

Events as Derived Objects

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Abstract

There are two philosophical conceptions of events. On one conception events are primitive objects, on a par with individuals. On the other view, events are derived objects, dependent on individuals, properties, and times. The first view, Davidson's view, is associated with the semantic assumption that events act as additional arguments of verbs, and it is certainly the most commonly adopted and influential view in linguistic semantics. This paper explores the second view.

In philosophy, there are two opposing views concerning the nature of events. On one view, events are objects on a par with individuals, concrete particulars that can be described in one way or another. On the second view, events are derived objects, objects entirely dependent on individuals, properties and times. The first view, whose main proponent is Davidson, has been the most influential one in linguistic semantics. The second view has been much less influential and in fact has been hardly explored in the context of natural language semantics at all. In this paper, I will argue that there are strong linguistic grounds for adopting the second view. At the same time, however, the second view poses particular difficulties, which make the view in a way much less attractive than it first may have seemed.

1. Two philosophical views about events

The two philosophical views of events primarily concern the nature of events. The first view is Davidson's view according to which events are primitive objects, that is, they are objects that cannot be defined in terms of other, more primitive entities (Davidson 1969). In particular, events do not depend on properties, but rather different properties can be used to describe one and the same event. Thus, one and the same event can be described as the rotation of the wheel or as the wheel getting hot. Given that the identity of events does not depend on properties, Davidson proposes that event identity depends on the causes and effects of events ('events are identical just in case they share the same causes and effects') and, in later writings, following Quine, on the space time region an event occupies ('events are identical just in case they occupy the same space-time region'). The identity conditions for events on the Davidsonian account, however, will not be crucial for our discussion. (Philosophers

in fact do not agree that entities taken as primitive need to be assigned identity conditions at all.)

With the view that events are primitive goes along a semantic view about the status of events in the semantic structure of sentences. In order to account for the inferential behaviour of certain adverbs, Davidson (1967) postulated events as additional arguments of verbs. A sentence such as (1a) is then analysed as in (1b):

- (1) a. John walked slowly.
 b. $\exists e(\text{slowly}(e) \wedge \text{walk}(e, \text{John}))$

The crucial argument Davidson (1967) gives for this analysis is the possibility of adverb dropping, that is, for example the inference from (1a) to (2):

- (2) John walked.

The second view of events is one on which events are derived objects, objects whose identity is strictly dependent on objects, properties, and times. The original proponent of the view that events are derived objects was Kim (1976). The view, however, has also been adopted and further developed by Bennett (1988), Lombard (1986), and others. The view can hardly be found among linguists, though, with the exception of Chierchia (1984). The second view says that events are individuated entirely on the basis of individuals, properties, and times: they are, basically, property exemplifications. For example, the event of John's walking at midnight is conceived of as the exemplification of the property of walking by John at midnight.

A semantic view goes along with the second metaphysical view about events. It would not make much sense for this view if events were additional arguments of every verb. Otherwise there would be a very peculiar semantic redundancy: every verb would have to take as its argument an entity that is strictly individuated on the basis of the content of the verb itself together with its arguments. Given the view that events are derived objects, verbs should rather be taken to express properties of individuals only, entities on which an event may then depend (or, of course, relations among individuals). Events would then be introduced into the semantic structure of a sentence only by means of nominalizations. This is in fact what Bennett (1988) and Chierchia (1984) propose. Thus, if an event e depends on John, the walking property and a time t , that is, if one can take e to be the value of a function f applied to the walking property, John, and t ($e = f[\text{walk}], \text{John}, t$), then the semantics of *John's walk* would be as follows:

- (3) $[\text{John's walk}] = f[\text{walk}], \text{John}, t$

By assuming that events are introduced into the semantic structure of sentences generally by nominalizations, the second view establishes what appears to be a nice correspondence between syntactic and ontological complexity: events are complex objects whose composition corresponds to the compositional semantics of the nominalizations that are used to refer to them.

On the first view, by contrast, events are primitive objects with no internal structure that could be reflected in the compositional semantics of an event-referring term.

Of course, proponents of the second view of events are generally aware of the fact that there are many event-denoting nouns that are not nominalizations, such as *fire*, *catastrophe*, or *storm*. But this simply means that events are derived objects whose composition does not *have* to go along with the compositional semantics of an event-referring term. After all, events are not conceived as objects that can *only* be introduced by a linguistic construction, that is, they are not language-dependent objects.

We will later see that even in the cases of event nominalizations, the correspondence between compositional semantic structure and ontological structure generally does not obtain in the way the second view would have liked, and this certainly makes the view much less appealing than it first might have seemed.

