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**U041**

**SEMANTICS, SITUATION**

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Versions of situation semantics incorporate systematic metaphysical accounts of such entities as situations, states of affairs, and propositions in explanations of linguistic, informational, and cognitive phenomena.

1. History of Situation Semantics
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## 1 History of Situation Semantics

Situation semantics was originally conceived as an alternative to extensional model theory and possible world semantics especially suited to the analysis of various problematic constructions, including naked-infinitive perception verbs (Barwise 1981) and belief-reports (Barwise and Perry 1981a, 1981b). In its earliest forms, the central ideas were:

- **Partiality.** Situations are contrasted with worlds; a world determines the answer to every issue, the truth-value of every proposition. A situation corresponds to the limited parts of reality we in fact perceive, reason about, and live in. What goes on in these situations will determine answers to some issues, but not all. In Barwise 1981, reporting his initial work on situation theory, Jon Barwise represents scenes, the situations we perceive, as partial first order models.
- **Realism.** Basic properties and relations are taken to be real objects, uniformities across situations and objects, not bits of language, ideas, sets of  $n$ -tuples or functions. In *Situations and Attitudes* (Barwise and Perry 1983; hereafter *S&A*), *courses of events* are partial functions from sequences of locations, relations and objects to truth-values. Complex properties and, and various types of objects were full-fledged objects, entering into courses of events.
- **The Relational Theory of Meaning.** The meaning of an expression  $\phi$  is conceived as a relation between a discourse situation, a connective situation, and a described situation, written

$$d.c.[[\phi]]_e$$

The meaning of “I am sitting next to David,” for example, would obtain between courses of events  $d$ ,  $c$ , and  $e$  if there are individuals  $a$  and  $b$  such that i) in  $d$ ,  $a$  is the speaker of the sentence; ii) in  $c$ ,  $a$ ’s use of “David” is used to refer to  $b$ ; iii) in  $e$ ,  $a$  is sitting next to  $b$ .

A number of trenchant criticisms were made of *S&A*; see especially Soames’ “Lost Innocence” (Soames 1990). In “Shifting Situations and Shaken Attitudes,” which appeared with Soames article and a number of others in a special issue of *Linguistics and Philosophy*, Barwise and Perry recognized the need to rethink the foundations of situation semantics. Two main developments bridge the early versions of situation semantics and the later ones which emerged from this rethinking:

(i) In early versions, situation semantics was developed within standard set theory; this led to foundational problems. In the mid-1980’s, Jon Barwise and others developed various versions of *situation theory*, in which all of the various entities the need for which had developed were treated axiomatically (Barwise 1989, Devlin 1991, Westerstahl 1990) or within Peter Aczel’s version of set theory (Barwise and Etchemendy 1987).

(ii) The concept of a constraint, developed in *S&A* as an adjunct to the relational theory of meaning, has become central to the development of situation semantics as a general account of informational and intentional content (Barwise 1993, Israel and Perry 1990 and 1991, Perry 1993).

## 2 Situations

The basic idea of situation semantics is that in thought and action we use complexes of objects and properties to *directly* and *indirectly* classify parts and aspects of reality, or *situations*. This sort of realistic classification is more basic than linguistic classification, and underlies it. Consider a simple dialogue:

‘What happened in the woods this afternoon?’

‘Jackie broke her leg.’

The question concerns a certain situation, a bit of reality: the events in the woods this afternoon. The answer directly classifies the situation in terms of an object (the dog Jackie) and a property (acquiring a broken leg). We classify situations by what goes on in them; which properties objects have, and the relations they stand in to one another in virtue of the events that comprise the situation.

Consider the issue of whether Jackie broke her leg at a certain time  $t$ . There are two dual possibilities or *states of affairs*, corresponding to whether she did or didn’t, which we can represent as:

$\sigma$ :  $\langle\langle$ breaks-leg,  $t$ , Jackie; 1 $\rangle\rangle$

and

$\sigma'$ :  $\langle\langle\text{breaks-leg, t, Jackie; 0}\rangle\rangle$

Of course, what goes on in the whole world (if we assume there is such totality) will determine whether or not Jackie broke her leg, but this will also be determined by much smaller situations. Let  $s$  be the situation in the woods this afternoon. Then,

$$s \models \sigma$$

i.e.  $s$  supports  $\sigma$ , or, in more traditional philosophical terms  $s$  makes it the case that  $\sigma$ , or makes  $\sigma$  *factual*.

In situation theory, various objects are built from the basic interplay of situations and states of affairs, permitting complex and abstract ways of classifying situations, including complex states of affairs, properties and relations. A key concept is a *type of situation*, such as the type of situation in which a dog breaks a leg (call it  $S$ ) and the type of situation in which a dog doesn't run (call it  $S'$ ).

