistent with those courses of events
– If consistent, then *earliest* is defined at *w*
    (as the earliest occurrence of *'B'* among the courses of events that were reasonably probable at w, t_A)

(Non-)veridical implications as contextual entailments

– The definedness of *earliest* is not a pragmatic presupposition
    (i.e., need not be satisfied at all worlds in the context set in order for the interpretation to succeed).
– *Point-wise* evaluation at worlds in the context set: those where *earliest* is undefined are discarded
    (i.e., where *B* did not happen and was unlikely at the relevant time).
➠ *'before/after'*-clauses can be informative.
– Only those worlds survive the update at which *B* either happened or was *reasonably probable*.
    Note that if *B* happened, it need not have been likely!
– For consistent update, it is sufficient that there be *some* such worlds in the context set.
➠ Veridical and non-veridical readings are *contextual entailments*
    (i.e., they result from updating particular types of context with a *'before/after'* sentence).

Most important for our purposes:

– "For the counterfactual reading, the input context has to entail that A's occurrence makes B's later occurrence impossible and that prior to A's occurrence there was a process that made B's occurrence at least reasonably probable." (Beaver & Condoravdi 2003:51)
– What matters for the question whether *'A'* happened "before *B*" or not is whether *'B'* was likely at the time.
– ignore everything that came after *'A'*;
– consider *all and only* the facts of the world at the reference time of *'A'*.

Questions:

– What does "reasonably probable" mean?
– What is the relationship between (42a) and (42b)?
– Are posterior facts (later than the reference time of *A*) ignored in both?

Counterfactuals *vs. 'before'*

– Posterior facts that are causally independent of *'A'* are held constant in the interpretation of the counterfactual *'if had been ¬A, would have been B'*.
– Such posterior facts are given up in the interpretation of *'A before B'*.
– But this is still not enough: Certain facts about the state of the world at the reference time of *'A'* must be given up as well.

4.1 Likelihood and *'before'*

Counterfactual *'A before B'* does not always imply that *'B'* is (was) probable at the time in question.

In (43) the use of *before* is felicitous even though the meteor was unlikely to reach the ground.

(43) a. *[As meteors usually do / As scientists expected,]*
         the meteor burned up before it hit the ground.
    b. If the meteor had not burned up, it would have hit the ground.

– The context given in (43) explicitly denies that the meteor was likely to hit the ground. Still, there is no problem with (43a).
– Notice that the counterfactual (43b) is true as well. This is for a somewhat different reason, though (see below).

Likewise, (44a) is felicitous even though Bill's books were never likely to become overdue.

(44) a. *[As he always does / as people around here always do,]*
         Bill returned his books to the library before they became overdue.
    b. If Bill hadn't returned his books to the library, they would have become overdue.

A better strategy for interpreting *'before'*-sentences

- Causally independent facts are not just "given up" in the interpretation of *'before'*-sentences

  – Giving up facts means "opening up" the question of whether those facts were likely to hold.
  – The answer may well be affirmative.
  – That's not what we want in cases like (43a), (44a).

- Rather, the very question of whether they occur or not is *disregarded*.

  – Intuitively, focus on a part of the world: the process that is/was (at the relevant time) bound to bring about the truth of the *'before'*-clause.
  – Don't even think about things external to that process.

A potential objection

Q: But the counterfactuals in (43b) and (44b) are also true! Doesn't that (somehow) explain the truth of the *'before'*-sentences?

A: – The counterfactuals are true because their antecedents are causally (though not logically) inconsistent with the events that interfered with the truth of B (the friction in the atmosphere; the books' becoming overdue).
    – Conditional antecedents "win" over unmentioned conflicting facts (see Hiddleston, 2005, for a theory which takes this into account)
    – In *'before'*-sentences, we want to know whether a given time lies "before B," regardless of what happens at that time.
  ➠ Our interpretation of *'before B'* cannot make reference to (the negation of) A.