2. The Davidsonian account

Given the Davidsonian view, nominalizations such as *John's walk* will simply pick up the implicit event argument of the verb as their referent:

(4) [*John's walk*] = $\iota e[\text{walk}(e, \text{John})]$

Some other extensions of the original Davidsonian account are needed, but unproblematic. First, event arguments need to also be postulated for stative verbs and adjectives, which also allow for adverbial modifiers, with the same inferential behaviour. Moreover, event arguments also need to be postulated for nouns taking temporal modifiers such as *last year's chairman* (cf. Higginbotham 1985).

The Davidsonian account is not the only account of adverbials that is available. Adverbs can also be treated as predicate modifiers (cf. Reichenbach 1947). Then (1a) will be analysed as in (5):

(5) slowly(walk(John))

Another treatment, moreover, is available for temporal and spatial adverbials, namely as operators whose semantics will involve quantification over spaces or times acting

as indices of evaluation. Thus, (6a) can be analysed as in (6b), where THEN is a suitable operator shifting the time of evaluation to the time i :

- (6) a. John walked then.
 b. THEN _{i} (walk(John))

Another option moreover would be available on the view that events are 'introduced' by nominalizations, namely an analysis of adverbs as predicates of events obtained by some sort of *implicit nominalization*. That is, the predicate complex would first have to be interpreted by the event nominalization function (this kind of implicit nominalization would be triggered by the presence of the adverb), so that an adverb like *slowly* can be predicated of the resulting event:

- (7) slow(f [[walk], John, t])

Later we will see that this is the best way of treating at least certain kinds of adverbial modifications.

3. Problems for the Davidsonian account

3.1. Event types vs. particular events

A general problem for the Davidsonian account concerns the possibility of reference to event types. The Davidsonian account makes sense only if events are particulars, not types. Davidson is a particularist, accepting only concrete particulars as entities, and thus he would reject abstract objects such as event types. But reference to types of events seems possible in just the same way as to particular events.

First, adverbs may make reference to events types, namely adverbs of completion:

- (8) John completely / partly burnt the cake.

One can make sense out of adverbs of completion only if one assumes that the verb specifies an event type, rather than a particular event (cf. Moltmann 1997). (8) with *partly* then will be analysed as 'there is a particular event e which instantiates an event type E , such that E is part of an event type E' that is a burning of the cake'.

Second, nominalizations can as easily refer to event types as they can refer to particular events, as illustrated in (9):

- (9) a. Laughter is rare.
 b. The closing of the door takes place every evening.

In (9a), we have a frequency predicate, a predicate applicable only to types of events. In (9b), the predicate is again a predicate of event types, counting their instantiations at particular times.

Even without adopting the particularist view that Davidson as a philosopher maintains, it does not make sense to take event types to be the arguments of verbs. For this would lead to the same semantic redundancy as when events when conceived of as derived objects were taken to act as arguments of verbs. Event types clearly depend on a property, much more so than Davidson's concrete particulars. In fact, any event modifier can help define an event type. Thus *walking with a stick at noon* can refer to an event type for which the properties of being with a stick and at noon are constitutive (even though they would not be constitutive of a particular instance, a particular walking event). But this means that event types as arguments of verbs will have to anticipate not only the meaning of the verb, but also the meaning of the verb's arguments and modifiers.

3.2 Stacked modifiers

An even more serious problem for the Davidsonian account is stacked modifiers:

- (10) a. John intentionally walked slowly.
 b. Mary dances slowly very elegantly.

A Davidsonian has to assume that *slowly* in (10a) and *elegantly* in (10b) act as predicates of events, namely of an action in (10a) and of an event type in (10b). But this means that the Davidsonian has to postulate additional event argument places for adverbs as well. As a matter of fact, this is precisely what Peterson (1997) proposes. Thus, Peterson analyses (10a) as in (11):

- (11) $\exists e' \exists e (\text{intentionally}(e') \wedge \text{slowly}(e', e) \wedge \text{walk}(e, \text{John}))$

In (11), *slowly* expresses a two-place relation between two kinds of arguments. The second arguments would be the familiar Davidsonian events, events that are said to be slow, in (11), for example, a simple event of walking. The first arguments, however, would be events of the 'slowness' or of the 'slow occurrence' of events acting as the second arguments, in (11), for example, an event of a walk being. That is, the first events are a sort of second-order events: they are events of a holding of a property of a simpler event. (11) thus states that there is an event *e* that is a walking of John and is slow and moreover that there is an event that is *e*'s slowness and intended on the part of John.

Clearly, this analysis leads to a rather unpleasant proliferation of event arguments. Note that then even *John walked intentionally* would have to be about two events, rather than only one.

