A PROLEGOMENON TO SITUATION SEMANTICS

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ABSTRACT

An attempt is made to prepare Computational Linguistics for Situation Semantics.

I INTRODUCTION

The editors of the AI Journal recently hit upon the nice notion of correspondents' columns. The basic idea was to solicit experts in various fields, both within and outside of Artificial Intelligence, to provide "guidance to important, interesting current literature" in their fields. For Philosophy, they made the happy choice of Dan Dennett; for natural language processing, the equally happy choice of Barbara Grosz. Each has so far contributed one column, and these early contributions overlap in one, and as it happens, only one, particular; to wit: Situation Semantics. Witness Dennett:

...situation semantics - [is] the hottest new topic in philosophical logic...[is] in some ways a successor or rival to Montague semantics.

And now Grosz:

In recent work, Barwise and Perry address the problem of what information from the context of an utterance affects which aspects of interpretation and how? in the context of a proposed model theory of natural language, one that appears to be more compatible with the needs of AI than previous theories... (It) is of interest to work in natural-language processing for the kind of compositional semantics it proposes, and the way in which it allows the contexts in which in an utterance is used to affect its interpretation.

What is all the fuss about? I want to address this question, but rather indirectly. I want to situate situation semantics in "conceptual space" and draw some comparisons and contrasts between it and accounts in the style of Richard Montague. To this end, a few preliminary points are in order.

A. The Present Situation

First, as to the state of the Situation Semantics literature. There is as yet no published piece of the scope and detail of either "English as a Formal Language" or "The Proper Treatment of Quantification In Ordinary English". Nor, of course, is there anything like that large body of work by philosophers and linguists - computational and otherwise - that has been produced from within the Montague paradigm. Montague's work was as much or less the first of its kind. It excited, quite justifiably, an extraordinary amount of interest, and has already inspired a distinguished body of work, some of it from within AI and Computational Linguistics. The latter can hardly be said for Situation Semantics (yet?).

So what is there? Besides a few published papers, each of them containing at least one position since abandoned, there is a book, situations and attitudes, deliberately on the very verge of publication. This contains the philosophical/theoretical background of the program - The Big Picture. It also contains a very brief treatment of a very simple fragment of ALIAS. And why, the reader may well ask in MNLASS? An Artificial Language for Illustrating Aspects of Situation Semantics, that's what. Moreover there is the work in the world called Situations and Discourses. This will contain a "Fragment of Situation Semantics", a treatment of an extended fragment of English, together with a self-contained treatment of the technical, mathematical background. By "self-contained", understand: not requiring either familiarity with or acceptance of The Big Picture presented in S&A.) The bottom line: there is very little of Situation Semantics presently available to the masses of hungry researchers.

B. Similarities

There are important points of similarity between Situation and Montague semantics, of course. One is that both are committed to formulating mathematically rigorous semantic accounts of English. To this end, both, of course, dip heavily into set theory. But this isn't saying a whole lot; for they deploy very different set theories. Montague, for a variety of technical reasons, was very fond of MKM, a very powerful theory, countenancing huge collections. MKM allows for both sets and (proper) classes, the latter being elements of other collections, and too big to be sets, say, of ZF. It also provides an unnervingly powerful comprehension axiom. B&P, on the other hand, have at least provisionally adopted KPU, a surprisingly weak set theory. Indeed, the vanilla version of KPU comes without an axiom of infinity and (more or less hence) has a model in the hereditarily finite sets, in that setting, even little infinite collections, like the universe of hereditarily finite sets, are proper classes, and beyond the pale. Enough for the moment of set theory, although we shall have to return to this strange land for one more brief visit.

More important, and perhaps more disheartening, similarities are immediately to hand. Both Montague and B&P - thus far - restrict themselves to the declarative fragment of English; Montague, for the obvious reason that he was a model theorist and a student of Tarski. For such types, the crucial notion to be explicated is that of "truth -The collaborators being B&P, Robin Cooper, Hans Kamp, and Stanley Peters.
of a sentence on an interpretation*. Moreover, Montague showed no interest in the use(s) of language. Of course people working within his tradition are not debarred from doing so; but any such interest is an extra added attraction. The same applied to Montague to a large extent. It was only to be expected; and here again, the crucial question is whether their overall philosophical perspective so informs their account of natural language as to enable a more fruitful accommodation of work on various aspects of natural language. For Barwise-Perry as well; they certainly aren't syntacticians. But in their case it is reinforced by philosophical considerations which point toward the use of language to convey information as the central use of language - hence, to asserting as the central kind of utterance or speech act. Thus, even when they narrow their sights to this use, the notion that language is something to be put to various uses by humans to further certain of their purposes is not foreign to Situation Semantics.*