5 Outline of a formal analysis

5.1 Premise semantics, similarity, and human necessity

Main points (accepted here largely without argument):

– Counterfactuals and *'before'*-sentences alike call for a modal interpretation in terms of what's likely, necessary, etc.
– The standard interpretation of necessity as truth at *all A*-worlds is too strong for our purposes.
  For instance, if *'B'* was likely but did not happen, its likelihood cannot have been truth at all possible courses of events. Similar arguments abound for conditionals.
– "Human necessity" is a weaker notion of (roughly speaking) truth at all "relevant" worlds, e.g., all worlds following the "normal" course of events.
➠ Goal: Encode the difference between counterfactuals and *'before'*-clauses in terms of different conditions on the "relevant" worlds to consider.

Some formal background

Let us adopt the formal tool of an *ordering source* imposing a relation of *relative likelihood* on the possible worlds (or states of affairs). For details, see Kratzer (1981).

– A *proposition* is a set of possible worlds.

- A *modal base* is a function f from worlds to sets of propositions. For concreteness, let $f(w)$ be the set of those propositions that are contextually taken for granted. Their intersection, $\bigcap f(w)$, is the set of those worlds which, are compatible with everything that is taken for granted.
- An *ordering source* is a function o from worlds to sets of propositions. Intuitively, on one construal, $o(w)$ is the set of those propositions that are "normally" true (or more likely to be true than not) given the facts at w.
- At each world w of evaluation, $o(w)$ induces an order between worlds: world u is (at least) as relevant as world v iff all the propositions in $o(w)$ that are true at v are also true at u.

(45) $u \leq_{o(w)} v \iff \{p|p \in o(w) \wedge v \in p\} \subseteq \{p|p \in o(w) \wedge u \in p\}$

5.2   Counterfactuals

Main idea:

- In the evaluation of *'If had been A, would have been B'* at world w, the "relevant" worlds are those which satisfy two conditions:

    · A is true at them; and
    · they are at least as similar to w as any other A-worlds.

- Roughly: The counterfactual is true at w iff among all A-worlds, those that are most similar to w are B-worlds (Stalnaker, 1968; Lewis, 1973).

- $f(w) = \emptyset$ for all w. Thus $\bigcap f(w) = W$, the set of all worlds.
- Since the relevant ranking is based on *relative similarity to w*, $o(w)$ contains propositions that are true at w.

Q: Which true propositions?

How the relevant worlds are chosen (reconstruction of similarity)

Much recent work in philosophy, psychology and artificial intelligence has explored the role of *causal (in)dependencies* in the interpretation of counterfactuals (Spirtes et al., 1993; Pearl, 2000; Hiddleston, 2005; Schulz, 2007, among many others)

(46)   *[I bet on heads, the coin came up heads, I won]*
       If I had bet on tails, I would have lost.

- True if the speaker's bet has no (causal) influence on the outcome of the toss.
- False if it does (e.g., if a different fair coin is used depending on the bet).

(47)   *[I got off the bus, the bus had an accident, I was uninjured]*
       If I hadn't gotten off the bus, I would have been injured.

- True if the speaker's presence or absence on the bus has no (causal) influence on the accident.
- False if it does.

➥ If a relation of *causal dependence* (or causal influence) is given as basic, then the interpretation of counterfactuals can be explained in terms of it.

Lots of people nowadays think that this is a more fruitful approach than Lewis's attempt to go the other way and reduce causality to counterfactual (in)dependence.

Main idea reconstructed:

- In the evaluation of *'If had been A, would have been B'* at world w, the "relevant" worlds are those which satisfy two conditions:
  - · A is true at them; and
  - · True propositions at w that are causally independent of A are true at them.
- The counterfactual is true at w iff among all A-worlds, the most relevant ones are B-worlds.

This is a simplified picture. The causally most relevant worlds should be ranked further by likelihood or normalcy. We ignore this here.

Some formal background

- Causal dependence is a relation between *variables* (in the statistical sense).
- The relation is transitive and asymmetric (often given as a *directed acyclic graph*).
- In our framework, a "variable" is a *partition* of the set of all worlds (like a question denotation).
- For simplicity, assume that these variables are binary (i.e., yes-no questions): Each corresponds to a proposition and its negation.
- At each world, all relevant variables take some value or other.