3.3 Adverbials modifying quantified predicates

An even more difficult problem for the Davidsonian account is the possibility for an adverb to modify a quantified predicate:

- (12) a. John quickly ate all the chips.
 b. John carefully eliminated all the mistakes.

In (12a), what is said to be quick is John's eating 'exhausting' all the chips; in (12b) what is said to be careful is John's doing away with the entirety of the mistakes. A Davidsonian would have to treat *quickly* and *carefully* in this case as predicates of events too (as there is the possibility of adverb dropping here as well). But then *quickly* and *carefully* act as predicates for which a universal quantifier, i.e. the exhaustion of all the chips or all the mistakes, is constitutive.

Typically, adverbials can modify quantified predicates in this way (i.e. taking scope over the quantifier) when the predicate describes actions, rather than mere events. Thus, exhaustiveness in (12a–b) is constitutive of the event because exhaustiveness was precisely part of John's intention. One might therefore try to set the problem aside as one requiring special treatment. This is not possible though: for Davidson, actions have exactly the same status as events, both ontologically and semantically. In fact, the original motivation for treating adverbs as event predicates was getting the 'logic of action sentences' right (Davidson 1969).

It is hard to see how a Davidsonian could deal with cases like (12a) and (12b) at all. A Davidsonian would again have to posit additional event argument places. This time, however, the additional argument places would have to be posited for quantifiers like *all*, since it is the exhaustiveness of *all* that is partly constitutive of the event that *quickly* or *carefully* in (12a–b) are predicated of. If an event were to be made an additional argument of *all*, then *all* would express a three-place relation between events, sets and sets. (12b) would then have to be analysed in (13):

- (13) $\exists e'(\text{carefully}(e') \wedge \text{all}(e', [\text{mistake}], \lambda x[\exists e(\text{eliminate}(e, \text{John}, x)])))$

It would then be in the meaning of *all* to tell us how the event *e'* relates to the event arguments of *eliminate*: *e'* must be an event of John's exhausting the mistakes in his eliminations. But it would be extremely strange if that should be part of the meaning of *all*. Note again that a sentence like *all the girls kissed all the boys* would have to be about two additional states, constituted by the exhaustion of the girls and the

exhaustion of the boys respectively, not just about the individual events of a girl kissing a boy.

3.4 Frequency adverbials

Yet another problem for the Davidsonian arises with quantified adverbials such as *frequently* or *sometimes*, as in (14):

(14) John worked out frequently.

In Davidsonian event semantics, frequency adverbials are generally considered quantifiers ranging over events. But as quantifiers, they would not introduce events themselves. Given a Davidsonian view of adverbials, this, however, conflicts with the observation that adverbials can act as modifiers of predicates already modified by frequency adverbials. Even frequency adverbials themselves can act as such modifiers, allowing for the possibility of stacked frequency adverbials, as in (15b):

- (15) a. Last year John worked out only rarely.
 b. Sometimes John works out only rarely.

If *last year* in (15a) acts as an event predicate, then the event it is predicated of is an event of John's working out only rarely. But then *rarely* cannot, or cannot just, act as a quantifier; it also will have to introduce a new event, an event composed of single events of John's working out. In (15b) *sometimes* even *quantifies* over events that are events of John's working out rarely, that is, events composed of the kinds of events a Davidsonian takes the arguments of *work out* to be.

The use of adverbials in fact indicates that there is in principle no limit to the 'generation' of 'higher-order events'. Obviously, the Davidsonian account needs to be extended in such a way that it also admits collective events, events composed of events that could act as arguments of predicates. Moreover, a Davidsonian has to assume that those collective events act as additional arguments of frequency adverbials. But this again leads to a proliferation of event argument places, this time for event quantifiers.

3.5 Cognate objects

On a Davidsonian account, cognate objects such as *a high jump* in (16a) are naturally taken as complements spelling out the event argument of the verb, as in the analysis in (16b) (cf. Moltmann 1989):

- (16) a. John jumped a high jump.

- b. $\exists e(\text{jump}(e, \text{John}) \wedge \text{high jump}(e))$

Thus, cognate objects seem to be particularly good evidence for Davidsonian event arguments. However, it turns out that cognate objects cannot always be taken as predicates of the event argument. *An interesting thought* in (17a) does not act as a predicate of the event argument because what is meant to interesting is not the act of thinking, but rather its content; similarly for *an interesting dream* in (17b):

- (17) a. John thought an interesting thought.
 b. John dreamt an interesting dream.

Thoughts are proposition-like objects; they are not events—and so are dreams.