Second, B&P (again: so far) stop short at the awesome boundary of the period. Here again, this was only to be expected; and here again, the crucial question is whether their overall philosophical perspective so informs their account of natural language as to enable a more fruitful accommodation of work on various aspects of natural language. For Barwise-Perry as well, they certainly aren't syntacticians. But in their case it is reinforced by philosophical considerations which point toward the use of language to convey information as the central use of language - hence, to asserting as the central kind of utterance or speech act. Thus, even when they narrow their sights to this use, the notion that language is something to be put to various uses by humans to further certain of their purposes is not foreign to Situation Semantics.*

The major point, however, concerns the primary focus of B&P's work, which is contrasted with that of Montague. Montague approached the problem of the semantics of natural language essentially from a model-theoretic viewpoint, attempting to apply new mathematical techniques to the solution of classical problems in the semantics of natural language. This had to do with intensional contexts. After all, these new techniques - in the development of which Montague played a role - had precisely to do with the treatment of formal languages containing modal and other intensional constructions. What made a fragment of English of interest to Montague, then, was that it contained loads of such contexts. It is as if all of that wondrous machinery, and the technical brilliance to deploy it, were aimed at an analysis of the following sentence: While the monkey was running, John seemed to be looking for a unicorn who was thinking about a centaur. What is astounding, of course, is that Montague should have been able to pull a syntactic and a rigorous treatment of such contexts out of the model-theoretic hat.

When we turn to Situation Semantics, on the other hand, we seem to be back in the linguistic world of first-grade readers: Spot ran. Dick saw spot run. Jane believed that Spot ran. Indeed, the major concern of Barwise-Perry is not the semantics of natural language at all. They have bigger (well, different) fish to fry. First and foremost, they are catching an account of the place of meaning and mind in the universe, an account that finds the source of meaning in nomic regularities among kinds of events (situations) which, in general, are independent of language and mind. For the frowning of said fish, a treatment of cognitive attitudes is essential. Moreover, and not independently, for any attempt to apply their overall philosophical picture to the semantics of natural language, the propositional attitude contexts pose a crucial and seemingly insuperable obstacle.*** Hence the fact that the book Situations and Attitudes precedes Situation Semantics - the first lays the philosophical foundations for the second. Thus the origin of their concern even with the classical problems of the Montaguean model-theoretic approach is not through by no means incompatible with, that of Montague's.

Something brief must now be said about the big picture. Here goes.

The work of B&P can be seen as part of a continuing debate in philosophy about the source of the intentionality of the mental - and the nature of meaning in general; a debate about the right account to give of the phenomenon of one thing or event or state-of-affairs being able to represent (carry information about) another thing or event or state-of-affairs. On one side stand those who see the phenomenon of intentionality as dependent on language - no representation without notation. This doctrine is the heart of current orthodoxy in both philosophy of mind and meta-theory of cognitive psychology. (See, by way of best example, [5].) It is also a doctrine widely thought to be presupposed by the whole endeavor of Artificial Intelligence. On another side are those who see the representational power of language as itself based on the intentionality of mind.** The striking thing about Barwise and Perry is that, while they stand firmly with those who deny that meaning and intentionality essentially involve language, they reject the thesis that intentionality and meaning are essentially mental or mind-involving.

The source of meaning and intentionality is to be found, rather, in the existence of lawlike regularities - constraints - among kinds of events. For Barwise-Perry, the analysis of meaning begins with such facts as that: smoke means fire or those spots mean meaning. The ground of such facts lies in the ways of the world; in the regularities between event types in virtue of which events of one type can carry information about events of other types. If semantics is the theory of meaning, then there is no pun intended in the application of semantic notions to situations in which there is no use of language and, indeed, in which there are no minds.

Meaning's natural home is the world, for meaning arises out of the regular relations that hold among situations, among bits of reality. We believe linguistic meaning should be seen within this general framework of a world teaming with meaning, a world full of information appropriately attuned to that meaning.***

There is yet another dimension to the philosophical debate, one to which Barwise and Perry often allude:

Some theories stress the power of language to classify minds, the mental significance of language, and treat the

"A Fragment of Situation Semantics" will contain a treatment of certain kinds of English intensional expressions. Further out in the Future, Situation Semantics will contain such a more extensive treatment.