  (48)   Let X_w be the cell in partition X that contains world w.

- Impose the following constraint on ordering sources for counterfactuals:

  (49)   For all X, Y such that $X \rightarrow Y$ (i.e., X causally influences Y), and all w, $o_{cf}(w)$ contains only $Y_w \cap X_w$ (not Y_w).

  Intuitively, the partition Y does not really play a role in the intepretation; only its refinement by X does.

Upshot:

- Suppose X, Y are both true at w.
- Without causal dependence: Among the worlds at which X is false, those at which Y is true are more similar to w than those at wich Y is false.
- With causal dependence $X \rightarrow Y$: Among the worlds at which X is false, Y does not count towards relevance at w.
- ➡ We derive the following asymmetry:

  (50) a.   If Y were false, X would (still) be true.
      b.   If X were false, Y might not be true.

---

(51)   If I had stayed on the bus, I would have been injured.

- Suppose my presence or absence on the bus had no causal bearing on whether there would be an accident.

➧ At worlds w at which the accident happened, $o(w)$ contains the proposition that the accident happened.
This proposition is consistent with the antecedent of (51), hence (51) is true.
– Suppose my whereabouts did have an influence on the accident.
➧ At worlds w at which the accident happened, $o(w)$ does not contain the proposition that the accident happened, but only the proposition that I got off and the accident happened.
This proposition is not consistent with the antecedent of (51), hence (51) is false.

5.3 *'Before'*-clauses

(52) The meteor burned up before it hit the ground.

> **Main idea:**
>
> – What mattered for counterfactuals was a kind of "similarity to w."
>   Since the accident happened, accident-worlds are more relevant than others.
> – What matters for *'before'*-clauses is not similarity.
> – *Nor* is it (overall) likelihood, however.
>   (52) may be true even if the meteor never had a chance to hit the ground.
> ➧   · Not only do we not hold on to the fact that the meteor burned up;
>   · We even disregard the question of whether it would burn up nor not.

Implementation

– Assume again that we are given information on causal independence.
– Consider some relevant fact, such as the fact that the meteor was falling (along a certain trajectory, with a certain velocity) at time t.
– Worlds at which it burns up in the atmosphere are *more likely* than worlds at which it doesn't.
– This follows from a "stereotypical" ordering source of the usual kind:

(53) For all X, Y such that $X \twoheadrightarrow Y$, and all w, $o_l(w)$ contains Y_w or its negation, whichever is more "normal" at w.

– BUT the atmosphere presents an external intervention on the meteor's fall.
– Impose the following constraint on ordering sources for *'before'*:

(54) For all X, Y such that $X \twoheadrightarrow Y$, and all w, $o_i(w)$ contains neither Y_w nor its negation.

– *A before B* will be defined in world w relative to a partition X only if there is a cell in which *'B'* is a human necessity.
– Condition (54) will remove any partitions Y that are causally independent of X, that is, it will make ordering sources $o_l(w)$ for $w \in X_B$ irrelevant.
– Consequently, even though in both (55a,b) the *'before'*-clause is not only false but unlikely as well, (55a) is infelicitous (there is no X relative to which David's making a clean sweep of all the gold medals in the Sydney Olympics is a human necessity) while (55b) is felicitous.

(55) a. David ate lots of ketchup before he made a clean sweep of all the gold medals in the Sydney Olympics.
 b. Mozart, fatally ill, died before he finished the Requiem.

6 The Progressive

6.1 Partial Realization

- The semantics of the progressive makes reference to partial realization of an event description by some event, which is continued, actually or counterfactually.
- Partial realization presupposes a potential eventual development of full realization.
- Implications of existence are tied to partial realization.
- Use Piñón's (2008) notion of the degree of realization of an event type to model partial realization.

