On the Progressive and the Perfective*

Zoltán Gendler Szabó
Cornell University

Socrates: Thirdly, that it is impossible that a thing should ever be what it was not before without having become and without any process of becoming?
Theaetetus: Yes, I think so.

Plato, Theaetetus 155b

0. Introduction

Grammar distinguishes between the *tense* and the *aspect* of a sentence. While (1) and (2) are both in past tense, they differ aspectually: the first sentence is in *perfective* aspect, the second in *progressive*.

(1) Mary crossed the street.
(2) Mary was crossing the street.

Since these sentences share their syntactic and semantic features except for their aspect, I will call them *aspect-correlates*: (1) is the perfective correlate of (2) and (2) is the progressive correlate of (1).[1] Their meanings are related in a fairly straightforward way: (1) says that at some point in the past some crossing of the street by Mary was *completed*, according to (2) at some point in the past some such crossing was *in progress*. The question is how to incorporate this insight into a semantic theory of English.

A natural suggestion might be that the paraphrases closely capture the sentences' logical forms. The idea could be fleshed out by assuming that verbs like 'cross' contribute predicates of events to logical form.[2] These are the logical forms Terence Parsons has suggested for (1) and (2):[3]

(1′) $\exists e \exists i \exists t (i < now \land t \in i \land crossing(e) \land Agent(e, Mary) \land Theme(e, the\ street) \land Cul(e,t))$

(2′) $\exists e \exists i \exists t (i < now \land t \in i \land crossing(e) \land Agent(e, Mary) \land Theme(e,$
the street$) \land Hold(e,t))$

There is much to be said in favor of Davidsonean semantics in general and Parsons's analysis in particular. Still, such an account fails to provide what semanticists thinking about the progressive have long sought: a *semantic analysis* of (2) in terms of (1). (By a semantic analysis of a sentence S in terms of a sentence S', I mean an equivalence that would allow us to determine the truth-value of S relative to certain parameters—speaker, time, possible world, and whatever else the semantics is relativized to— given the complete truth-value distribution of S' over the values of those parameters.) Since the two-place predicates '$Cul(x,y)$' and '$Hold(x,y)$' in (1′) and (2′) are *lexical primitives* (with respective interpretations 'x culminates at y' and 'x holds at y') without additional meaning postulates, Parsons's theory does not specify truth-conditions for the progressive (2) in terms of its perfective correlate (1).

One might wonder whether this is a genuine shortcoming. Why think that semantics *should* deliver such an analysis? I suspect the reason is a certain felt analogy with tense. Consider (2), (3), and (4):

(2) Mary was crossing the street.
(3) Mary is crossing the street.
(4) Mary will be crossing the street.

Since these sentences share all their syntactic and semantic features except for tense I will call them *tense-correlates*: (2) is the past correlate of (3) and (4), (3) is the present correlate of (2) and (4), and (4) is the future correlate of (2) and (3). Whatever the details of an adequate semantic theory of English might look like, it is natural to expect that it will yield the following equivalences:[4]

(5) (2) is true at t iff there is a t' before t such that (3) is true at t'
(6) (4) is true at t iff there is a t' after t such that (3) is true at t'

(5) and (6) provide analyses of the past and future tenses respectively in terms of the present tense, the prepositions 'before' and 'after', and quantification over times. And they do so in such a straightforward manner that the claim that this sort of analysis belongs to semantics—that it is part of what *qua* speakers of English know when they understand these sentences—has been nearly uncontested.[5] Given that tense and aspect are two facets of the way natural language expresses the temporal structure of events, it might be natural to expect analogous treatment for aspect as well. And that, many have thought, would require a semantic theory that entails a semantic analysis of progressive sentences in terms of their perfective correlates.

I will argue that Parsons is entirely justified in giving up on this traditional expectation: a semantic analysis of progressive sentences in terms of their perfective correlates is a more or less hopeless enterprise.[6] And even if such an analysis could be given, it is not part of what a semantic theory should deliver; it is not something speakers of English must know on account of their competence.[7] But abandoning the traditional project is not the same as abandoning the semantic analysis of aspect altogether. What I propose to explore in this paper is the possibility of a *reverse analysis*, an analysis of perfective sentences in terms of their progressive correlates. The analysis I present is not as simple as (5) or (6), but it is simple enough to make the hypothesis that it is part of what speakers of English know when they understand (1) and (2) quite reasonable.

That one type of sentence might be straightforwardly analyzed in terms of another, but not the other way around, is a familiar predicament. Consider again tense. While we have simple analyses of past and future tenses in terms of the present tense, it is by no means clear how one could analyze the present tense in terms of the other two. (Though tempting, it is incorrect to say that a present tense sentence is true at t just in case at all times after t its past correlate is true and at all times before t its future correlate is true. If the ordering of times is dense, a present tense sentence can be false at a time even though its past correlate is always true afterwards and its future correlate is always true beforehand.) If I am right, we have a similar asymmetry in the case of aspect.

My goals in this paper are relatively modest. I do not claim to provide a compositional semantic *theory* for aspect. To do that, one would need to take a stand on the syntactic structure of these sentences and choose an appropriate semantic framework. Among other things, one would have to take into account the way aspect interacts with tense, with quantifiers, with aspectual verbs, and with a variety of prepositional complements. For now, my aim is simply to present a novel way of explaining the truth-conditions of *simple* perfective English sentences in terms of the truth-conditions of their progressive correlates. That is, what I propose is a *constraint* that adequate semantic theories dealing with aspect should meet.[8]

The plan of the paper is as follows. Sections 1 and 2 provide an overview of some of the attempts to provide a semantic analysis for the progressive. In section 1, I discuss how the recognition that progressive sentences do not entail their perfective correlates made it clear that such a semantic analysis must presuppose a richer ontology than that of classical tense logic. In section 2, I present some of these subsequent proposals, leading up to one that fares the best with the examples discussed in the literature. In section 3, I criticize that account on two grounds: that it gives rise to an unwelcome modal implication, and that it fails to accommodate intuitively valid

inferences from perfective sentences to their progressive correlates. This concludes the negative part of the paper. In section 4, I present and defend my own alternative analysis, an analysis that reverses the traditional order and analyzes the perfective in terms of the progressive. Finally, in section 5, I try to answer the objection that even if my analysis is adequate, it cannot be significant for compositional semantics, since it analyzes simpler sentences in terms of more complex ones. Section 6 is a brief summary of the results.

1. The Imperfective Paradox

In the literature on the semantics of the progressive, the fact that a progressive sentence can be true even though its perfective correlate is false is often called *the imperfective paradox*. Thus, for example, from 'Mary was crossing the street' we cannot infer 'Mary crossed the street'. The reason is obvious: Mary may be crossing the street without ever getting across. She might, for example, die of a heart attack along the way.

To appreciate why this has been regarded as paradoxical, we need to recall a fundamental assumption of semantic theorizing in the 70's and early 80's. It was then widely believed that the appropriate framework for dealing with questions of tense and aspect was classical tense logic or some suitable extension of it. Within such a framework, the earliest analysis of the progressive was the one given in Montague (1969) and Scott (1970):

(I) $Prog[\varphi]$ is true at an instant t iff φ is true at every instant t' in some open interval containing t

Unfortunately, this analysis licenses the inference from 'Mary was crossing the street' to 'Mary crossed the street': if $Prog[\varphi]$ is true at t, so is φ. At first, the problem was thought to be that we are only allowed to quantify over instants within classical tense logic. Bennett and Partee (1972) proposed the introduction of intervals and the following semantic clause for the progressive:

(II) $Prog[\varphi]$ is true at an interval i iff φ is true at some interval i' that contains i as a non-final part

This amendment blocks the troubling inference: φ might be true at i' without being true at any of its sub-intervals, and hence, without being true at i. But the switch from instants to intervals does not go to the heart of the imperfective paradox: (II) still says that if $Prog[\varphi]$ is true at a time, φ must also be true at some time or other. So, the analysis validates the inference from (2) to (7):

(2) Mary was crossing the street.

(7) At some time Mary crossed the street.

But again, Mary can be crossing the street without ever getting across.

So, (I) and (II) fail. Can we hope for an adequate analysis that fares better than these within the scope of tense logic, broadly construed? The answer is no. Using tense logic, we cannot do more on the right hand side of a proposed analysis than specify the entire temporal extension of φ, i.e. the set of those intervals where φ is true. But this is not enough: there are sentences φ_1 and φ_2 with identical temporal extensions such that Prog[φ_1] and Prog[φ_2] differ in truth-value. Let Oak Street and Pine Street be streets freshly built, never crossed by Mary. Suppose Mary begins to cross Oak Street, but before she finishes her crossing both streets are blown up by terrorists. Then the sentence 'Mary was crossing Oak Street' is true and the sentence 'Mary was crossing Pine Street' is false, even though 'Mary crossed Oak Street' and 'Mary crossed Pine Street' have identical (empty) temporal extensions.[9]

The moral is that in order to give an adequate semantic analysis for Prog[φ] we need a framework that includes more than just times plus whatever the ontological commitments of φ might be.