Breaking out of the straightjacket of the sentence is the job of Situations in Discourse.

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*Who knows? Maybe it is.

**These latter can, in turn, be divided into those who seek a naturalistic, in principle physicalist, account and those who, like Frege and Church, hold no such demand.

***For an important philosophical predecessor, see [4].

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classification of (external) events as derivative... A second approach is to focus on the external significance of language, on its connection with the described world rather than the describing mind. Sentences are not the ideas they express, but by how they describe things to be... Frege adopted a third strategy. He postulated a realm of ideas nor of worldly events, but of senses. Senses are the philosopher's sense - the medium that coordinates the three elements in our equation: minds, words and objects. Minds grasp senses, words express them, and objects are referred to by them... One way of regarding the crucial notion of intension in possible worlds is a development of Frege's notion of sense. [3]

Barwise and Perry clearly opt for the second approach. This is one reason for their concern with the problems posed by the propositional attitudes; for it has often been argued that these contexts doom any attempt at a theory of the second type. This is the burden of the dreaded "slingshot" - a weapon we shall gaze at later. For the moment, though, I want simply to note the connection of this dimension with that about the source and nature of intentionality. Just as (some particular features of) a particular X-ray carries information (the particular) on infinite (of infinite) X-rays, so too does an utterance by the doctor of the particular features of a particular X-ray carries information about the individual on which the particular points of difference, remember that in the one case mechanical, optical and electromagnetic, in the other, perceptual, cognitive, and social-conventional. More to the point, in all cases the centrality of meaning in general. They also note, however, that their relational account of meaning shows it to be a central feature of meaning in general.

III THE PRINCIPLE OF EFFICIENCY

One other respect in which Barwise and Perry are orthodox is their acceptance of a form of the Principle of Compositionality, the principle that the meaning of a complex expression is a function of the meanings of its constituents. This is the principle that is supposed to explain the productivity or generativity of languages, and the ability of finite creatures to master them. But for Barwise and Perry, an at least equally important principle is the Principle of Efficient Communication. This principle is concerned with the ability of different people at different times and in different contexts to (re)use the same sentence to say different things - to impart different pieces of information. So, to adopt their favorite example, if Hitch now says to me, "You're dead wrong", what he says - what he asserts to be the case - is very different from what I would say if I were to utter the very same sentence directed at him. The very same sentence is used, "with the same meaning"; but the message or information carried by its use differs. Moreover, the difference is systematically related to difference in the contexts in which the utterances are made.

Barwise and Perry take this phenomenon, often called indexicality or token-reflexivity and all too often localized to the occurrence of particular words (e.g., "I", "you", "here", "now", "this", "that"), to be or the essence of natural languages. They also note, however, that their relational account of meaning shows it to be a central feature of meaning in general.

What smoke pouring out of the possible building means something, that the building in the new situation is on fire at the new time. Each of these specific smoky situations means something, that the building then and there is on fire. This is... event meaning The meaningful situations had something in common, they were of a common type; smoke pouring out of a building, the message this is... event-type meaning... What a particular case of smoke pouring out of a building means, what it tells us about the
Moreover, B&P contend that the fact that modern formal semantics grew out of a concern with the language(a) of mathematics has caused those working within the orthodox model-theoretic tradition either to ignore or to slight this crucial feature.*

A preoccupation with the language of mathematics, and with the seemingly eternal nature of its sentences, led one of the founders of our field to neglect the efficiency of language. In our opinion this was a critical blunder, for efficiency lies at the very heart of meaning. [3]

A. A Little Background

Sure enough, indexicality gave nightmares to both Frege and Russell.** It might seem that the issue of indexicality did not escape Montague’s attention; and it didn’t. Indeed, as Thomason says, “As a formal discipline, the study of indexicals is a significant development in semantics.” (See especially [10] and [11]). This last is most especially true with respect to the work of David Kaplan, both a student and a colleague of Montague’s. For Kaplan disagreed with Montague precisely about the extent to which the formal treatment of contexts of utterances should be accommodated to the treatment of indexicality proper. A&P start from where Kaplan leaves off. [7, 8]

