c-depends are wffs' by '(2) *C* is a wff and all of the hypotheses on which *C* *c*-depends are wffs'; page 112, line 23, replace 'a' by '2'; page 235, line 2 from below, read 'non-Cantorian' for 'Cantorian.' In addition, LFM sometimes repeats phrases from FM which are no longer appropriate: thus J. Rubin's ***Set theory for the mathematician*** (Holden-Day, 1967) might have been "recent" in 1968 but it is no longer "recent" in 1982. More annoying is the occasional reference to work not mentioned the bibliography, e.g. to Feferman's work on consistency statements (Chapter 6). This is found in Feferman, op. cit.

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JON BARWISE and JOHN PERRY. ***Situations and attitudes.*** Bradford books. The MIT Press, Cambridge, Mass., and London, 1983, xxii + 352 pp.

Situation semantics is a theory of meaning based on what the authors call *ecological realism* where meaning is located in the interaction of living things and their environment. Meanings are neither mental representations nor transcendent Platonic forms, on this theory, but arise out of recurring relations between situations, relations that organisms must become attuned to if they are to survive. Humans are in particular attuned to the use of language, which in turn is the guide to the other uniformities across situations that we are able to recognize. To know a human language is to be able to exploit the intricate relation between utterance events, or discourse situations, and other aspects of objective reality, a relation that ultimately depends on the way the linguistic community uses that language, i.e., on the conventional constraints that obtain in that community. What the authors propose, accordingly, is a relational theory of meaning according to which a meaning is a relation between different types of situations, and a linguistic meaning in particular is a relation between utterances or statements and described situations (called the *interpretations* of the statements). The meaning of a simple declarative sentence, for example, is a conventional constraint between statements made with that sentence and their interpretations (the situations described). The primary function of language, on this view, is to convey information, which in general is underdetermined by, and therefore is to be distinguished from, the interpretation of a statement. (The fallacy of misplaced information assumes that all of the information contained in an utterance comes from its interpretation.)

The text is divided into four parts with the general topic of how meaning arises and the evidence for a theory of linguistic meaning taking up Part A. The evidence consists of six semantic universals: (1) the external significance of language (where information is prior to language); (2) the productivity of language (where a version of the compositionality principle holds for meanings but not for interpretations); (3) the efficiency of language (where different uses of an expression can have different interpretations even though its meaning remains the same); (4) the perspective relativity of language (where different speakers are always in different discourse situations, possibly having different referential connections with parts of reality, and possibly exploiting different situations as resources for conveying information about the situations being described); (5) the ambiguity of language (which is another aspect of the efficiency of language); and (6) the mental significance of language, which, according to the authors, is adequately explained by its external significance (an idea not unlike Bertrand Russell's 1910–12 multiple relations theory of belief).

Part B consists of the authors' theory of situations wherein real situations are distinguished from abstract situations. Real situations (including events as well as facts) are metaphysically basic and constitute the causal order, with individuals, properties, relations, and space-time locations arising as uniformities across real situations. Abstract situations are constructed from individuals, properties, relations, and locations within the framework of Kripke–Platek set theory (KPU) and are used to classify real situations. Thus, an abstract situation is a set of triples $\langle l, \langle r, x_1, \ldots, x_n \rangle, i \rangle$, where l is a space-time location, r is an n-ary relation, $x_1, \ldots, x_n$ are objects, and i is 1 or 0, depending on whether r holds or does not hold, respectively, between $x_1, \ldots, x_n$ at l. (Although negative facts are built into the framework in a fundamental way, such as when $\langle l, \langle r, x_1, \ldots, x_n \rangle, 0 \rangle$ belongs to a situation that classifies a real situation, the authors never discuss, much less justify, the metaphysical assumption of such. Nevertheless, for reasons we cannot go into here, the assumption does seem unavoidable in any viable fact ontology.) Abstract situations play no role in the causal order; but, apparently, this does not mean that sets are not constituents of real situations. Indeed, the authors' result (p. 307) that the class of situations in the interpretation of a (persistent) statement is not a set but a proper class requires both that sets are constituents of real situations and that the property of being a set is a basic property (and hence a

uniformity across real situations). Thus, although sets play no role in the causal order, they nevertheless are constituents of real situations that form the causal order (a result that will not be welcomed by all friends of a situation ontology).