2. Enriching the Ontology with ...

Some have sought to solve the problem by introducing possible worlds, others by quantifying over events. The dominant view these days seems to be that we need both. Let me review and update the relevant arguments.

2.1. ... worlds ...
The most influential world-based analysis of the progressive is from Dowty (1979). It is very similar to the Bennett & Partee analysis, except for the newly introduced quantification over inertia worlds.

(III) *Prog*[φ] is true at i in w iff for every inertia world w' of w at i, φ is true in w' at some i' that contains i as a non-final part

Intuitively, the inertia worlds of w at the interval i are identical to w up to i, and differ from w afterwards only in being maximally boring. Past i in an inertia world everything takes its normal, natural course; we have no unexpected interruptions. So, according to (III) 'Mary is crossing the street' is true just in case she gets across in every world where nothing extraordinary interferes with her walk (or anything else, for that matter).

There is an immediate problem with this proposal. Suppose we have two simultaneous courses of events, which cannot both proceed in their natural ways. Say, a terrorist tries to blow up a building and a police officer tries to stop him. If one succeeds, the other must fail. Then, given the above characterization of inertia worlds, we must conclude that the actual world has *no* inertia worlds relative to times when these conflicting courses of events occur. (III) entails that at such times *all* progressive sentences are vacuously true, an unacceptable result.[10]

And there is an even more serious problem. (III) fails because Mary's crossing of the street can be interrupted by the natural course of events, for example, when a truck hits her.[11] Given the laws of nature, had the truck not prevented Mary from crossing the street *that* would have been a miracle. Mary does not get across in any of the inertia worlds, and hence, according to either analysis, the sentence 'Mary was crossing the street, when a truck hit her' cannot be true.

The problem seems irremediable without recourse to events. For any modal analysis of the progressive says that the truth of Prog[φ] in a world at a time is determined by the truth or falsity of φ in some worlds at some times, and hence, any such analysis must characterize somehow *which* worlds are the relevant ones. As a first pass, we should say that what takes its normal course in the relevant possible worlds where Mary crosses the street is not *everything*, but only *Mary's crossing of the street*. This, however, cannot be expressed without talking about Mary's crossing of the street, which is an event.

2.2. . . . and events

So, let us help ourselves to events and see how we can reformulate the analysis of the progressive with their help. I will make the assumption that the sentence 'Mary crossed the street' describes events of a certain type, namely, crossings of the street by Mary, and I will say that the sentence is *true of* the events it describes.[12] I will assume that the same event can occur in different possible worlds and that events are individuated at least as finely as their temporal extensions: if for some time t, e but not e' occurs at t then $e \neq e'$. As far as I can tell, these assumptions are not essential for articulating an event-based semantic analysis of the progressive; I make them for the sake of clarity and simplicity of presentation.

The main idea of an event-based analysis of the progressive is this: 'Mary was crossing the street' is true at an instant just in case some event occurs at that instant and in some not too far-fetched world where that event continues uninterrupted 'Mary crossed the street' is true of that continuation. More precisely:

(IV) *Prog*[φ] is true at t in w iff there is an e at t in w and there is a w', such that w' is a reasonable option for e in w and φ is true of the continuation of e in w'

I will leave the notion of the continuation of an event at the intuitive level for now; it will be discussed further in the next section.[13] w' is a reasonable option for e in w just in case there is a reasonable chance on the basis of what is internal to e that e continues in w as far as it does in w'.[14] This captures the thought that worlds that are reasonable options for e in w may lack external things, which interfere with the continuation of e in w (like trucks or heart attacks), but they must be just like w as far as the e itself is concerned. The distinction between the external and the internal character-istics of an event in a world is problematic, but let us not worry about it now. After all, the idea is *prima facie* appealing. That we need to restrict our attention to something like reasonable options is illustrated by the contrast between (8) and (9):

(8) Mary was walking across the street when a truck hit her.
(9) Mary was swimming across the Atlantic when she drowned.

(8) can easily be true, but not (9). This is exactly what (IV) predicts: a world where Mary gets across the street is reasonable option for her walking, but a world where Mary gets across the Atlantic is not a reasonable option for her swimming.

The trouble with (IV) is that sometimes we accomplish things against all odds. Suppose Mary is delusional and decides to swim across the Atlantic. She gets into the water in France and starts swimming towards the United States. Normally we would say that she isn't crossing the Atlantic. She may be *trying* to swim across, but she isn't swimming across. But now suppose that by divine intervention she makes it through. Then, it seems, she *was* swimming across the Atlantic, after all.[15]

Notice that the problem cannot be fixed by the *ad hoc* maneuver of including in the range of the quantification over possible worlds the actual one along with all the reasonable options. Imagine that God decides that he would help Mary swim across the ocean just in case she manages to swim a mile on her own. Suppose she drowns after three-quarters of a mile. Then (9) would still be true. After all, had she managed to swim another quarter of a mile, she would have made it across the ocean.

Fred Landman suggests a way to get around this problem. Roughly, he proposes that a progressive sentence is true at some time just in case some event occurs at that time, and if we follow the development of the event (within our world as long as it goes, then jumping into a nearby world, and iterating the process within the limits of reasonability) we will reach a possible world where the perfective correlate is true of the continuation. More precisely, it goes like this:[16]

(V) *Prog*[φ] is true at t in w iff there is an e at t in w and there is an ordered pair $\langle e', w' \rangle$ on the continuation branch for e in w such that φ is true of e' at w'

The continuation branch for e in w is a set of pairs of events and worlds constructed thus: We follow the development of e in w; if the continuation of e stops we go to the nearest possible world where it does not stop, assuming it is a reasonable option for e in w and we follow the development of e there; we iterate the process until either the development of e doesn't stop in a world or we find ourselves in a world where the nearest possible world is no longer a reasonable option for e in w.[17]

$w : e \text{———} e' \ |$
$w_1: e \text{———} e' \text{———} e'' \ |$
$w_2: e \text{———} e' \text{———} e'' \text{———} e''' \ |$
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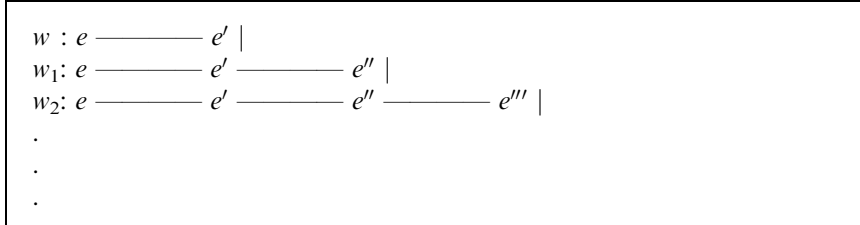
(V) avoids the pitfalls of the earlier accounts. 'Mary was crossing the street when a truck hit her' can easily be true, since a world very similar to the actual one where the truck is zapped away is arguably a reasonable option for Mary's walking in the actual world and in *that* world Mary makes it to the other side. Normally 'Mary is swimming across the Atlantic' is false when Mary is swimming towards the United States, because a world where she gets across is not a reasonable option for her swimming in the actual world. But if divine intervention helps her through, 'Mary was swimming across the Atlantic' comes out as true, since against all odds, her swimming did develop into a crossing in the actual world, so it doesn't matter that no world where she swims across is a reasonable option for her swimming in the actual world. Also, (V) correctly predicts that if God decided that he would help Mary just in case she manages to swim a mile, 'Mary is swimming across the Atlantic' is true during Mary's swimming even if she drowns after three-quarters of a mile.

Despite these impressive results, Landman's account has a serious problem, which was pointed out by Andrea Bonomi.[18] Suppose Leo is driving from Chicago towards Albany. His intention is to go either to Boston or to New York but he has not made up his mind which. And let's say he never will, because just before Albany he will get into an accident and die.

Now consider the following sentences:

(10) Leo is driving to Boston.
(11) Leo is driving to New York.
(12) Leo is driving to Boston or New York.

(12) is clearly true at the time when Leo is driving towards Albany. In order to make this prediction, Landman must insist that on the continuation
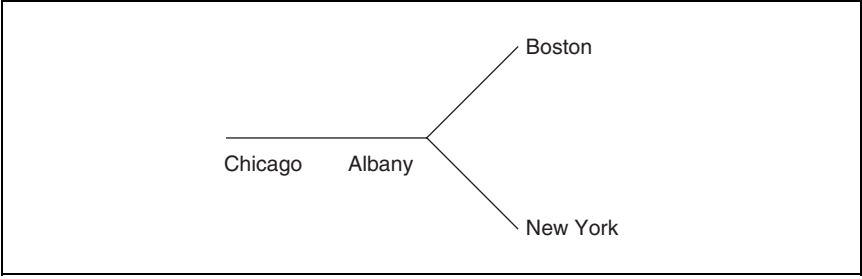
branch of his current driving Leo arrives at Boston or New York. But Leo cannot arrive at Boston or New York without arriving at one or arriving at the other. So, in order to ensure the truth of (12) before the accident, Landman must also predict that either (10) or (11) is true then. This is the problem: intuitively (10) and (11) cannot both be true in this situation. (Note that we can even postulate that Leo specifically intended *not* to go to both cities. To insist that nonetheless he was doing just that seems indefensible.[19]) So, Landman must maintain that one of them is true and the other is false. But the fact that Leo has not made up his mind and never will makes this prediction hard to swallow. There just does not seem to be anything (not even the future!) that could favor one of these sentences over the other.