There are states of affairs involving these abstract objects; in particular one type of situation may *involve* another: if there is a situation of the first type, there will also be one of the second type.  $S$  involves  $S'$ ; dogs with broken legs don't run. These sorts of states of affairs are *constraints*.

### 3 Meaning

Constraints give rise to the possibility of *indirect classification*: classifying situations by what they mean. That is, classifying situations not by the states of affairs they support, but by the types of situations they involve, relative to some constraint.

Indirect classification is how situation semantics conceives of informational and intentional *content*. Classifying situations by their contents is what organisms do under the influence of what Hume calls "custom"; confronted with a situation, they form expectations, or at least contemplate possibilities, on the basis of what the situation involves relative to some constraint, factual or not, to which they have become attuned. Situation semantics interprets informational and intentional content as a system that exploits such indirect classification. Situations are indirectly classified relative not only to laws of nature and other actual constraints, (informational content) but also to conventions, rules, customs, plans and other constraints, both factual and fictional, of human contrivance (intentional content).

Consider:

1. Jackie has a broken leg.
2. The x-ray shows that Jackie has a broken leg.
3. The vet said that Jackie had a broken leg.

In (1), we have direct classification, in (2) and (3) indirect classification. In the latter a common pattern is discernible, involving three types of situation and a constraint:

- A local situation;
- Connections between objects in that situation and other objects, the *subject matter*;
- A remote situation, the content, involving the subject matter;
- A constraint according to which the a combination of situations of the first two types involves a situation of the third type.

In (2) the local situation is the x-ray having certain characteristics. The x-ray is connected to Jackie; it was taken of her. The complex type of situation, in which an x-ray taken of a certain dog exhibits those features, involves a situation in which the dog has a broken leg. Given the connections between the x-ray and Jackie, its having those characteristics shows that she has a broken leg. Here the constraint is factual and the content is informational.

In (3) the local situation is the utterance, in which the vet utters the words, “Jackie has a broken leg”. The vet’s use of the word “Jackie” is connected through various mental and conversational links to the dog Jackie. The rules of English provide the constraint; given the characteristics of the utterance and its connections, it is true iff Jackie has a broken leg. English speakers are attuned to these constraints, not in the sense that they automatically form expectations when they hear utterances, but that they grasp the type of situation meant. Here the content is intentional.

Situation semantics then conceives of meaning as a relation between types of situations. A key advantage of this conception is that it allows us to see how different information can be gleaned from the same “signal” given different starting points.

In the case of (2), we think naturally of a case in which an experienced vet in a well-organized office studies an x-ray known to be of Jackie, and learns that she has a broken leg. In another case, an experienced vet in a poorly organized office might infer from the x-ray and the fact that Jackie is the only dog in the place with a broken leg, that it was of her. And a would-be vet might learn how to read x-rays, knowing that the x-ray is of Jackie, and that she has a broken leg.

Similarly, in (3) we think of a person who knows to which dog the vet refers when he says “Jackie” and knows English learning that Jackie has a broken leg. But attunement to the same constraint, and a different starting point, might allow someone to learn which of the dogs in the office was named “Jackie”.

## 4 Accomplishments

Situation semantics has been used to analyze a wide variety of linguistic phenomena (see, for example, Gawron and Peters 1990, Cooper 1992, and various papers in the *Situation Theory and Its Applications* volumes), the liar paradox (Barwise and Etchemendy 1987), heterogeneous reasoning and representation (Barwise and Etchemendy 1990), diagrammatic reasoning (Shin 1990 and 1991), the nature and structure of information and action (Israel and Perry 1990 and 1991, Devlin 1991, Barwise 1993), and

number of other issues involving language, representation and computation (see the *Situation Theory and Its Applications* volumes).

It is probably fair to say, however, that up to this point situation semantics has been more successful in terms of adoption of its broad themes than in terms of adoption of its specific formalism and proposals. The main themes of early situation semantics, partiality, realism and the relational nature of meaning, have been incorporated into the (generally) received wisdom of philosophy and linguistics. But situation semantics remains only one of a number of alternative semantical frameworks that exhibit these virtues in various ways from which a theorist may choose.