By replacing one or more of the individuals, properties, relations, or locations in an abstract situation by abstract proxies called *indeterminates*, the authors include in their theory new abstractions that they call *event-types*. An anchor f for an event-type E assigns individuals, properties, relations, and locations to the indeterminates (of the same type) occurring in E; and the result, $E[f]$, when f covers all the indeterminates in E, is a new situation. An abstract situation e is then of type E if $E[f] \subseteq e$, for some such anchor f. One purpose event-types serve is the representation of complex properties and relations. That is, a complex property or relation, according to the authors, is an event-type with the appropriate number of individual indeterminates and exactly one location indeterminate. Thus, with complex properties so represented, Leibniz's principle of the identity of indiscernibles is provable in the form that $e = e'$ if for all event-types E, e is of type E iff e' is of type E. (The authors' distinction between simple and complex properties and relations seems to make English the arbiter of which properties and relations are simple, or basic, and which are complex; for the distinction apparently corresponds, on the account given in the text, exactly to that between simple and complex predicates of English. Thus, a natural language that has only a complex predicate where English has a simple predicate will then have some of its metaphysics wrong, a result suggesting that the simple–complex distinction should be left out of the theory of properties and relations altogether. Note incidentally that the simple or basic properties and relations in question are in no sense restricted to the "natural" properties and relations posited in scientific theories, but include all of the properties and relations that the simple predicates of English purport to represent. That is, even aside from the sets of KPU, the theory is clearly Platonistic even though the Platonic forms in question are not meanings.)

Event-types are also used in the construction of the authors' theory of constraints, where each constraint is based upon a relation of involvement between event-types and sets of event-types (called *schemata*) considered disjunctively. The basic idea is that an event-type E *involves* a schema S iff every actual situation of type E is part of some actual situation of type S (where to be of type S is to be of type E', for some $E' \in S$). For example, kissing involves touching because every actual event of a type where someone is kissing someone is part of an actual event of a type where someone is touching someone. A situation e_0 is said to be *meaningful* with respect to a constraint C of E involving S if e_0 is of type E; and e_1 is said to be a *meaningful option* from e_0 with respect to C if e_0 is meaningful with respect to C and for all total anchors f for C, e_0 is of type $E[f]$ only if e_1 is of type $S[f]$. Four types of constraint are disccussed, namely, necessary, nomic, conventional, and conditional constraints, with linguistic meanings being conventional constraints on utterances. The situations in the interpretations of statements, in other words, are meaningful options from the situations in which those statements are made.

A distinction is made by the authors between factual constraints and constraints that are respected (in a structure of situations); and they claim that this distinction corresponds to that between nomic and accidental patterns of the involvement relation obtaining between situations. Any factual (nomic) constraint will be respected, but not all constraints that are respected will be factual (nomic), unless the structure of situations that obtains in reality is Humean. Most (if not all) of the problems that plague a Humean analysis of laws of nature (based on material conditionals) apply to the notion of constraints that are respected, and the authors' gambit in avoiding these problems is simply to maintain, at least for the semantics of ordinary language, that the structure of situations that obtains in reality is not Humean; i.e., that not all constraints that are respected are factual. This gambit is problematic, however, insofar as no real explanation as to how a constraint can be respected and yet not be factual is given. Moreover, no explanation is likely to be forthcoming, insofar as the authors reject any modal analysis that brings in possible situations beyond the factual situations that obtain in a structure of situations, i.e., insofar as there are in their framework no possible situations upon which to base the distinction between nomic and accidental patterns of the involvement relation obtaining between situations.