The natural reaction to this difficulty is to say that the source of the problem lies in the tacit assumption made in defining the notion of the continuation branch for an event in a world. Landman assumes that if an event stops at a time in a world, then there is a unique closest reasonable option for that event in that world. But why should this be so? If Leo has an accident before he gets to Albany, worlds where he gets to Boston and worlds where he gets to New York seem equally close reasonable options for his driving. Instead of a single continuation branch, we should probably speak of a *continuation tree*. The continuation tree of an event in a world is defined as Landman defines the continuation branch of an event in a world, except that 'going to the nearest possible world' should be replaced by 'going to all the nearest possible worlds'. The iteration is continued on all the continuation branches.[20] The new definition should require the presence of a world where the perfective correlate is true on *all* branches of the continuation tree.[21]

(VI) *Prog*[φ] is true at t in w iff there is an e at t in w and for every $\langle e^*, w^* \rangle$ on the continuation tree for e in w if φ is not true of e^* at w^* then there is an $\langle e', w' \rangle$ on the continuation tree for e in w such that e' is a continuation of e^* in w' and φ is true of e' at w'

Unlike (V), this analysis is compatible with the intuition that before Leo reaches his decision, neither 'Leo is driving to Boston' nor 'Leo is driving to

New York' is true. Leo is not driving to Boston, for there is a continuation branch for his driving in the actual world which contains a drive to New York and no drive to Boston. He is also not driving to New York, for there is a different continuation branch for his driving in the actual world which contains a drive to Boston and no drive to New York. But, since all continuation branches contain a drive to Boston or New York, 'Leo is driving to Boston or New York' comes out true.

So (VI) avoids the problem that plagued (V), and it deals with all the cases hitherto considered. The price for this is considerable complexity; we are very far indeed from the simple intuitive analyses of Scott and Montague. And the complexity has not bought us correctness: in the next section I will argue that (VI) fails too, and fails in a way that casts serious doubt on the possibility of a successful repair.

3. Troubles with the Analysis

The problem with (VI) is that it does not get the inferential properties of the English progressive right. It errs in both directions by simultaneously yielding false positives (entailing the validity some invalid inferences) and false negatives (failing to entail the validity of some valid ones). Furthermore, the problems do not seem to hang on anything idiosyncratic about (VI): they seem to be the shortcomings of the general strategy that employs possible worlds and events in trying to analyze the progressive in terms of the perfective.

3.1. False Positives
(VI) *almost* entails that the inference from *Prog*[φ] to *Possibly*[φ] is truth-preserving. The only case when the former could be true and the latter false at a time is when the event described by *Prog*[φ] has no continuation branch at that time, in which case *Prog*[φ] would be vacuously true. We can filter out this case by insisting that the event does continue at least for a short time beyond *t*. In other words, (VI) entails that a sentence like (13) is necessarily false.

> (13) As the architect was building the cathedral he knew that, although he would be building it for another year or so, he couldn't possibly complete it.

But (13) does not seem to be necessarily false. It is not at all unnatural to describe the activity of successive architects who worked on a cathedral that took two or three hundred years to complete as 'building the cathedral.'

A fairly natural reaction would be to say that the truth-conditions of progressive sentences are context-dependent in a radical sense. Events that

cannot possibly culminate can nevertheless be truly said to be in progress, as long as we are allowed to abstract from those features that make their completion impossible. Such an abstraction may be permitted, given one's take on the course of events. So an architect could be building a cathedral fully aware of the impossibility of his completion of the project as long as the factors that would prevent him from accomplishing his goal are appropriately neglected from a certain *perspective* or *point of view*.[22] Landman himself is inclined to think that his analysis is incomplete because it neglects the perspective-dependence of the progressive, and he presumably thinks the same about (VI). He writes:[23]

> Suppose I was on a plane to Boston which got hijacked and landed in Bismarck, North Dakota. What was going on before the plane was hijacked? One thing I can say is: "I was flying to Boston when the plane was hijacked." This is reasonable. But another thing I could say is: "I was flying to Boston. Well, in fact, I wasn't, I was flying to Bismarck, North Dakota, but I didn't know that at the time." And this is also reasonable.

From this, Landman draws the conclusion that "the notion of an event as it plays a role in semantics is not an absolute notion."

I agree with Landman that saying either of those jointly inconsistent things is *reasonable*, but this is a far cry from saying that both are *true* relative to a suitably chosen perspective. Quite the contrary, I submit that the second claim (interpreted as an ordinary progressive) is a reasonable falsehood: although after the hijacking the plane was flying to Bismarck, before it changed course it was not. Our intuitions mislead us here because the progressive in the second claim could be taken as a *futurate progressive*. If you plan to go to the movies in the evening, you could already say at noon 'I am going to the movies'. Similarly, since there is not only a definite plan for hijacking the plane, but the plan has already been set in motion by the time the plane is in the air, you could (if you knew about the plan in time) already say 'I am flying to Bismarck'. And since, after the fact, you do know about the plan, you can use the futurate progressive in saying something reasonable, but false.

I tentatively suggest that other examples from the literature that are supposed to show the need for relativizing the truth-conditions of the progressive to perspectives can be dealt with similarly. If my contention is correct, the appeal to perspectives in a semantic analysis of the progressive is illegitimate. But even if I am wrong and the semantics of the progressive must be relativized to a perspective, doubts remain about the *value* of the explanation given here.[24]

First, the explanation of the possible truth of (13) involves a curious context-shift: the first clause is supposed to be evaluated relative to a perspective that abstracts away from the impossibility of completion, the second relative to some other perspective, from which this impossibility

comes into view again. But then, *prima facie*, we should also be able to hold on to a single perspective, in which case we should judge the sentence to be necessarily false. However, I don't think that there is a way to read (13), according to which it expresses a necessary falsehood. So the only way the perspective-shift explanation could work is if we postulated that in inter-preting (13) one *must* evaluate different parts of the sentence relative to different perspectives. It is rather obscure why this would be the case. Second, if we accept the perspective-shift explanation in the case of the architect, it seems that a similar story could be told about deluded Mary. Why can we not say that Mary is in fact swimming across the Atlantic because the factors that will prevent the completion of her crossing do not come into view from the perspective of evaluation?[25]

To sum up, there are reasons for thinking that an appeal to perspectives in accounting for the intuitive truth of sentences like (13) may be illegiti-mate, or at least of dubious explanatory value. The source of the trouble with (VI) is not the neglect of perspectives, but the insufficient robustness of the intuitions it is based on. Sometimes we are *doing* things even though there is no real chance that we could get them *done*, and this is true even if we abstract away from the possibility of miraculous intervention.

3.2. False negatives

The fact that in general progressive sentences do not entail their perfective correlates has received a lot of attention in the literature. By contrast, the fact that the converse inference appears to be valid has gone virtually unnoticed. But this latter intuition is quite robust: if Mary crossed the street, then at least for some time leading up to the moment of her reaching the other side, she was crossing the street.

There is nothing in (VI) (or its predecessors) that would explain this inference. The truth of 'Mary was crossing the street' requires that there be some event in the past such that all of its continuation branches contain a crossing of the street by Mary. The truth of 'Mary crossed the street' requires the past existence of such a crossing event, but does *not* require that this event be the continuation of some other event. So, for all we are told, 'Mary crossed the street' could be true without 'Mary was crossing the street' being true.

To rectify this problem the framework of continuation branches must be appropriately constrained. The obvious proposal would be to postulate that every non-instantaneous event must have a *development part*, some earlier event of which it is a *continuation*:

(CONT) Necessarily, for every non-instantaneous e there is an e' before e such that e is the continuation of e'

Prima facie, the principle sounds plausible. Its plausibility is due to the natural assumption that *any* initial temporal part of a non-instantaneous event would count as a development part, so *of course* all non-instantaneous events have development parts. This assumption, however, has unwelcome consequences.

