5 Events, situations, and adverbs

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5.1 Introduction

This chapter concerns a dispute about the relationship of sentences to the events they describe, and how that relationship is manifested in sentences with adverbial modifiers. The two sides to the argument might be called the "Davidsonian position" and the "situation semantics position"; the former being chiefly represented by Donald Davidson's well-known paper "The Logical Form of Action Sentences" (Davidson, 1980) and the latter by John Perry's critique of Davidson's view, "Situations in Action" (Perry, unpublished manuscript).[1]

The issue turns on Davidson's analysis of how a sentence such as (1) is related to a similar sentence with an adverbial modifier, such as (2).

(1) Jones buttered the toast.
(2) Jones buttered the toast in the bathroom.

Stated very informally, Davidson's position is this: (1) claims that an event of a certain type took place, to wit, a buttering of toast by Jones, and that (2) makes a similar claim but adds that the event took place in the bathroom. Put this way, an advocate of situation semantics could find little to complain about. Perry and Barwise themselves say rather similar things. The dispute is over the way that (1) and (2) claim that certain events took place. Davidson suggests that the event in question is, in effect, a hidden argument to the verb "butter". As he would put it, the logical form of (1) (not analyzing the tense of the verb or the structure of the noun phrase) is not

(3) Buttered (Jones, the toast)

but rather

(4) ∃x(Buttered(Jones, the toast, x)),

where the variable x in (4) ranges over events. Adding the adverbial modifier is then quite straightforward; it is simply an additional predication of the event:

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[1]This dispute is a special case of a much deeper disagreement about semantics that is treated in depth by Barwise and Perry in *Situations and Attitudes* (1983).

(5) $\exists x(\text{Buttered}(\text{Jones}, \text{the toast}, x) \wedge \text{In}(\text{the bathroom}, x))$

Perry objects strenuously to making the event described by the sentence an explicit argument to the relation expressed by the verb. He says:

> If we ask what about the statement tells us that there was an event of that type, the only reasonable answer is that the whole statement does. It is not that part of the statement refers to an event, and the other part tells us what it was like. Part of the statement refers to Jones and the other part tells us what he did. Both parts working together tell us that an event of a certain sort occurred. The simple parts of the sentence refer to basic uniformities across events: Jones, buttering, and the toast. The way the simple parts are put together in the sentence describes the event. (Perry, 1983, p. 2)

Now it happens that Davidson considers but rejects an analysis derived from Reichenbach (1947, pp. 266–274) that is in the spirit of Perry's objection. On this analysis, (1) and (2) would be rendered by (6) and (7), respectively:

(6) $\exists x$(x consists in the fact that Jones buttered the toast)

(7) $\exists x$(x consists in the fact that Jones buttered the toast and x took place in the bathroom)

This seems to meet Perry's objection in that it is the whole statement "Jones buttered the toast" that gives rise to the reference to the event, rather than a hidden argument to the verb. Davidson rejects the analysis, however, on the grounds that its logical properties are problematical. Davidson notes that, from the identity of the Morning Star and Evening Star, we would want to be able to infer that, if I flew my spaceship to the Morning Star, I flew my spaceship to the Evening Star. On the analysis under consideration, this requires being able to infer (9) from (8).

(8) $\exists x$(x consists in the fact that I flew my spaceship to the Morning Star)

(9) $\exists x$(x consists in the fact that I flew my spaceship to the Evening Star)

Davidson argues that the only reasonable logical principles that would permit this inference would entail the identity of all actually occurring events, which would be absurd. Barwise and Perry's (1983, pp. 24–26) rejoinder to this is that Davidson makes the unwarranted assumption that logically equivalent sentences would have to be taken to describe the same event, an idea they reject. Perry (1983) goes on to develop, within the framework of situation semantics, an analysis of event sentences and adverbial modification that is faithful to the idea that, in general, it is an entire sentence that describes an event.[2]

To summarize the state of the argument: Davidson and Perry agree that sentences describe events, but Davidson thinks that it is virtually incoherent to view

[2]We omit the details of Perry's own analysis of adverbial modification, as it is not really needed for the points we wish to make.

the event as being described, as it were, "holistically" by the entire sentence, whereas Perry views it as "the only reasonable answer." Barwise and Perry pinpoint where they think Davidson's argument goes wrong, and Perry provides an analysis of adverbial modification consistent with the holistic view.