I shall assume once again the right to be sketchy: Montague adopted a very narrow stance towards issues in pragmatics, concerning himself solely with indexicals and tense and not concerning himself at all with other issues about the purposes of speakers and hearers and the corresponding uses of sentences.*** In addition, the treatment of formal pragmatics was to follow the lead of formal semantics: the central notion to be investigated was that of truth of a sentence, but now relative to the work of David Kaplan, both a student and a colleague of Montague’s. For Kaplan disagreed with Montague precisely about the extent to which the formal treatment of contexts of utterances should be accommodated to the treatment of indexicality proper. A&P start from where Kaplan leaves off. [7, 8]

*Barbara Grosz hints at agreement with this judgment. *(One place that situation semantics is more compatible with efforts in natural-language processing than previous approaches is that context and facts participate at two points: (1) in interpretation, for determining such things as who the speaker is, the time of utterance; and (2) in evaluation, for determining such things as whether the relationships expressed in the utterance hold."

**For the former, see [14], see also [15].

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B. Beyond Indexicality

For B&P, however, go beyond Kaplan’s treatment, and in more than one direction. Crucially, the treatment of indexicality proper is only one aspect of the account of efficiency, in some ways, the least intriguing of the lot. Still, to drive home the first point: as it is with smoke pouring out of buildings, so too is it with sentences. The syntax and semantic rules of language, conventional regularities or constraints, determine the meaning - the event-type meaning - of a sentence; features of the context of use of an utterance of that type get added in to determine what is actually said with that use. This is the event meaning of the utterance, also called its interpretation. Finally, that interpretation can be evaluated, either in a context which is essentially the same as the context of use, or some other; thereby yielding an evaluation of the utterance, (finally) a truth value.

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A number of researchers working within the Montague tradition (in a sense there was another) were unhappy with this particular result of Montague’s quest for generality; the most important among them being Kaplan himself. For issues involved in the apocy of centraally those involving the interaction of indexical and intensional constructions - interactions which, at the very least, cast doubt on the doctrine that the intensions of expressions are total functions from the set of points of reference to extensions of the expression at that point of reference.** The end result, anyway, is the proposal for some type of a non-uniform two-step account. Montaguean points of reference should be broken in two, with possible worlds (and possibly, moments of time) playing one role and contexts of use (possibly including moments of time) another, different, role.

In this scheme, sentences get associated with functions from contexts of use to propositions and these in turn are functions from contexts to truth-values. Contexts, upon "application" to utterances of sentences, yield determinate propositions; world (world-times) another role in the treatment of indexicality proper is only one aspect of the account of efficiency, in some ways, the least intriguing of the lot. Still, to drive home the first point: as it is with smoke pouring out of buildings, so too is it with sentences. The syntax and semantic rules of language, conventional regularities or constraints, determine the meaning - the event-type meaning - of a sentence; features of the context of use of an utterance of that type get added in to determine what is actually said with that use. This is the event meaning of the utterance, also called its interpretation. Finally, that interpretation can be evaluated, either in a context which is essentially the same as the context of use, or some other; thereby yielding an evaluation of the utterance, (finally) a truth value.

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The extension appropriate to sentences and clauses being truth values.

There is even a version of this called "two-dimensional modal logic" [20].
"underdetermines" the interpretation of an utterance of that type and to the fact the interpretation of an utterance "underdetermines" the information that can be imparted by that utterance. And even if they impose on themselves that they be able to account for significant regularities with respect to "the flow of information" in so far as that flow is mediated by the use of language and in cases where the information is not determined by a compositional semantic theory. And such cases are the norm. Compositionalism holds only at the level of event-type linguistic meaning. The claim is that seeing linguistic meaning as a special case of the relational nature of meaning - that meaning resides in regularities between kinds of situations - allows them to produce an account which satisfies this constraint.

C. Names

So, let us say something about proper names and something else about resource situations. Let us put aside for the moment the semantic type that poor little "David Israel" gets assigned in (13). Instead, we shall pretend that it gets associated with some individual. But which individual? Surely with one named "David Israel"; but there are bunches of such, and many, many more Davids. The proper name proper? Surely it is proper.** Just as surely, at the level of linguistic meaning it makes no sense for me to get something proper with respect to "David Israel". Still, if you (or I) hear Mitch Marcus, right after my talk, complaining to someone that "David is dead wrong", we'll know who's being maligned. Why so? Because we are aware of the speaker's connections; more finely, of the relevant connections in this instance. At the level of event-type or linguistic meaning, the contribution of a name is to refer to an individual of that name.** On the other hand, it is a feature of the context of use that the speaker of an utterance containing that name is connected in certain ways to such and such individuals of name. Surely Mitch knows lots of Davids and we might find him saying "David thinks that David is really dead wrong". Of course, he might be talking about someone inclined to harsh and "objective" self-criticisms; probably not.