Consider again Leo who is driving from Chicago towards Albany. This time he is luckier: he avoids the accident. In Albany he decides to head to the south, rather than to the east, and in a few hours he arrives at New York. If indeed any initial temporal part of his driving to New York is a development part of that event, (VI) entails that at the time when Leo is driving towards Albany, he is *already driving to New York*. Intuitively, this is not the case: before the decision, he may well be driving to Boston or New York, but he is not (yet) driving to New York. Those who want to deny this are committed to saying that Leo was already driving to New York for hours when he decided to drive to New York. This strikes me as seriously implausible.[26]

So, not all initial temporal parts of an event are development parts: Leo's driving to Albany is an initial temporal part of his driving to New York, but it is not a development part. Once this is conceded, we see (CONT) in a new light. To make plausible the claim that necessarily all non-instantaneous events have a development part, we need a substantive account of what development parts are. Unfortunately, it is not clear what such an account would look like.

Here is an attempt. If we reflect on the previous example, we might say that Leo's driving to Albany fails to be a development part of his driving to New York, because before he reached Albany there was still a reasonable option that he would go to Boston instead. Once Leo makes his choice, this option is no longer reasonable and Leo is driving to New York. In general, we might say that an event *e* is a development part of another event *f* in *w* just in case an event *very similar* to *f* is on every continuation branch for *e* in *w*. Then we could say that after Albany, Leo is in the development part of his driving to New York.

Unfortunately, if we accept this line about Leo, we can no longer deal with Mary. If she gets across with divine help, we do want to say that she was swimming across the Atlantic, even though plausibly at every moment of her crossing there was a reasonable chance that she would *not* get through. After all, there is no guarantee that the intervention would continue all the way through, and if it stops, given the amount of effort Mary has exerted, there is a near certainty of immediate death. Drowning is always a live possibility for Mary: there is no point before she gets across when the swimming event that is going on is such that each of its continuation branches contains an event that is very similar to a completed swimming across the Atlantic. Mary's miraculous swimming would then be an event without a development part.

One might complain that I have misidentified the relevant notion of similarity: an event of Mary drowning very close to the American shores of the Atlantic *is* very similar to an event of her swimming all the way to the United States. But if so, this just pushes the mystery one step further back. To accept (CONT) we need to understand what it is for an event to be the continuation of another, where the relevant notion of continuation is not the ordinary one. To explain this technical notion of continuation, we need to appeal to a notion of similarity between events, where the relevant notion of similarity is once again not the ordinary one. It is hard to see where these successive appeals to technical notions will end, and even harder to believe that the completed explanation will bring conviction that (CONT) is true. At best, we will end up with an *ad hoc* explanation of the validity of inferences from φ to $Prog[\varphi]$.

Given these difficulties, a proponent of (VI) may want to give up on predicting the validity of the inference from 'Mary crossed the street' to 'Mary was crossing the street'. He might claim that the inference is valid not in virtue of some general fact about the progressive, but due to an idiosyncratic feature of the verb 'cross'. The plausibility of this move depends on how generally valid the inference schema $\varphi \Rightarrow Prog[\varphi]$ is. My own hypothesis is that it is very general indeed: the inference pattern confronts no indisputable counterexamples, and the possible counterexamples fall under a general semantic heading. If I am right, failing to predict the validity of these inferences is a major shortcoming for a semantic analysis.

The first class of potential exceptions consists of sentences including a stative verb. The inferences below are strange, which might encourage some to claim that they are invalid:[27]

(14) Mary knew the answer $\Rightarrow$?? Mary was knowing the answer
     Mary liked to cook $\Rightarrow$?? Mary was liking to cook
     Mary had a friend $\Rightarrow$?? Mary was having a friend

But such examples cannot undermine the validity of inferences from φ to $Prog[\varphi]$. If the conclusions are indeed ungrammatical, they are not expressions of English, and hence, they are not proper substitution instances of any inference schema. If they are grammatical, albeit highly unusual, sentences, I see no reason to think that they fail to follow from their perfective correlates.

One might suggest that stative sentences involving the copula pose a problem. The inference under (15) is invalid:

(15) Mary was smart $\Rightarrow$ Mary was being smart

An extremely smart Mary might act in an utterly foolish way on a particular occasion, in which case the premise is true but the conclusion false. Still, the

example is not really convincing. Exactly because 'Mary was being smart' means something like 'Mary was acting smart', we have good reason to believe that the 'is' in this sentence is not the ordinary copula.[28] If so, the conclusion is not the progressive correlate of the premise, and hence, this is not an instance of the schema $\varphi \Rightarrow Prog[\varphi]$.[29]

Sentences containing achievement verbs might also be seen as potential counterexamples to the validity of the schema.[30] The progressive forms of sentences involving achievement verbs do sound somewhat peculiar, but there is little doubt that they are grammatical:

(16) Mary recognized me $\Rightarrow$? Mary was recognizing me
      Mary dropped the cup $\Rightarrow$? Mary was dropping the cup
      Mary blinked once $\Rightarrow$? Mary was blinking once

You can easily accustom yourself to these peculiar progressive forms if you imagine that you are watching a slow-motion movie. It would be quite all right to say then things like 'See, she's already dropping the cup here!' Furthermore, there are plenty of achievement verbs that take the progressive without even the appearance of linguistic impropriety: 'Mary was winning the race' or 'Mary was turning 30' are perfectly ordinary English sentences. Now it is clear that Mary cannot turn 30 without having been turning 30 for a while, but it is not at all clear that she cannot win the race without having been winning it antecedently. Perhaps she was behind all the way until the very last moment, when she unexpectedly threw herself ahead and crossed the finish line first. So, perhaps we have a counterexample to the inference from φ to $Prog[\varphi]$.

I am not convinced by this case: it seems to turn on a certain flexibility in the interpretation of achievement verbs. Since sentences containing them describe events whose temporal extension is small, we sometimes think of these events as occurring at an instant, and sometimes as occurring over an interval. If we focus our attention on either of these interpretations, the intuition that Mary could win the race without ever having been winning it evaporates. If Mary's winning is viewed as happening at the exact moment of her crossing the finish-line, then it seems clear that at that instant 'Mary is winning the race' is also true.[31] Now, one might object that 'Mary won the race' and 'Mary was winning the race' should not be true at the same time: by the time Mary won, she is no longer winning. But this objection seems to rely on the assumption that Mary's winning is temporally extended after all. And if it is, then at a certain point just before her crossing the finish line, she must already have been winning the race. Either way, the validity of the inference is preserved.

The best objection I know of against the claim that inferences from φ to $Prog[\varphi]$ are valid for all sentences involves a case when $Prog[\varphi]$ describes a single event, but φ apparently describes many. Imagine that you look at the coffee chart in the department lounge, which signals your obsessive

coffee-drinking over the past month. As a result, you might utter (17a). But from that, you would not conclude (17b):

(17a) I drank 57 cups of coffee.
(17b) I was drinking 57 cups of coffee.

(17b) suggests that the drinking of 57 cups of coffee occurred all at once. I am not entirely sure whether the phenomenon is merely pragmatic, or whether we have a genuine counterexample to the inference from a perfective sentence to its progressive correlate here. I am inclined to think that (17b) does have a reading for which the inference *is* valid.[32] But I might be wrong about this.

Fortunately, the source of the problem is clearly the quantifier, so for my present purposes I can neglect it.[33] I can do so because I want to use the inference pattern merely as a constraint on the acceptability of semantic *analyses* of the progressive. As I mentioned in the introduction, such an analysis sets itself the relatively modest goal of stating the truth-conditions of *simple* progressive sentences in terms of the truth-conditions of their perfective correlates.

Having surveyed the potential counterexamples known to me, I tentatively conclude that the inferences from φ to $Prog[\varphi]$ are truth-preserving for all simple sentences admitting the progressive. It is time to look for a semantic analysis that can explain this fact.

4. Turning the Analysis Around

If analyzing $Prog[\varphi]$ in terms of φ proved difficult, why not try to turn things around and provide an analysis of φ in terms of $Prog[\varphi]$? Consider the sentence 'Mary crossed the street'. If this sentence is true, we know that at some time Mary was across the street and just before that time Mary was crossing the street. Assuming that 'Mary is crossing the street' is a predicate true of events and 'Mary is across the street' is a predicate true of states, we get (18):

(18) 'Mary crossed the street' is true only if
    (i) 'Mary is crossing the street' is true of some event e,
    (ii) 'Mary is across the street' is true of some state s,
    (iii) e occurs before s does

Unfortunately, the 'only if' cannot be replaced by 'if and only if' here. Perhaps Mary was crossing the street but halfway through she turned

back, went around the whole street, and got to the other side without crossing it. It would not help much to require that *e* must occur *immediately* before *s*, for it might be that instead of going around the street, Mary was miraculously transported to the other side in an instant. Our semantic intuitions are robust here: under such circumstances Mary did not cross the street.

The link between Mary's crossing being in progress and her being across the street is not merely temporal. It is not enough for her crossing to be in progress at some appropriate time *before* her being across the street, she must be across the street *because* she was crossing the street at that time. But even this is too weak. Consider a case when there is a street demon whose task it is to ensure that nobody crosses the street. One way the street demon could work is as follows: every time someone gets halfway across, the demon picks her up and transports her to the other side. If there is such a street demon, Mary's being in the process of crossing the street causes the demon's action, which in turn causes her being across the street. This is a case where she ends up across the street because she was crossing the street, but nonetheless she did not cross the street.