5.2 Some facts about adverbs and event sentences

One of the things that Perry's and Davidson's analyses have in common is that neither is based on a very extensive survey of the linguistic data to be explained by a theory of adverbial modification; their arguments are based more on general logical and metaphysical concerns. A close examination of the relevant linguistic phenomena, however, shows that neither Davidson nor Perry have the story quite right, and that a more complete account of adverbial modification has to include at least two possible relations between sentences and events, one close to Davidson's account and the other close to Perry's.

The key set of data we will try to explain is that there exists a significant class of adverbs that can be used to modify event sentences in two quite distinct ways:

(10) (a) John spoke to Bill rudely.
(b) Rudely, John spoke to Bill.
(11) (a) John stood on his head foolishly.
(b) Foolishly, John stood on his head.
(12) (a) John sang strangely.
(b) Strangely, John sang.

The difference between the first and second member of each pair should be clear. For instance, (10a) suggests that it was the way that John spoke to Bill that was rude, whereas (10b) says that the very fact that John spoke to Bill was rude. Thus (10a) leaves open the possibility that John could have spoken to Bill without being rude, but (10b) does not. Similar remarks apply to the other pairs. With this class of adverbs, in general, "X did Y Adj-ly" means that the way X did Y was Adj, and "Adj-ly, X did Y" means that the fact that X did Y was Adj. We will therefore say that the (a) sentences involve a "manner" use of adverb and that the (b) sentences involve a "fact" use.

One notable observation about the fact use of these adverbs is that they are indeed "factive" in the sense that the truth of the sentence with the adverb entails the truth of the sentence without the adverb. This is in contrast to other "sentential" adverbs like "allegedly" or "probably":

(13) Probably John likes Mary.
(14) John likes Mary.

The truth of (13) would not necessarily imply the truth of (14). This factivity extends to the adjective forms from which the adverbs derive:

(15) It was rude for John to speak to Bill.

(16) It was foolish for John to stand on his head.
(17) It was strange for John to sing a song.

Another significant fact is that with copular constructions, only the fact use is possible; the manner use doesn't exist:

(18) Strangely, John is tall.
(19) *John is tall strangely.

Copular constructions accept the fact use of adverbs, as is shown by (18). If we move the adverb to the end of the sentence to try to obtain a manner interpretation as in (19), the sentence is unacceptable.

Finally, perhaps the most important logical difference between the fact and manner uses of these adverbs is that the manner sentences are extensional with respect to the noun phrases in the sentence, whereas the fact sentences are not. That is, we may freely substitute coreferential singular terms in the manner sentences, but not in the fact sentences. Suppose it is considered rude to speak to the Queen (unless, say, she speaks to you first), and suppose John is seated next to the Queen. Then it could well be that (20) is true, whereas (21) is false, although they differ only in substituting one singular term for a coreferring one.

(20) Rudely, John spoke to the Queen.
(21) Rudely, John spoke to the woman next to him.

Thus (21) can differ in truth-value from (20) because, on at least one interpretation, it seems to entail that it was rude for John to speak to the woman next to him, whoever she was, i.e., even if she were not the Queen. The issue is somewhat complicated by the fact that these sentences also exhibit the sort of *de dicto/de re* ambiguity common to most nonextensional constructs. That is, (20) and (21) seem to be open to an additional interpretation that there is a certain woman, whom we may identify either as the Queen or the woman next to John, and that it was rude for John to speak to that particular woman.

On the other hand, it seems that (22) and (23) must have the same truth-value on any interpretation, so long as the Queen and the woman next to John are the same person. Moreover, no *de dicto/de re* distinction seems to obtain.

(22) John spoke to the Queen rudely.
(23) John spoke to the woman next to him rudely.

Note, however, that (22) and (23) are not completely extensional in the sense that first-order logic is extensional. That notion of extensionality requires, not only intersubstitutivity of coreferring singular terms, but also intersubstitutivity of sentences with the same truth-value. But even if (24) and (25) have the same truth-value, it does not follow that (26) and (27) do.

(24) John spoke to the Queen.
(25) John spoke to the Prince.

(26) John spoke to the Queen rudely.
(27) John spoke to the Prince rudely.

This sort of behavior is quite general with these adverbs. Examples similar to (20) through (27) can be constructed for "foolishly", "strangely", and all the other adverbs in this class.