Piñón's (2008) aspectual composition with degrees

- An event type is realized to degree d, where $0 \le d \le 1$
- "what is measured by degree functions is the degree to which x qua type O is affected (or effected) in e with respect to the verbal property in question. Thus, the incremental degree function eat_δ does not measure the degree to which x as a 'bare individual' or quantity gets eaten in e but instead measures the degree to which x as an individual of type O gets eaten in e." (p. 203)
- Regarding activity predicates: "the incremental degree function eat_δ does not measure the degree to which x as a 'bare individual' or quantity is eaten in e. Instead, it measures the degree to whihc x qua type 'applesauce' is eaten in e, and so a sensible answer seems to be that if x qua type 'applesauce' is eaten at all in e, then the degree to which x qua type 'applesauce' is eaten in e is 1. Although, naturally, eating more of x would mean that a larger quantity of applesauce is eaten, it would not change the degree to which x qua type 'applesauce' is eaten. To harp on this point, we are not measuring quantities of applesauce that are eaten – we are measuring the degree to which the event type 'eat applesauce' is realized." (p. 205–206)

6.2 Partial Realization and Intensionality

- An event is assumed to partially realize an event type of a particular kind against a modal background of the same type as with *'before'*: you track the development of a process, disregarding any causally independent issues.
- The full realization of P (realization of P to degree 1) is a human necessity relative to ordering sources of two different kinds:
    - ordering sources based on prior intentions, plans, schedules, or on the physical state of some event participants, etc.
    - realistic ordering sources based on what actually happened

(56) $P(w, e, d)$, for $0 < d < 1$, is defined in w relative to c determining an appropriate ordering source o_i only if it is a human necessity relative to $o_i(w)$ that there is e' fully realizing P such that $e \subset e'$.

(57) $PROG(e, P)$ is true in w relative to c with contextual standard d_c iff
(i) for some d, $P(w, e, d)$ and $d_c \le d$,
(ii) there are e', d', and w' such that $e \subset_{nf} e'$, $d \le d'$, $w' \le_{o_i} w$, and $P(w', e', d')$

The idea: Supposing A and B are at equal distance from where you are, you can be halfway to A and halfway to B but, depending on your intentions, you are only going to A or to B.

The Context Dependence of the Progressive

- The interpretation of the progressive is made dependent on:
  - · a contextually determined ordering source of the appropriate type
  - · a contextually supplied standard for event type degree of realization

The Role of the Contextual Standard

(58) a. The Taliban are wiping out the American troops.
   b. The lethal agent is wiping out the city.

(59) a. The train was arriving at the station when the bomb exploded.
   b. He is dying.

(60) a. Mary was swimming across the Atlantic.
   b. Mary swam across part of the Atlantic.

(61)   Mary was wiping out the Roman Army.
     Mary wiped out part of the Roman Army.

- The truth of 60a) or (61a) depends on how much of the path on the Atlantic Mary has traversed by swimming, or how much of the Roman Army Mary has destroyed at the reference time in the world of evaluation.
- This is just like (60b) and (61b): a few kilometers are not sufficient for the truth of either (60a) or (60b); similarly, a few soldiers/units are not sufficient for the truth of either (61a) or (61b).

The role of the ordering source

- Different contexts of utterance may determine a different ordering source
- In the hijacking scenario, (62a) is judged true if the ordering relative to which the realization of *I fly to NYC* is a human necessity is determined by e.g. the schedule of the flight;
- (62a) is judged true if the ordering relative to which the realization of *I fly to NYC* is a human necessity is determined by the actual course of events
- Similarly, for the cases of the trip to the Cycladic islands.
- A realistic ordering source can be intended by the speaker only after "the facts are in", hence the switch on the truth value judgement in the case of the unfortunate trip to Paros.
- The specificity of your intentions will also determine the human necessities supported by the ordering source, hence you can truthfully be said to be going to a Cycladic island without there being any particular Cycladic island you are going to.

(62) a. I was flying to NYC.
   b. I was flying to Washington.