To obtain an adequate analysis, we must say that some event *e* that is Mary's crossing in progress causes a state of her being across the street without intermediate causes, like the actions of the street demon. I suggest that what we need is a requirement that all events in the causal chain between *e* and *s* must be events the same type as *e*: events of which 'Mary is crossing the street' is true.

(19) 'Mary crossed the street' is true iff
    (i) 'Mary is crossing the street' is true of some event *e*,
    (ii) 'Mary is across the street' is true of some state *s*,
    (iii) *e* causes *s*
    (iv) if *e* causes *e'* and *e'* causes *s* then 'Mary is crossing the street'
        is true of *e'*

This captures the idea that in the course of events leading up to Mary's being on the other side of the street there must be a point beyond which there is no more causally relevant external interference with the progress of Mary's crossing. The question is now how to generalize this account.

The key is the relationship is between the sentences 'Mary is crossing the street' and 'Mary is across the street'. Once Mary is across the street, her crossing can no longer continue. This is not because the onset of this state somehow *prevents* the continuation of the crossing, it is rather—to use a loaded term—a state at which the crossing is *aimed*, and the onset of this state marks the culmination of the crossing. Let us call it a *target state* of the event.

Mary's being across the street is not the only state that marks the culmination of her crossing. In fact, Terence Parsons has introduced the

notion of target states in passing, only to draw a distinction between these and what he calls *resultant states*:[34]

> If I throw a ball onto the roof, the target state of this event is the ball's being on the roof, a state that may or may not last for a long time. What I am calling the Resultant-state is different; it is the state of having thrown the ball onto the roof, and it is a state that cannot cease holding at some later time.

The fact that target states are often transient while resultant states are everlasting is not the only difference between them. Even more important is the nature of the link these states bear to events they follow. Events are one-to-one matched with their resultant states: any event of my son's throwing the ball onto the roof is necessarily followed by a state of its having been thrown there by him, and any state of his having thrown the ball onto the roof is necessarily preceded by an event of his throwing it there. There is no similar connection between events and target states. First of all, some events have no target states: my son's playing with the ball, for example, is not an event that can culminate. And a target state of his throwing the ball onto the roof—the balls' being on the roof—was not necessarily preceded by an event of his throwing the ball onto the roof. Someone else could have thrown the ball there. Or perhaps it was nobody—as my son might suggest, not very plausibly, but coherently—because the ball was always there.

I am not under the misapprehension that these remarks clarify the notion of a target state perfectly. It *is* perplexing why it is that if Mary crosses the street the event of her crossing the street has a target state, while the superficially similar event of her walking on the street has none. But even if we are not quite certain *why* some events are associated with target states while others are not, we seem to be able to tell about sentences describing events *whether* the events they describe are associated with target states. Furthermore, if they are, we seem to be able to provide another sentence that describes those target states. In fact, we seem to be able to match progressive sentences with others describing their associated target states with remarkable ease, whenever they describe events that *have* target states. Here is an illustrative list of such pairs.[35] (I will use '$Tel(\varphi)$' to refer to a sentence describing the target state of an event described by $Prog[\varphi]$.)

Prog[φ]:	*Tel*[φ]:
Mary is flying to New York	Mary is in New York
Mary is stealing a canary	Mary has that canary
Mary is running a mile	Mary is at the end of that mile
Mary is proving a theorem	A proof of that theorem by Mary exists
Mary is recovering	Mary is well

Mary is dying   Mary is dead

I see no reason to believe that the concept of a target state is a spurious one. The fact that much is unclear about it is unfortunate, but should not disqualify it as a tool for semantic analysis. If semantics is allowed to employ only crystal clear concepts—that is, if talk about possible worlds, situations, propositions, and thematic roles is out—much of contemporary semantics is in sin anyway.

There are plenty of sentences without associated target sentences; in the linguistic literature they are called *atelic*.[36] For *telic* sentences (19) generalizes straightforwardly:[37]

   (VII$_t$) If φ is telic and admits the progressive then φ is true iff
            (i)   *Prog*[φ] is true of some event e,
            (ii) *Tel*[φ] is true of some state s,
            (iii) e causes s,
            (iv) if e causes e' and e' causes s then *Prog*[φ] is true of e'

The idea clearly does not carry over to atelic sentences. Fortunately, these appear to be equivalent to their progressive correlates, so we have an even more straightforward analysis for them:

   (VII$_a$) If φ is atelic and admits the progressive then φ is true iff
              Prog[φ] is true

I claim tentatively that the conjunction of (VII$_t$) and (VII$_a$)—which I will call (VII)—is an adequate semantic analysis of perfective sentences in terms of their progressive correlates. According to (VII), if φ admits the progressive, then φ is true iff *Prog*[φ] is true and certain other conditions hold. So, the inference from φ to *Prog*[φ] is valid, the inference from *Prog*[φ] to φ is not, unless the extra conditions are vacuous. Since the extra conditions are vacuous exactly for atelic sentences, the analysis predicts that these and only these are equivalent to their progressive correlates.

My proposed analysis does not account for sentences that don't admit the progressive. This is certainly a shortcoming, since the fact that 'Mary was being in Paris' and 'Mary was stopping to talk' are not well formed sentences of English cries out for a semantic explanation. But a semantic analysis is less than a full-blooded semantic theory, and so we can put off the explanation. In this regard, there is no difference between (VII) and (I)–(VI): none of the existing analyses accounts for this phenomenon.

My reverse analysis for perfective telic sentences bears an interesting connection to an idea discussed in Dowty (1979). The idea is that all accomplishment verbs might be causative-inchoative. For example, one might suggest that 'Mary crossed the street' means something like that she

did something that caused her to become to be in the state of being across the street. Like (VII$_t$), Dowty's proposal analyzes the truth of this sentence partly in terms of a target state.[38]

There are three important regards in which my proposal differs from the one entertained by Dowty. The first is that it has a slightly different scope: (VII$_t$) concerns telic sentences, not accomplishment sentences. The second difference is that it employs the progressive sentence in the analysis. Finally, and most importantly, it gives an analysis of the causal relation involved (occasionally called 'direct causation' in the literature) in terms of genuine causation. I will comment on all three of these differences.

First, the difference between accomplishment sentences and telic sentences is substantial. According to the standard test, telic sentences take temporal adverbials of the form *in an NP,* but not temporal adverbials of the form *for an NP*, whereas the situation with atelic sentences is the reverse:[39]

(20a) Mary was sick (*) in a week/for a week
(20b) Mary ran (*) in an hour/for an hour
(20c) Mary built a house in two years/(*) for two years
(20d) Mary died in a few minutes/(*) for a few minutes

It has often been claimed that the test distinguishes state sentences (like (20a)) and process sentences (like (20b)) from event sentences, which describe accomplishments (like (20c)) or achievements (like (20d)). It makes good sense to say that states and processes have no target states: given that processes and states don't culminate, there could obviously be no state the onset of which would mark their culmination. It would be nice if the converse were true as well, if all events had target states. But this is not the case. Consider the following examples:

(21) Mary kissed/stabbed/hit/kicked/shouted at John for an hour/*in an hour.

One would be hard pressed to say what sort of state marks the culmination of a kissing or a kicking.[40] The sentences under (21) are atelic accomplishment sentences. (VII$_a$) correctly entails that they are equivalent to their progressive correlates. Mary stabbed Leo just in case she was stabbing him. If she already raised her arm with the intention of stabbing him, but she has not struck yet, then she is *about to* stab him but she is not yet stabbing him. (Of course, we might be willing to use the futurate progressive in this case.)

The second difference between the Dowty proposal and mine lies in my appeal to the progressive. It is because of this that my analysis does not claim that telic sentences are ordinary causative constructions. Saying that Mary broke the window implies that she did something—e.g. threw a rock—that brought about the state of the window being broken. But saying

that she crossed the street carries no similar implication. If Mary crossed the street, her being across the street was not brought about by something she *did*, but by something she *was doing*. The need for the progressive is especially clear when we consider telic sentences like 'Mary died'. It would be quite perplexing to say that the truth of this sentence requires there being something Mary did that brought her death about. Still, it would be appropriate to say that the *direct* cause of her being dead is her dying.

This brings me to the third difference between Dowty's proposal and mine. It is widely believed that any analysis of direct causation in terms of ordinary causation is fraught with extreme difficulties. It is not true that for Mary to break the window is simply for her to do something that causes the window to break: paying a friend to throw a rock would not do. What exactly is required for a causal link to count as a direct link is far from obvious. My analysis can bypass this problem because it involves the progressive. If Mary broke the window, then there is something she was doing—namely, she was breaking the window—that directly caused the breaking of the window. Directness simply amounts to this: anything in the causal chain between the cause and the effect is itself an event just like the cause in the sense that it is an event of which 'Mary was breaking the window' is true.