5.3 Situations and events

Before we can give a semantic analysis of event sentences that accounts for these observations, we must develop the framework within which the analysis will be couched. As this will require technical notions of situation and event, this section is devoted to explaining those concepts.

A word of caution is in order before proceeding further. The goal of this exercise is semantic analysis of natural language, not the discovery of Deep Metaphysical Truths. If we postulate situations or events as entities in the world, it is not necessarily because we believe they objectively exist, but because postulating them gives the most natural analysis of the meanings of the class of sentences we are trying to analyze. Our real concern is to identify the metaphysics embedded in the language, not to decide whether that metaphysics is true.

A second word of warning concerns our use of the term "situation". This term is so closely identified with the work of Barwise and Perry that one might be misled into assuming that the theory of situations assumed here is simply Barwise and Perry's theory. That is emphatically not the case. Yet it seems so clear that both Barwise and Perry's theory and the theory presented here are attempts to formalize a single intuitive notion, that in the end it would probably be even more misleading to employ a different term.

5.3.1 Situations and propositions

Relatively little in the way of a theory of situations is actually needed to construct an analysis of the linguistic data that we have presented. We really need to say little more than (1) that situations are part of the causal order of the world rather than an abstraction of it, and (2) that situations are in one-to-one correspondence with true propositions. To leave the theory of situations at this, however, would leave open so many questions about what sort of objects situations and propositions were that it might cast serious doubt over the application of the theory to the analysis of event sentences.

In our theory, situations are simpler entities than in Barwise and Perry's theory. For us, a situation is a piece of reality that consists of an n-tuple of entities having an n-ary property or relation.[3] Like Barwise and Perry, then, we take properties

[3]We might want to add "at a spatio-temporal location", but we will ignore this aspect of the problem, as the issue seems independent of the others considered here.

to be first-class entities. A proposition is simply an abstraction of a situation: a way that a situation could be. We will assume that for every *n*-ary property and every *n*-tuple of entities, there exists the proposition that those entities satisfy that property. That is, suppose we have an individual John and the property of being tall. If John is tall, then there is an actual situation of John being tall. Even if John is not tall, however, there is the abstract possibility of John being tall: i.e., there might have been a John-being-tall situation, but as things turn out, there was not. This abstract possibility is what we take a proposition to be. A true proposition is one that is the abstraction of an actual situation. We can ask what would be the individuation criteria for situations and for propositions in this theory, and although various answers are possible, the most natural one would be that the identity of the properties and each pair of corresponding arguments are required for the identity of two situations or propositions.

The theory so far satisfies both of the requirements that we previously placed on situations. They are part of the causal order of the world, because they are taken to be pieces of reality, just as Barwise and Perry take real situations to be. They are in one-to-one correspondence with the true propositions, because they have been individuated in such a way that there is exactly one situation for every proposition that accords with reality. What may be in doubt, however, is that there will be enough propositions to do the work that notion normally does in semantics. Elsewhere (Moore, 1989), we show how the theory can be extended to handle first-order quantification, propositional connectives, and propositional attitude attributions, by admitting propositions and propositional functions among the entities to which properties and relations can be applied.

To summarize the extensions briefly: Propositional connectives become properties of propositions. Negation, for example, would be a unary property of propositions. A proposition has the negation property just in case it is false. For every false proposition, there is an actual situation of it being false, and for every proposition there is the additional proposition that it is false. Conjunction, disjunction, etc., become binary relations between propositions. First-order quantifiers become properties of functions from individuals to propositions.[4] For example, in standard logic "All men are mortal" is rendered as "Everything is such that, if it is a man, then it is mortal". In our framework this would be analyzed as the proposition: every individual is mapped into a true proposition by the function that maps an entity into the proposition that, if the entity is a man, then it is mortal.

Within this theory there is a natural semantics for first-order logic with formulas taken to denote propositions, with distinct formulas denoting distinct propositions unless they can be made identical by renaming of variables. We will

[4]A generalized quantifier treatment where quantifiers are considered to be binary relations on pairs of properties is probably preferable, but we present the simpler treatment in this chapter to be consistent with standard logic and with Davidson.

therefore use the notation of standard logic freely in the rest of this chapter, but with the semantics sketched here rather than the normal Tarskian semantics.