## References and Further Reading

- \*Aczel, Peter, David Israel, Yosuhiko Katagiri, and Stanley Peters, eds., 1993 *Situation Theory and Its Applications*, vol. 3 (Stanford: CSLI). (This volume contains a number of articles about situation theory and situation semantics; it is the third in a series of volumes devoted to these topics.)
  - \*Barwise, Jon 1981, 'Scenes and Other Situations', *The Journal of Philosophy*, vol. 77, pp. 369-97. Reprinted in Barwise 1989. (In this paper Barwise describes his original idea of a scene semantics, a precursor of situation semantics in which partial first-order models are used to provide an analysis of naked-infinitive perception reports.)
  - \* — 1989 *The Situation In Logic* (Stanford: CSLI). (The papers in the collection developed many of the basic ideas of later versions of situation theory.)
  - \* — 1993, 'Constraints, Channels, and the Flow of Information', in Aczel, Israel, Katagiri, and Peters 1993. (In this paper Barwise develops an abstract theory of information flow based on the idea of constraints.)
  - \*Barwise, Jon and John Etchemendy 1987 *The Liar* (New York: Oxford University Press). (Barwise and Etchemendy provide an analysis of the liar paradox in terms of situation semantics.)
  - \* — 1990, 'Visual Information and Valid Reasoning', in W. Zimmerman, ed., *Visualization in Mathematics* (Washington, D.C.: Mathematical Association of America). (Barwise and Etchemendy use a situation-based concept of information to defend the view that reasoning using diagrams and reasoning that combines diagrams and sentences can provide valid proofs and can be studied model-theoretically.)
- Barwise, Jon, Jean Mark Gawron, Gordon Plotkin, and Syun Tutiya, eds., 1991 *Situation Theory and Its Applications*, vol. 2, (Stanford University: Center for the Study of Language and Information). (This volume is the second in a series devoted to articles about situation theory and situation semantics.)

- \*Barwise, Jon and John Perry 1981a, ‘Semantic Innocence and Uncompromising Situations’, in P. French, T. Uehling, and H. Wettstein, eds, *Midwest Studies in the Philosophy of Language*, vol. VI (Minneapolis: University of Minnesota Press, 1981). (In this article, which announced situation semantics, Barwise and Perry criticize a famous argument used by Church, Davidson and others to show that facts cannot be the semantic values of sentences.)
- \*Barwise, Jon and John Perry, ‘Shifting Situations and Shaken Attitudes’, *Linguistics and Philosophy*, vol. 8: 105-161. (Responding to the criticisms of Soames and others, Barwise and Perry recognize that their theory in *S&A* has serious problems and explore strategies for repairing it.)
- \* — 1981b, ‘Situations and Attitudes’, *Journal of Philosophy*, vol. 77: 668–91. (In this early article Barwise and Perry describe the application of situation semantics to belief-reports, and explain the foundational issues that plagued early versions of situation semantics.)
- \* — 1983 *Situations and Attitudes*. (Cambridge: MIT-Bradford). (This book developed a version of situation theory within set theory, and applied it to linguistic meaning, the propositional attitudes, and the semantics of mental states.)
- \*Cooper, Robin 1992, ‘A Working Person’s Guide to Situation Theory’, in S. Hansen and F. Sorensen, eds., *Semantic Representation and Interpretation* (Fredericksberg: Samfundslitteratur). (A lucid introduction to situation theory for the working cognitive scientist.)
- \*Cooper, Robin, Kuniaki Mukai, and John Perry, eds., 1990 *Situation Theory and Its Applications*, vol. 1 (Stanford: CSLI). (This volume is the first in a series devoted to articles about situation theory and situation semantics.)
- \*Devlin, Keith 1991 *Logic and Information* (Cambridge: Cambridge University Press). (Devlin’s book explains the basics of the current version of situation theory and applies it to a number of problems in linguistics and psychology.)
- \*Gawron, Jean Mark and Stanley Peters 1990 *Anaphora and Quantification in Situation Semantics* (Stanford: CSLI). (Situation semantics is used to explain the certain aspects of anaphoric relations.)
- \*David Israel and John Perry 1990, ‘What is Information?’, in P. Hanson, ed., *Information, Language, and Cognition* (Vancouver: University of British Columbia Press). (Israel and Perry develop a distinction between pure and incremental information within situation theory.)
- \* — 1991, ‘Information and Architecture’, in J. Barwise, J. Gawron, G. Plotkin, and S. Tutiya, eds., 1991. (Israel and Perry use the theory developed in Israel and Perry 1990 to distinguish among various types informational structures.)

- \*Perry, John 1993 *The Problem of the Essential Indexical and Other Essays* (New York: Oxford University Press). (A collection of Perry's essays on situation semantics and related topics.)
- \*Seligman, Jerry and Dag Westerstahl 1996 *Logic, Language, and Computation*, vol. 1 (Stanford: CSLI). (The first in a projected series of volumes that contains original articles about situation semantics and other broadly similar approaches to information.)
- \*Soames, Scott 1990, 'Lost Innocence', *Linguistics and Philosophy*, vol. 8: 59-71
- \* — 1990, *The Logical Status of Diagrams* (Cambridge: Cambridge University Press). (Situation theory is used to provide a precise analysis of reasoning with Venn Diagrams).
- \*Westerstahl, Dag 1990, 'Parametric Types and Propositions in First-Order Situation Theory', in R. Cooper, K. Mukai, and J. Perry, eds., 1990. (A subtle analysis of the role of parameters in situation theory.)