Before turning to the next section, I want to briefly mention a problem that is not dealt with by any of the current analyses of aspect, my own included. Consider the telic sentences (22a) and (22b):

(22a) Mary drew a circle in the sand.
(22b) Mary drew a circle in the water.

The first one appears to be unproblematic: it is true just in case there is a state of there being a circle in the sand, and an event of Mary drawing it, which brought the state about without interfering causes. Intuitively, (22b) should behave quite similarly, except that the circle is in the water. But Mary could have drawn a circle in the water without there being a circle in the water at any time. So, it seems that the event described by (22b), unlike the event described by (22a), does not have an associated target state.

So we have a counterexample to (VII$_t$). And it is not alone. Once we see that Mary can draw a circle in the water without there being a circle in the water at any time, we must reject the analysis for (22a) as well. After all, she could have accidentally erased part of the line she drew as she was drawing it. Appreciating this leads us to doubt the analysis for all verbs of creation. Suppose a company has a contract to build a new highway from A to B. They start at A and they reach B in half a year. By the time the construction reaches B, the early parts of the road have been destroyed. Did the company violate the contract? I don't think so: refusing payment to them on the account that they did not build the highway would be preposterous. And we

don't have to stop at verbs of creation here. Suppose a snail was moving ahead on the highway right behind the construction team. Did the snail move from A to B on the highway from A to B? It seems to me that it did.

As I said, I am not sure what to think of these cases. They are certainly not problems exclusively for my account: unless verbs like 'draw' and 'move' are treated as non-extensional, 'Mary drew a circle in the water' and 'The snail moved from A to B on the highway from A to B' are supposed to entail the existence of a circle in the water and a highway from A to B. If these verbs are indeed intensional transitives, they might be set aside for the same treatment as 'seek' or 'admire'. But I am reluctant to accept this: the source of the failure of existential entailment seems quite different here. If Mary drew a circle in the water then *all parts* of a circle in the water exist at some time, even though there is no time when they exist together. Similarly for the highway the company built. Perhaps, we could say that in all these cases there is a target state, although it is temporally scattered.[41] But that still does not explain why we are willing to be so metaphysically generous here, when we would rarely consider being so in other cases. So this remains an unresolved source of perplexity for the semantics of aspect.

5. Is there a 'Natural Direction' for the Semantic Analysis of Aspect?

Let me turn now to the objection that is probably on many minds. ''What is the point of giving such a twisted analysis? When we analyze an expression, we try to elucidate its meaning. Trying to explain what a progressive sentence means in terms of its perfective correlate is a hard, but sensible project: it can tell us something about what the *progressive morpheme* '-ing' means. The reverse analysis does no such thing. Clearly, we can understand *Prog*[φ] only by understanding φ. To provide an analysis of an arbitrary sentence in terms of a more complex one is putting the cart before the horse. If the reverse analysis is really an analysis, what is it supposed to be the analysis of?''

Let me start by addressing the last question. My answer is that (VII) is an analysis of the *perfective marker*, phonologically unrealized in English sentences in the simple tenses. In Romance and Slavic languages the perfective aspect is overtly marked. To insist that sentences like 'Mary crossed the street', or 'Mary will cross the street' are aspectually unmarked would be absurd. After all, they are truth-conditionally equivalent to overtly perfect forms: the former is true just in case Mary has crossed the street, the latter if and only if she will have crossed the street. I am not claiming that these forms have the same meaning, or that there is no difference in their distribution.[42] But if one accepts that the English perfect is a perfective aspect and that the distinction between imperfective and perfective aspects is truth-conditionally significant, these equivalences show that English sentences in simple tenses are also perfective.[43]

Consequently, in all the analyses 'φ' can be replaced by '$Perf[\varphi]$'. Previous analyses of the progressive have not been given in terms of some primitive sentence without any aspectual marking; they have been given in terms of perfective correlates. Similarly, my proposal is not an analysis of a simple sentence in terms of a more complex one, but an analysis of a complex one in terms of another.

What can we expect from an adequate semantic theory of English? We can expect that it will tell us what the uninflected clause (23) means in terms of the meanings of its constituents and its syntactic structure, that it will tell us how the progressive and perfective aspects affect the meaning of the base predicate 'cross the street', and that as a result of these it will tell us how the meanings of (1) and (2) are related to that of (23):

(1) Mary crossed the street.
(2) Mary was crossing the street.
(23) Mary cross the street.

But it could easily do these things without delivering either an analysis of (2) in terms of (1) or an analysis of (1) in terms of (2).

Unless, of course, one of the aspectual markers is truth-conditionally inert. For if applying one of these markers to the uninflected verb phrase 'cross the street' does not change the truth-conditional contribution of the verb phrase at all, then there is, after all, a natural direction of analysis. We should proceed from the truth-conditionally inert aspect to the truth-conditionally significant one. So, is (24) equivalent to either (1) or (2)?

(24) At some time in the past the clause 'Mary cross the street' was true.

I don't know the correct answer to this question. In fact, I don't quite know how even to begin to address it. The trouble is, of course, that uninflected clauses do not occur in English unembedded (they cannot be used to make an assertion), and so our evidence for deciding the question is bound to be indirect.[44] And although uninflected clauses do occur embedded, for example as complements of perceptual verbs, even here they seem to carry some sort of phonologically unrealized aspectual marker. Consider (25):

(25) John saw Mary cross the street. Before she could reach the other side she collapsed and died.

What John saw was clearly not merely a partway crossing, as attested by the absurdity of this sequence of sentences. This seems to support the view that the uninflected clause describes a completed event, and hence, it is perfective. But now consider (26):

(26) John was watching Mary cross the street. Before she could reach
   the other side she collapsed and died.

(26) could easily be true, so it seems that the very same uninflected clause
now describes a potentially incomplete event, and hence, it is imperfective.
Putting the two examples together strongly suggests that the verb in the
subordinate clause somehow inherits its aspect from the verb in the main
clause.[45, 46]

   If we cannot draw conclusions from cases when uninflected clauses occur
as verbal complements, perhaps we should look at them in subject position:[47]

(27) For Mary to cross the street was an accomplishment.

This sentence strongly suggests that 'for Mary to cross the street' describes a
completed crossing. It is, after all, only the completed event that could be
called an accomplishment. This is sometimes regarded as strong evidence
that uninflected clauses are perfective.

   One concern with this sort of argument is that 'for Mary to cross the street'
is not the same expression as 'Mary cross the street'. In the former *for* could
be either a complementizer introducing an infinitival clause or a preposition
whose complement is 'Mary'.[48] Either way, the expression clearly has a
different structure than 'Mary cross the street', which means that conclu-
sions from the aspectual features of the former to the aspectual features of
the latter are bound to be dubious.

   But even if we brush these worries aside, the example remains inconclu-
sive, and for much the same reason (25) did. It seems that the perfective
aspect of 'for Mary to cross the street' is again simply inherited from the
perfective aspect of the matrix clause. When we replace the matrix verb with
one that bears progressive marking, the aspect of the clause shifts:

(28) For Mary to cross the street was becoming rather difficult. By the
   time she reached the middle, she was so exhausted that her son had
   to pick her up and carry her across.

As the coherence of (28) attests, 'for Mary to cross the street' in the first
sentence does not have to describe a complete crossing event.

   Examples like (26) and (28) show at the very least that not all occurrences
of uninflected clauses are inherently perfective.[49] This is sufficient to reject
the argument that an analysis of perfective sentences in terms of their
progressive correlates goes against the natural direction of analysis dictated
by the semantics of uninflected clauses. If uninflected clauses in fact acquire
perfective or progressive aspect depending on the aspect of the matrix
clause, it seems reasonable to suppose that these clauses are genuinely
aspectless.[50] This is, after all, what we should expect if we believe that

both tense and aspectual marking is a matter of inflection. A clause, like 'Mary cross the street' would then pick out *all* crossing events by Mary. The function of the tense marker would be to restrict the extension of this class to past, present or future crossing events; the function of the aspectual marker would be to restrict it to incomplete or complete crossing events. If this is right, there is no natural direction for the semantic analysis of aspectual marking.

As I mentioned in the introduction, in this paper I wish to remain neutral on the syntax of aspect and on a host of other empirical issues that would have to be settled before one attempts to devise a compositional semantics for a significant fragment of English that contains aspectual markers. Nonetheless, it might be useful to indicate how my analysis might be incorporated into a genuine semantic theory. I will again use Parsons' theory for illustrative purposes.

My main complaint against his theory was that he makes the meaning connections between progressive sentences and their perfective correlates a matter of *lexical semantics*, that it leaves the predicates '$Cul(x,y)$' and '$Hold(x,y)$' unanalyzed. A natural way to incorporate my semantic analyses into Parsons' framework is to view them as an attempt to define '$Cul(x,y)$' in terms of '$Hold(x,y)$' plus a few other semantically crucial notions.