5.3.2 Situations and events

The preceding discussion makes an attempt to clarify the relation between situations and propositions, but what of events? Although we have claimed that situations are parts of the real world, they may seem rather abstract. Events, on the other hand, may seem much more real and familiar. For instance, if a bomb goes off, there seems little doubt that there really is such a thing as the explosion. We can see it and feel it, and it has undoubted causal effects. We will maintain, however, that situations and events are intimately related; that, in fact, robust large-scale events such as explosions consist of nothing more than the sum of (literally) uncountably many simple situations.

Suppose an object moves from point P1 to point P2 between T1 and T2. Consider the situation of the object being at P1 at T1, the situation of it being at P2 at T2, and all of the situations of it being at some intermediate point at the corresponding intermediate time. We claim that the event of the object moving from P1 to P2 between T1 and T2 consists of nothing more than the sum of all these situations. The argument is really quite simple: if all these situations exist – that is, if the object is at P1 at T1 and at P2 at T2 and at all the intermediate points at the corresponding intermediate times – then the movement in question exists. Nothing more needs to be added to these states of affairs for the moving event to exist; therefore it is gratuitous to assert that the moving event consists of anything beyond these situations.

The only qualification that needs to be mentioned is that the verb "consist" is used quite deliberately here, instead of the "be" of identity. That is because, according to common sense, one and the same event could have consisted of slightly different smaller events, and hence of a slightly different set of situations. World War II would not have been a different war merely if one fewer soldier had been killed. But this is no different than the observation that changing one screw on a complex machine does not make it a different machine. Therefore we will say that situations are the stuff out of which events are made, just as material substances are the stuff out of which objects are made. The exact identity criteria for events in terms of situations are likely to be just as hard to define as for objects in terms of their material. But by the same token, there is no reason to conclude that there is something to an event over and above the situations it includes, any more than there is to conclude that there is something to an object over and above the material of which it is made.

5.4 The analysis

With this framework behind us, let us look again at "Jones buttered the toast". Perry begins his analysis by saying

"Jones" refers to Jones, "the toast" refers to some piece of toast, and "buttered" refers to a relational activity, with the tense constraining the location. (Perry, 1983, p. 2)

This certainly seems unobjectionable. We have two objects and a binary relation, ignoring tense, as we do throughout this chapter. If the objects in question actually satisfy the relation, then there is a corresponding situation. But how is this situation related to the commonsense event of Jones buttering the toast? The buttering event is surely a complex motion, so by the argument of the last section it must consist of countless situations of the butter, the toast, the knife, Jones's arm, etc. being in certain positions at certain times. According to the identity criterion we have given for situations, those situations and the event that is constituted by their sum are distinct from the single situation of the buttering relation holding between Jones and the toast.

Clearly the buttering situation and the buttering event are closely related, but according to the principles we have adopted, they cannot be one and the same. Davidson's analysis of event sentences turns out to provide a very attractive way of expressing the relation between them. If we analyze an event sentence as asserting the existence of an event, as he suggests, then according to our semantic framework, the sentence asserts that a certain property of events is instantiated.[5] In the buttering toast example, the sentence says that the property of being a buttering of the toast by Jones is instantiated. The situation that the whole sentence describes then, is the situation of the property of being a buttering of the toast by Jones being instantiated. Thus, on the one hand, we have a situation of a certain property of events being instantiated, and on the other hand we have the event that actually instantiates the property.

On first exposure, this may seem like an artificial distinction imposed to solve an artificial problem. In point of fact, however, this distinction is exactly what is needed to explain the two types of adverbial modification discussed in Section 5.2. Moreover, all the data presented there can then be quite straightforwardly accounted for within the framework we have developed.

Let us look again at perhaps the simplest pair of sentences illustrating these two types of modification:

(12) (a) John sang strangely.
(b) Strangely, John sang

The manner use of the adverb in (12a) seems to fit quite comfortably within the Davidsonian pattern of treating adverbs as making additional predications of the event whose existence is asserted by the basic sentence. If John sang strangely, it seems most definitely to be the singing event itself that is strange. With (12b), though, the singing event itself may be quite ordinary as singing events go. It

[5]Strictly speaking, the theory says the sentence asserts there is an event mapped into a true proposition by certain propositional functions, but for simplicity we will paraphrase this in terms of the corresponding property of events.

seems to be the fact that there is any singing by John at all that is strange. But this is precisely what we are saying if we analyze (12b) as predicting strangeness of the situation of the property of being-a-singing-by-John being instantiated.