Rather than taking cognate objects to generally spell out the Davidsonian event argument, the generalization concerning cognate objects seems rather this: cognate objects are nominalizations repeating the content of the verb, but thereby introducing new objects of one sort or another, objects which will not act as arguments of the verb.

This generalization, of course, fits much better with the view on which events are derived objects.

4. Events as derived objects

If events are derived objects, how should they be conceived? The original account on which events are derived objects is the one of Kim (1976), where events are conceived as simple property instantiations. Kim gives existence and identity conditions for events dependent on objects, properties, and times as follows, where $[d, P, t]$ is the event dependent on an object d , a property P , and a time t :

- (18) For individuals d, d' , properties P, P' , and times t, t' ,
 a. $[d, P, t]$ exists iff P holds of d at t .
 b. $[d, P, t] = [d', P', t']$ iff $d = d', P = P', t = t'$.

Not all predicates that occur in an event description need to be part of the existence and identity conditions of events, though. Kim (1976) made a distinction between event-characterising and event-constitutive roles of modifiers. Thus, *slow* in (19) most likely acts only as an event-characterizing modifier, whereas in (20a–b) it acts as an event-constitutive modifier:

- (19) John's slow walk took an hour.
 (20) a. John's slow walk to the house was the cause of the delay.

- b. Mary was upset about John's slow walk.

In (20a) the slowness of the walk is causally relevant and in (20b) it bears on the mental state. By contrast, in (19) it seems to bear no relevance for the application of the predicate. With *slow* acting as an event-characterizing modifier in (19), (19) will be analysed as in (21b), rather than as in (21a):

- (21) a. $[John's\ slow\ walk]^t = [John, [slow\ walk], t]$
 b. $[John's\ slow\ walk]^t = \exists e(\text{slow}(e) \wedge e = [John, [walk], t])$

A major problem for Kim's account, as has often been pointed out, is that it does not distinguish events from facts: any property, however complex, can, for Kim, act as event-constitutive. As a matter of fact, however, not any property can be event-constitutive. Take the property of inviting two children as it is involved in (22):

- (22) John invited two children.

Clearly, if John sent out two separate invitations to two children, then (22) describes two distinct events, but only one fact. Moreover, there will be two events of John's inviting of a child, but only one fact describable as *the fact that John invited a child*. On Kim's account, however, on which no constraints are imposed on the properties that may define events, (22) could describe one single event, constituted by the property expressed by *invited two children*.

Events, it appears, need to involve particular participants, a quantifier alone does not suffice.

The same problem arises for tensed predicates such as *read the book*:

- (23) John read the book.

(23) describes an event, *John's reading the book*, which is either an event that occurs at a particular time or else an event type that can be instantiated at different times ('John's reading of the book took place several times'). By contrast, the fact that John read the book is unspecific and not to be located in time. For Kim, it is John and the property of reading the book at some point or other (as well as another time) that can define an event. But as a matter of fact, these three elements define only a fact, not an event.

Any explicitly or implicitly quantified predicate can, on Kim's account, yield an event (together with an individual and a time). But this gives us only a notion of fact, not a notion of an event.

There is a fundamental distinction between events and facts. By contrast to events, any proposition—quantificational, disjunctive, or quantificational—can

constitute a fact (if true). Facts differ from events also in the kinds of properties they can have. Facts can act as the object of propositional attitudes (e.g. emotive verbs, some epistemic verbs), and perhaps as the relata of causal explanations (rather like events). But facts don't stand in any temporal or spatial relations, unlike events. Facts differ from events also in that they can stand in logical relations to each other: a fact can 'mean' or 'imply' another fact ('the fact that the sky is blue means / implies that it is not raining'). But events cannot 'mean' or 'imply' (literally speaking) another event.

Events, one can thus say, are concrete in that they are located in space and time and in that they are fully specific. Facts, by contrast, are abstract in not fulfilling the first and not having to fulfil the second condition.

Events, if they are conceived as derived objects need to be conceived as dependent on individuals, times and certain *kinds* of properties. The constraint on the property should not just be that the property not be explicitly or implicitly quantificational. It should also be what Armstrong calls a *natural property* (and Lewis 1986 calls a *sparse property*) Natural properties are fully specific properties. Thus, having a certain temperature and being a certain shade of red are natural properties, but being warm and being red are not, because of their lack of specificity.

But what about the cases in (12a) and (12b), where quantifiers seem to be event-constitutive? What goes on in those cases, it seems, is that an event in the proper sense, that is, an event that is fully specific property-wise and participant-wise, is viewed with an additional gloss, namely as involving the exhaustion of a set of entities (the chips, the mistakes). For those cases, the notion of a qua object of Fine (1981) seems quite suitable, a notion that Fine also meant to apply to events (though more in order to distinguish my movement of my arm from my giving a signal). John's eliminating of all the mistakes would thus describe an event of elimination of the particular mistakes on the part of John qua being an elimination of all the mistakes.