I can illustrate this on our pet examples. The logical forms of (29), (30), and (31) for Parsons are (29′), (30′), and (31′), respectively:

(29) Mary crossed the street.
(30) Mary was crossing the street.
(31) Mary was across the street.

(29′) $\exists e \exists i \exists t (i < now \wedge t \in i \wedge crossing(e) \wedge Agent(e, Mary) \wedge Theme(e, the\ street) \wedge Cul(e,t))$

(30′) $\exists e \exists i\ \exists t (i < now \wedge t \in i \wedge crossing(e) \wedge Agent(e, Mary) \wedge Theme(e, the\ street) \wedge Hold(e,t))$

(31′) $\exists s \exists i\ \exists t (i < now \wedge t \in i \wedge being(s) \wedge Theme(s, Mary) \wedge across(s, the\ street) \wedge Hold(s,t))$

These logical forms predict no inferential relations; but in fact, I have suggested, (29) entails both (30) and (31). To rectify this problem, we can keep the logical forms of (30) and (31) and incorporate an instance of the analysis (VII$_t$) into a revised logical form for (29):[51]

(1″) $\exists e \exists i\ \exists t \exists s \exists i'\ \exists t'\ (i < now \wedge t \in i \wedge crossing(e) \wedge Agent(e, Mary) \wedge Theme(e, the\ street) \wedge Hold(e,t) \wedge i' < now \wedge t' \in i' \wedge being\ (s) \wedge Theme(s,Mary) \wedge across(s,the\ street) \wedge Hold(s,t') \wedge cause(e,s) \wedge \forall e''((cause(e,e'') \wedge cause(e'',s)) \rightarrow \exists i''\ \exists t''\ (i'' < now \wedge t'' \in i'' \wedge crossing(e'') \wedge Agent(e'', Mary) \wedge Theme(e'', the\ street) \wedge Hold(e'',t'')))$

The revised logical form predicts the validity of the relevant inferences; they turn out to be instances of conjunction elimination within the scope of existential quantifiers.

6. Conclusion

Semanticists working on aspect have long sought to provide a semantic analysis of perfective sentences in terms of their progressive correlates. The task has proven to be remarkably difficult: simple initial analyses have been gradually replaced by successively more baroque alternatives. I have argued that even the best of these attempts that I am familiar with fails, and for systematic reasons. On the one hand, it incorrectly predicts that if a progressive sentence is true at a time and remains true for some time afterwards, then it is at least possible for its perfective correlate to be true at an even later time. On the other hand, it fails to account for the validity of inferences from simple perfective sentences to their progressive correlates. Moreover, there seems to be no obvious way to fix such proposals.

I suspect few semanticists are very surprised by this negative result: many have accepted it without substantive argument, realizing the inherent difficulties with any analysis of the progressive.[52] What I have explored in addition is the possibility of a reverse analysis. The analysis suggests that a perfective telic sentence φ is true just in case its progressive correlate $Prog[\varphi]$ is true of some event, its target correlate $Tel[\varphi]$ is true of some state, the event causes the state, and any event between them in the causal chain is such that $Prog[\varphi]$ is true of it. (The analysis is trivial for atelic perfective sentences, since they are equivalent to their progressive correlates.)

Although the direction of this analysis may seem unnatural at first, I have suggested that there is no compelling reason to think that it analyzes simpler expressions in terms of more complex ones. The widespread view that non-inflected clauses have perfective aspect is dubious at best. It seems more plausible to assume that aspectual marking is a matter of inflection, and hence, that a truly uninflected clause has no aspect.

Unlike the failed traditional analyses, the reverse one is relatively simple and it accounts for inferences that plausibly belong to semantics. The asymmetry may well indicate a certain conceptual priority. Recall that we can straightforwardly analyze the past and future tenses in terms of the present tense, temporal ordering, and existential quantification over times. At the same time it is by no means clear how one could analyze the present tense in terms of the other tenses without substantial assumptions about the nature of time. This provides some support for the claim that we have a grip on past and future tenses by virtue of having some prior grip on the present. Similarly, it may be that we comprehend what it is for an event to culminate only through our prior understanding of what it is for it to be in progress.

Notes

* I have benefited from the discussions where I had the opportunity to present parts of this material at the Rutgers Semantics Workshop, the Cornell Linguistics Club, the Linguistics Department at NYU, and the Research Institute for Linguistics of the Hungarian Academy of Sciences. My commentator at Rutgers was Kent Johnson, whose comments have led to substantial revisions. I especially would like to thank Tamar Szabó Gendler, Delia Graff, John Hawthorne, Brendan Jackson, László Kálmán, Chris Piñon, Anna Szabolcsi, Károly Varasdi, Sandro Zucchi, and two anonymous referees for this journal for their comments.

[1] Not every progressive sentence has a perfective correlate; e.g. 'Mary was dying for a year' could only be matched with * 'Mary died for a year.' The perfective correlate of 'Mary is running' is 'Mary runs,' where the latter is to be taken not a *habitual* but in a *reportive* reading. Reportive readings of sentences in simple present are intended rarely, but consider: 'Mary gets the ball and runs past the 16 meter line!'

[2] Cf. Davidson (1967).

[3] See Parsons (1990), Chapter 9. (In Chapter 12 and in the Appendix of the book he gives a slightly different semantic theory for the English progressive.) The predicates '$Agent(e,x)$' and '$Theme(e,x)$' express thematic relations. It is an assumption of Parsons' theory that verbs assign thematic roles to their arguments and these roles specify the way that entities picked out by expressions filling the requisite argument places participate in the events described by the verb. For example, in (1) and (2) Mary is the agent and the street is the theme of the crossing event.

[4] If the semantic theory is not truth-conditional, the entailment may require additional premises, but these would presumably have nothing to do with tense. For example, if the semantic theory assigns structured propositions to sentences, we need instances of the propositional T-schema.

[5] I am bracketing philosophical worries about the reality of the past and/or the future. For a well-worked out Davidsonean alternative to the standard eternalist semantics for tense, see Ludlow (1999).

[6] Parsons' skepticism is far from unique. According to Kamp & Reyle (1993) the questions surrounding the analysis of the progressive "are still waiting for definite answers, in spite of the many attempts that have been made to deal with them" (576). Kamp & Reyle leave their own progressive operator unanalyzed.

[7] Many semanticists hold the view that the view that progressive sentences are true just in case some actual event realizes sufficiently much of some event of the type their perfective correlates are true of. Cf., Cooper (1985), Link (1987), ter Muelen (1987). This does not yield a semantic analysis of the progressive, as I use the term. Without additional meaning postulates, we could not fix the truth-value of 'Mary was crossing the street' in terms of the truth-value distribution of 'Mary crossed the street'. Proponents of this view often express reservations about the possibility and/or desirability of a theory that would spell out what it is for an event to realize sufficiently much of another. See, for example, ter Meulen (1995): 60.

[8] Note that my approach does not presuppose that an adequate semantic theory of aspect will *yield* truth-conditions—as standard semantic theories, like Situation Semantics, Discourse Representation Theory, Context-Change Semantics, etc. all can—the constraint that an adequate semantic theory of aspect should entail instances of the semantic analysis I provide in this paper is applicable.

[9] This quick result might strike the reader as surprising. After all, Michael Bennett had proposed a theory of the progressive within the limits of interval semantics in Bennett (1981), and that theory claims to avoid the imperfective paradox. The crucial idea is that the truth of a sentence in the progressive depends on something being in the extension of a verb at an *open* interval, whereas the truth of its perfective correlate depends on something being in the extension of that verb at a *closed* interval. This obviously blocks the inference from 'Mary was crossing the street' to 'Mary crossed the street'. But Bennett's theory is *not a semantic analysis* of the progressive in the sense I am using this term. He does not give us the truth-conditions of progressive sentences in terms of the truth-conditions of their perfective

correlates. As Parsons (1990) notes, the best way to understand Bennett's appeal to open and closed intervals is to regard it as "a way of coding whether an eventuality culminates, without using any notions that are not definable by the resources of pure interval semantics" (181). Bennett's account has the same predictions as Parsons's: without additional meaning postulates the truth-conditions of a progressive sentence and its perfective correlate are independent.

[10] In Dowty (1977) the analysis is slightly different: instead of universal, we have existential quantification over inertia worlds. So this analysis predicts that if at a time we have two simultaneous courses of events that cannot both proceed in their natural way, then all progressive sentences are false at that time. This is no more palatable.

[11] Vlach (1981): 286.

[12] If we assume, following Landman (1992), that the semantic value of a sentence is of the form $\lambda e.F(e)$ and that the usual meaning of a sentence is assigned via existential closure, we can speak of a sentence being *true of* an event, just as logic textbooks speak of ordinary predicates being *true of* objects.

[13] Landman says that a continuation of an event is another event of which the first event is a *stage*. He treats *stage of* as a primitive binary relation.

[14] This definition is adopted from Landman (1992): 25.