We can represent this symbolically by making a minor extension to ordinary logic; (12a) can be represented in the way Davidson has already suggested.

(28) $\exists x(\text{Sang}(\text{John}, x) \wedge \text{Strange}(x))$

The extension is required to represent the fact use of the adverb in (12b). That sentence attributes strangeness to a situation, and because we have decided to let formulas denote propositions, we do not yet have any notation for situations. One remedy for this is to let situations be in the domain of individuals, as Davidson already assumes events to be, and to introduce a relation "Fact" that holds between a situation and the corresponding true proposition. The name "Fact" is chosen because this relation quite plausibly provides the semantics of the locution "the fact that P." Note that although "Fact" denotes a relation between a situation and a proposition in our semantics, it will be an operator whose first argument is a singular term and whose second argument is a formula, rather than an ordinary relation symbol. (12b) would then be represented by

(29) $\exists y(\text{Fact}(y,\exists x(\text{Sang}(\text{John}, x))) \wedge \text{Strange}(y))$

This says literally that there exists a fact (or situation) of there being a singing-by-John event and that fact is strange, or more informally, the fact that John sang is strange.

If there is a distinct situation corresponding to every true proposition, it may be worrying to allow situations into the domain of individuals. There are various foundational approaches that could be used to justify this, but we will merely note that the logical principles needed for our use of situations are so weak that no inconsistency seems threatened. The only general principle that seems appropriate is the schema

(30) $\exists y(\text{Fact}(y,P)) \equiv P$

This schema can easily be shown to be consistent by giving "Fact" a simple syntactic interpretation that makes the schema true.

Under this analysis of event sentences and adverbial modification, all the other data are easily explained. The factivity of the fact use of adverbs and their related adjectives arises because the adverbs and adjectives express properties of situations, which are real pieces of the world that do not exist unless the corresponding propositions are true.

Copular sentences do not exhibit the fact/manner distinction in their adverbial modifiers, because they do not involve event variables; only the overall situation is available for the adverb to be predicated of. This provides one answer to Perry's objection to the Davidsonian treatment of event sentences: "The idea that 'Sarah was walking' gets a cosmically different treatment than 'Sarah was agile'

strikes me as not very plausible" (Perry, 1983, p. 3). The first of these can take manner adverbials, and the second cannot, a fact that seems to require *some* difference in analysis to explain.

The extensionality with respect to noun phrases of sentences with manner adverbials follows directly from Davidson's original proposal. The noun phrases do not occur within the adverbial's ultimate scope, which is only the event variable. Changing the entire sentence, as in (24) through (27), changes the event, though, so we do not get that sort of extensionality.

The nonextensionality of sentences with fact adverbials follows from the fact that changing a description of a participant in an event changes the particular property of the event that goes into determining what situation is being discussed, even though the event itself does not change. If we compare (20) and (21),

(20) Rudely, John spoke to the Queen.
(21) Rudely, John spoke to the woman next to him.

we see that the two sentences describe a single event, John's speaking to the Queen, who is also the woman next to him. The sentences describe the event in two different ways, though, so they ascribe two different properties to it.[6] If we leave out the adverb, the unmodified sentences assert that these two properties of events are instantiated. Since these properties are different, the situation of one of them being instantiated is a different situation from that of the other one being instantiated. Hence one of those situations might be rude (of John) without the other one being so.

5.5 Conclusions

Let us return to Davidson's and Perry's analyses of event sentences, to see how they fare in the light of the data and theory presented here. We have adopted Davidson's analysis of manner adverbials wholesale, so we are in complete agreement with him on that point. We sharply disagree with him, however, on the possibility of associating event-like entities, i.e., situations, with whole sentences, and we find them absolutely necessary to account for the fact use of adverbs, a case Davidson fails to consider. Perry, on the other hand, rightly takes Davidson to task for his faulty argument against associating situations with whole sentences, but then fails to look closely enough at the data to see that something like Davidson's analysis is still needed to account for the detailed facts about manner adverbials.

[6]To make sure these two properties do come out nonidentical in our semantics, we need to treat "the" as a quantifier. There are many independent reasons for doing this, however.

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