(63) a. I am going to Paros on the boat from Rafina.   *[false]*
   b. Yesterday at 10am I was going to Paros on the boat from Rafina.   *[true]*

References

Abusch, D. 1985. *On Verbs and Time*. PhD thesis, University of Massachusetts, Amherst, MA.

Asher, N. 1992. A default truth-conditional semantics for the progressive. *Linguistics and Philosophy*, 15: 463–508.

Beaver, D. and C. Condoravdi. 2003. A uniform analysis of *before* and *after*. In *Proceedings of SALT XIII*, pages 37–54.

Bonomi, A. 1997. The progressive and the structure of events. *Journal of Semantics*, 14:173–205.

Dowty, D. 1979. *Word Meaning and Montague Grammar*, volume 7 of *Studies in Linguistics and Philosophy*. Reidel.

Fernando, T. 2008. Branching from inertia worlds. *Journal of Semantics*, 25:321–344.

Geenhoven, V. V. 2005. Cross-domain plurality and (im)perfective aspect. Handout of talk presented at *Semfest 6*, Stanford University.

Heinämäki, O. 1972. Before. In *Proceedings of CLS 8*, pages 139–151.

Hiddleston, E. 2005. A causal theory of counterfactuals. *Noûs*, 39(4):632–657.

Higginbotham, J. 2004. The english progressive. In Guéron, J. and J. Lecarme, editors, *The Syntax of Time*, pages 329–358. The MIT Press.

Kratzer, A. 1981. The notional category of modality. In Eikmeyer, J. and H. Riesner, editors, *Words, Worlds, and Contexts*, pages 38–74. Walter de Gruyter.

Kratzer, A. 2007. On the plurality of verbs. In Dölling, J., T. Heyde-Zybatow, and M. Schäfer, editors, *Event structures in linguistic form and interpretation*. Walter de Gruyter, Berlin.

Lewis, D. 1973. *Counterfactuals*. Harvard University Press.

McCready, E. 2006. Created objects, coherence and anaphora. *Journal of Semantics*, 23:251–279.

Ogihara, T. 1995. Non-factual *before* and adverbs of quantification. In *Proceedings of SALT V*, pages 273–291. CLC Publications, Cornell University.

Parsons, T. 1989. The progressive in english: Events, states and processes. *Linguistics and Philosophy*, 12: 213–241.

Parsons, T. 1990. *Events in the Semantics of English. A Study in Subatomic Semantics*. The MIT Press.

Pearl, J. 2000. *Causality: Models, Reasoning, and Inference*. Cambridge University Press.

Piñón, C. 2008. Aspectual composition with degrees. In McNally, L. and C. Kennedy, editors, *Adjectives and Adverbs: Syntax, Semantics, and Discourse*, pages 183–219. Oxford University Press.

Portner, P. 1998. The progressive in modal semantics. *Language*, 74:760–787.

Schulz, K. 2007. *Minimal Models in Semantics and Pragmatics: Free Choice, Exhaustivity, and Conditionals*. PhD thesis, University of Amsterdam.

Spirtes, P., C. Glymour, and R. Scheines. 1993. *Causation, Prediction, and Search*. Springer.

Stalnaker, R. 1968. A theory of conditionals. In *Studies in Logical Theory, American Philosophical Quarterly, Monograph: 2*, pages 98–112. Blackwell.

von Stechow, A. Temporally opaque arguments in verbs of creation. In Cecchetto, C., G. Chierchia, and M. T. Guasti, editors, *Semantic Interfaces: Reference, Anaphora and Aspect*, pages 278–319. CSLI Publications, Stanford, CA.

Szabó, Z. G. 2008. Things in progress. *Philosophical Perspectives*, 22:499–525.

Vlach, F. 1981. The semantics of the progressive. In Tedeschi, P. and A. Zaenen, editors, *Tense and Aspect*, volume 14 of *Syntax and Semantics*, pages 271–292. Academic Press.

Zucchi, S. 1999. Incomplete events, intensionality and imperfective aspect. *Natural Language Semantics*, 7:179–215.