[15] The example is Landman's. I don't want to go deep into theology, but it matters how we think of divine intervention here. The sort of miracle I (and presumably Landman) have in mind does not involve anything on God's part that would deprive Mary of agency. For example, if the intervention involves moving Mary's arms and legs for her, then arguably Mary wasn't swimming across the Atlantic. But then neither did she swim across it.

[16] This differs from Landman's actual analysis in one respect. Following the lead of Bennett & Partee and Dowty, Landman relativizes his analysis to intervals, rather than time instants. (Correspondingly, Landman understands 'e at t' as saying that t is identical to the temporal extension of e, whereas in (IV) this must be interpreted as saying that t is included in the temporal extension of e.) This change is inessential, but it reflects the fact that with the introduction of events, time intervals become otiose in dealing with the imperfective paradox.

[17] More formally: The continuation branch for e in w is the smallest set of ordered pairs containing $\langle e, w \rangle$ such that (i) if $\langle e', w' \rangle$ is in the set and e'' is the continuation of e' in w' then $\langle e'', w' \rangle$ is in the set and (ii) if $\langle e', w' \rangle$ is in the set, there is no continuation of e' in w', w'' is the nearest world to w' that is a reasonable option for e in w and where there is a continuation of e', then $\langle e', w'' \rangle$ is in the set.

[18] Bonomi (1999):181–4. Bonomi calls this the *multiple-choice paradox*. I have changed the example without altering its point.

[19] Of course, (10) and (11) could be simultaneously true in a different situation, e.g. if Leo's intention were to drive to New York via Boston. Furthermore, it may well be true even in the situation as described that Leo is driving *towards* Boston and also that he is driving *towards* New York. But this is a different matter. Most of us have driven towards the sun, but driving to the sun is not an option.

[20] By replacing 'the nearest possible world' with 'all the nearest possible worlds' the formal definition of a continuation branch in footnote 17, we get a formal definition of a continuation tree.

[21] This is essentially Bonomi's definition, although for independent reasons he introduces a further complication to be discussed (and rejected) in section 3.1.

[22] For analyses employing the notion of a perspective, see ter Meulen (1987), Asher (1992), and Bonomi (1999).

[23] Landman (1992): 31. The example is credited to Roger Schwarzschild.

[24] Note that to follow Landman in accepting that progressive sentences are typically perspective-relative is tantamount to giving up on the objectivity of a large part of our ordinary discourse.

[25] The relevant difference between the architect and Mary is probably that the construction of the cathedral is likely to reach completion, but there is no reasonable chance that the

swimming across the Atlantic would. This does not help a defender of (VI). According to (VI), the truth of 'The architect was building the cathedral' requires the truth of 'The architect built the cathedral' on each of the continuation branches.

[26] One might object that intuitions in this case depend essentially on the fact that driving is an intentional activity. But analogous examples can be given without intentional activity. Consider a case of a billiard ball rolling towards the corner, then being hit by another billiard ball, changing course, and eventually making its way into a side pocket. It seems farfetched to say that before the collision with the other ball, the ball was already rolling to the side pocket.

[27] Stative verbs apply to states: event-like entities that intuitively do not involve change. The most reliable tests for distinguishing statives from the rest is that only non-statives can occur with agentive adverbs, like 'deliberately' and 'carefully', or in pseudo-cleft constructions with the auxiliary 'do' ('What John did was. . .'). Also, it makes no sense to ask how long a state took, even though one can inquire how long the state lasted. The terminology of the distinction and some of the tests go back to Vendler (1967).

[28] For a detailed argument in favor of distinguishing the 'activity' sense of 'is', see Zucchi (1997).

[29] A similar diagnosis might be offered for the sentences 'Applause followed the concert' and 'Applause was following the concert,' an example mentioned to me by a referee for this journal. The intuition that inference from the former to the latter does not go through is due to the fact that 'was following' seems to require an agent in its subject position and that events cannot be agents. If this is right 'Applause was following the concert'—at least in its most natural reading—is not the progressive correlate of 'Applause followed the concert.'

[30] The distinction between achievement verbs and the rest is a subtle one. Intuitively, sentences containing achievement verbs describe instantaneous or near-instantaneous events. The most reliable linguistic test for achievement verbs is that they cannot occur with the aspectual verb 'stop'.

[31] Does it even make sense to say that a progressive sentence is true at an instant? Consider: 'The train was moving very fast at the instant when the bell began to ring.'

[32] It is interesting to note that if the inference from (17a) to (17b) really fails, this is also a counterexample to the widely accepted analysis of the past tense mentioned at the very beginning of the paper. For it seems that (17a) could be true even if there is no time in the past when its present tense correlate—'I drink 57 cups of coffee' in its reportive reading—is true.

[33] The phenomenon is well known and it seems to be connected to the fact that progressive sentences describe processes. According to Krifka (1989), processes are analogous to masses in that they have the so-called cumulative property. This means that if 'I was drinking 57 cups of coffee' is true of a process, it is also true of any (relevant) part of this process. Consequently, the sentence must be interpreted as describing a single drinking process involving all 57 cups of coffee.

[34] Parsons (1990): 235.

[35] As the examples indicate, there are often anaphoric links between these pairs of sentences. This is important in the analysis: it ensures the appropriate nexus between an event in progress and its target.

[36] The distinction between atelic and telic sentences is frequently characterized in mereological terms. Roughly, atelic sentences describe events whose parts are all events of the same type. (Any temporal part of Mary's walking in the park is an event of her walking in the park.) By contrast, telic sentences describe events whose proper parts are all of a different type. (Any proper temporal part of Mary's crossing of the street is something other than an event of her crossing the street.) Since the telicity of a sentence depends not only on the properties of its main verb, but also on the nature of its complement, a compositional theory along these lines must be rather complex. For details, see Krifka (1998).

[37] One might wonder whether the central idea of this analysis could be used to provide an analysis for progressive sentences in terms of their perfective counterparts. One of the problems

with (VI) was that the key notion of continuation was left unexplained. Couldn't we say that continuation is the sort of causal relation we postulated to hold between e and s in (VII$_t$)? No, we could not. Since the analysis of that relation explicitly mentions *Prog*[φ], its incorporation into a semantic analysis of the progressive would result in circularity.

[38] Lombard (1985) makes a similar proposal.

[39] None of the starred examples is strictly ungrammatical, but each lacks a characteristic reading. (20a) is acceptable with 'in a week' if the sentences are taken to mean that Mary was sick in a week from a contextually specified time; the situation is analogous for (20b). (20c) is acceptable with 'for two years' if the iterative interpretation of the sentence, when it means something like 'Mary built a house over and over for two years'. The case is analogous for (20d).

[40] This is the point made in Parsons against the proposal that all accomplishment verbs are causative-inchoative. Cf. Parsons (1990):165.

[41] A proposal of this sort is mentioned in fn. 4 of Zucchi (1999).

[42] For example, 'Yesterday Mary crossed the street'/*'Yesterday Mary has crossed the street'. As ter Meulen (1995) argues persuasively, the crucial difference between sentences in simple past and sentences in the past perfective lies in how their occurrence affects the interpretation of subsequent discourse.

[43] Sentences in the simple present are aspectually ambiguous. Their typical reading is a habitual one, which is not perfective. However, they can also be interpreted 'reportively' as perfective.

[44] This is roughly what Zucchi (1999) calls *the problem of indirect access*.

[45] This proposal is made in the formal appendix of Parsons (1990).

[46] Notice that the phenomenon occurs with non-perceptual verbs as well. Cf. 'John helped Mary cross the street' vs. 'John was helping Mary cross the street'.

[47] I thank an anonymous referee for this journal for calling my attention to this example.

[48] The latter possibility is attested by the fact that *for Mary* can be separated from 'to cross the street', as in 'For Mary it was quite an accomplishment to cross the street'.

[49] Zucchi (1999) ultimately comes out in favor of the view that uninflected clauses are inherently perfective in English. His main evidence is that whenever such clauses occur embedded in a matrix clause with an aspectual verb, they are true of complete events. He concedes that Parsons' inheritance suggestion may deal with these data, but insists that postulating the relevant syntactic devices would leave important generalizations unexplained. I think examples (26) and (28) tilt the evidence the other way.

[50] We cannot assume a simple aspectual inheritance theory. As Zucchi (1999) points out, if 'Mary was trying to cross the street' is true, the alternatives compatible with Mary's attempt are those where she succeeds in getting across the street. Even more problematic are pseudo-cleft constructions. * 'What Mary was doing is cross the street' is ungrammatical, but we would expect otherwise if inheritance of aspect worked in a straightforward fashion. Inheritance of aspect is an intricate matter that can be studied only in connection to the related problem of sequence of tense. This lies beyond the scope of the present paper.

[51] Higginbotham (2000) contains a similar event-based proposal where telic VP's contribute two eventualities to logical form.

[52] See the works mentioned in footnotes 6 and 7.

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