We can summarize that an event, even though a quantificational property may be partly constitutive of it, must be *grounded* in specific objects having certain kind of property at specific times, more precisely, a natural property.

5. Event reference

Of course events generally involve change, that is, transitions from an object having a particular property at a time t to the object's having a contrary property at a subsequent time t' . Lombard (1986) proposed a theory on which events are in fact identified with such transitions. The grounding of each event must be based on transitions constituted by individual d , property space K (consisting of 'simple', natural proper-

ties), and subsequent times t and t' , $[d, K, t, t']$. Then a transition is of type $[d, K, t, t']$ iff for contrary properties P and P' in K , P holds of d at t and P' holds of d at t' .

Clearly, Lombard's theory has to be extended in such a way that other events may be built from such transitions, either as a collection of transitions or as a transition viewed with a particular gloss, such as a quantificational property. Lombard's theory of events as such gives only an account of how events are grounded.

6. Conclusion

With such an account, suitably extended, unfortunately a major problem arises for semantic analysis. Many, in fact most verbs in English do not describe the kinds of transitions that could constitute or ground events. In fact, it is hard to find any reasonably simple predicates at all that do. Even predicates expressing a simple property change such as *become soft*, *turn red* still involve a non-natural property. Looking at the range of verbs that can describe events, one can distinguish at least five major classes where the content of the verb merely characterizes an event, but would not be fully constitutive of it—at best it would just constitute a gloss of the event:

- (24) a. verbs involving quantification over kinds of properties: *change*
 b. verbs expressing quantification over spatial positions: *move towards*, *walk*
 c. verbs expressing quantification over types of action, expression of causal effect: *disturb*, *kill*
 d. verbs expressing quantification over types of action or expressing a mode of action, namely the verbs Ryle calls 'adverbial verbs' such as *hurry*, *obey*, and *continue*

If events are 'introduced' into the semantic structure of sentences only by means of nominalizations, then the descriptive content of the nominalization of any of the verbs just mentioned is not sufficient to act as a basis of the constitution of an event. That is, the descriptive content of a nominalization underspecifies the nature of the particular event it refers to. For example, *John's change* has a descriptive content that underspecifies the particular event of change that is being referred to. The same holds for *the object's becoming red* (leaving open the particular shade of red the object arrives at), *John's walk toward the house* (which leaves open what changes in spatial positions exactly took place), *John's disturbance of Mary* (which leaves open what exactly John did to cause Mary's state of irritation), and *John's hurry* (which leaves out what exactly John did that was done in a hurried way).

Thus, it cannot be the content of the nominalization itself that introduces the event that is referred to, in the sense of defining that event. Rather event nominaliza-

tions generally give only a partial characterization of an event, a description that should only suffice to pick out one event rather than another.

Event nominalizations in that respect differ fundamentally from fact nominalizations. Fact nominalizations, that is, constructions of the sort *the fact that S*, have a descriptive content that displays the various constituents of the fact being referred to in a completely transparent way. The nature and composition of a fact is fully reflected in the compositional semantics of the fact-referring term (of the sort *the fact that S*).

What does this mean for the view on which events are derived objects in general? Given that the derivation of the event can't be 'read off' the meaning of the event-referring phrase anymore, an event nominalization must be regarded like an ordinary description providing the means for picking out a particular object. This means that the semantics of nominalizations would not be much different from the semantics Davidson proposed for verbs: event nominalizations would have to have an additional argument place for events, which need to fulfil the descriptive content of the nominalization, but are otherwise individuated independently. The second view of events thus would simply posit such argument places for nominalizations only and not for verbs (and adverbs and quantifiers).

Are there then sufficiently strong motivations for (24a) the philosophical view that events are derived objects and (24b) the semantic account on which events come into play only in the presence of nominalizations?

Concerning (24a), we have seen that in the context of semantics we need events for which the content of a modifier or quantifier may be partly constitutive (the possibility of stacked adverbials and adverbials modifying quantified predicates). Thus, once grounded, we *would* need the possibility of further 'deriving' complex events.

Concerning (24b), we have seen serious problems for the Davidsonian account, especially from the behaviour of adverbials. At the same time, some other arguments for the Davidsonian account, such as cognate objects, turned out to be little convincing.

The way to go then, it appears, is to take events to generally be introduced by explicit or implicit nominalizations, but not in the sense that those nominalizations fully define the event.

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