The application to semantics of the theory of situations developed in Part B is taken up in Part C where the relation constituting the meaning of an indicative sentence is said to constrain both the utterances in its domain and the situations in its range. The constraints on utterances in the domain are those usually investigated in speech act theory, while those regarding the situations in the range are usually taken as belonging to truth-conditional (model-theoretic) semantics. Situation semantics encompasses both approaches insofar as it is designed explicitly to deal with both sides of the meaning relation. That is, the

goal of situation semantics is to describe the constraints that hold between the uniformities that arise across utterances on the one hand and those that arise across the situations described on the other; for it is these constraints that make the statement made in the utterance mean the situation described. The uniformities that arise across the utterance or discourse situations are identified by means of roles, which are ordered pairs of indeterminates (abstract proxies) and event-types, such as the roles of the speaker, the addressee, the discourse location, and the expression used. The uniformities across the situations described are identified by means of the speaker's referential connections that map words onto their referents, including locations as the referents of tense markers. Thus, the meaning of a tensed verb phrase constrains a discourse situation in a nontrivial way, as do the meanings of 'I' and 'you,' since these are used to refer to the speaker and addressee respectively. A separate chapter is dedicated to the meaning of singular noun phrases where the authors introduce not only the now-standard distinction between referential and attributive uses of definite descriptions but also a further distinction between inner and outer attributive uses. (Inner attributive uses amount to what are better known as *de dicto* uses, and outer attributive uses are perhaps better described as referential uses without existential presuppositions.)

The real test for situation semantics, as the authors recognize, is whether it can provide an adequate account of cognitive attitudes, i.e., of statements using such verbs as 'know,' 'believe,' and 'assert.' Two approaches are described in the fourth and final part of this text, a "hard-line" approach in which attitudes are relations to situations, and a more "fine-grained" approach in which attitudes are indirect classifications of mental states or activities. The hard-line approach follows a type of analysis made famous by Jaakko Hintikka, where, for example, a situation e is a *doxastic option* for an agent x in a situation s at a location l if e is compatible with what x believes in s at l; and e is a *doxastic alternative* for x in s at l if e is not precluded by what x believes in s at l. Unlike Hintikka's possible-worlds analysis, however, where (as a result of the principle of excluded middle) the two notions coincide, doxastic alternatives will not in general be doxastic options in the authors' theory of situations. Nevertheless, following Hintikka's analysis, a *believes-that* report describes a situation s iff every doxastic alternative for the agent in s at the time of the believing is in the interpretation of the statement believed; and a *does-not-believe-that* report describes s iff some doxastic option for the agent in s at the time of his not-believing the statement in question is not in the interpretation of that statement.

One of the problems with the hard-line approach is that it fails to account for how attitude reports serve to describe psychological states of an agent that are connected in a lawlike way to other psychological or behavioral states of that agent. On their more fine-grained approach, the authors develop a theory of frames of mind where, for example, beliefs are factored into (1) efficient doxastic conditions in which the agent's frame of mind is represented by a belief-schema (set of event-types), and (2) settings or anchors for some or all of the indeterminates in the agent's belief-schemata. The indeterminates in belief-schemata are called *ideas*, and the roles that ideas have in belief-schemata are called concepts. Belief-schemata and their settings or anchors are then used in the semantics of belief-reports. Analyses relating knowledge to believing and having information are also given, where knowledge involves having a belief that contains information for the agent. Some constraints on the use of attitude verbs are described, including some of the guides to the use of attitude reports in folk psychology (the theory of psychological and behavioral states embodied in natural language).

Much of the semantics in this book is limited to simple kinds of sentences, and in a final chapter the authors admit that "we are still far from our destination, a comprehensive theory of meaning" (p. 274). Nevertheless, this is a book with many insights and new ideas about the foundations of semantics. We can but look forward to its sequel and the fulfillment of some of the authors' more important promissory notes.

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JUDSON CHAMBERS WEBB. ***Mechanism, mentalism, and metamathematics. An essay on finitism.*** Synthese library, vol. 137. D. Reidel Publishing Company, Dordrecht, Boston, and London, 1980, xiii + 277 pp.

The past two decades have seen a considerable amount of discussion concerning the effect of certain metamathematical results on the philosophies of formalism and mechanism. (See, for example, Lucas XXXIII 613, Gödel's remarks in Wang XLII 579, and the survey in Chihara, ***The journal of philosophy***, vol. 69 (1972), pp. 507–526.) To date, this discussion has consisted of arguments that the views are challenged (or refuted) by various theorems, and responding arguments that the views are unaffected. That is, concerning the metamathematical results, formalism and mechanism have been on the defensive.