Just one more thing about names and speaker connections. As noted above that for B&P, the interpretation of an utterance event underdetermines the information carried by that event. The use of names is a case of such examples of this. It is no part of the interpretation of that meaning of Mitch's complaint about me that my name is "David"; but someone who saw him say this while be (Mitch, that is) was surreptitiously looking my way can learn that my name is "David", or even that I am the David Israel who gave the talk on Situation Semantics. Even without that, someone could learn that Mitch knows (is connected with) at least one person so named. (Of course, there are possibilities for "misinformation" here, too.) Just so, when I introduce myself by saying "I'm David Israel", the interpretation of what I say on that occasion is singularly uninteresting, being (roughly speaking) an instance of the law of self-identity. But I will have conveyed the information I wanted to, namely that I am a David Israel, that "David Israel" is my name (though not mine alone). That's where we get (or, for the B&P's) the custom of making introductions. Anthropology aside, the central point is that Situation Semantics is meant to give us a way in which we can explain and predict such regularities in the flow of information as that exploited by the combination of introductions and names. It shows how such regularities are related to the conventional regularities that determine the linguistic meaning of sentence types and the patterns of contextual determination which then generate the meanings of particular utterance events.

D. Definite Descriptions

An analogue of the problem of the impropriety of talk of proper names arises with respect to definite descriptions. Take a wild and wooly sentence such as "the dog is barking:" Again, we want the denotations of such definite descriptions to be just plain individuals; but, again, which individuals? Surely it is proper.** Most definitely proper. But how about "Tristan Tzara", to pick a name out of a hat? Mostly not; but how about "Tristan Tzara", to pick a name out of a hat? Mostly not. English should have no truck with (even) benign analogues of bills of attainder.

***It's a nice question whether some names carry more than just the linguistic level, the specific information as well as their...(??) doesn't seem to be an abuse of English to call, say, a platypus "David Israel".

### SOME POSSIBLE INDIVIDUALS

My grandmother, for one, would have disagreed. So, too, do B&P.

### MOSTLY NOT

How about "Tristan Tzara", to pick a name out of a hat?

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model-theoretic accounts the key notion is that of truth on an interpretation, or in a model. Having said this, one might think that this notion is that of entailment or logical consequence. A set of sentences \( S \) entails a sentence \( A \) if there is no interpretation in which all of the sentences in \( S \) are true and \( A \) is false. From the purely model-theoretic point of view, this relation can be thought of as holding not between sentences, but between propositions (conceived of as the import of linguistic sentences). For instance, it might be taken to hold between sets of possible worlds. Still, it is presumed (to put it mildly) that an important set of such relations among non-linguistic objects have syntactic realizations in relations holding among sentences which express those propositions. Moreover, that sentences stand in these relations is a function of certain specifiable aspects of their syntactic type - their "logical form".

In artificial, logical languages, this presumption of syntactic realization can be made more or less good; and anyway, the connections between, on the one hand, syntactic types and modes of composition, and semantic values on the other, must be made completely explicit. In particular, one must specify, for each sentence as the logical constants of the language, specifies how to build up complex expressions by the use of those constants, operating ultimately on the "non-logical constants", and then - ipso facto - one has a perfectly usable and precise notion of logical form.

In the standard run of such artificial languages, sentences (that is: sentence types, there being no need for a notion of tokens) can be, and typically are, assigned truth-values as their semantic values. Such language is then not ad hoc for indexicals; hence the talk about "eternal sentences". The linguistic meaning of such sentence need no longer be distinguished from the proposition expressed by a particular use of it. Once indexicality is taken seriously, one can no longer attribute truth-values to sentences. (Note how this way of putting things suggests just the unification of the treatment of indexicality with that of modality that appealed to Montague.) One can still, however, take as central the notion of a sentence being true in a context on an interpretation. The main reason for this move is that it allows one to develop a fairly standard notion of logical consequence or entailment at the level of sentences. Roughly, a set of sentences \( S \) entails a sentence \( A \) if for every interpretation, and for every context of use of that interpretation: if every sentence in \( S \) is true in a given context, then so too is \( A \).

Barwise & Perry are prepared to de-emphasize radically the notion of entailment among sentences. As they fully realize they must provide a new notion - a notion of one statement following from another.

At the very least then, our theory will seek to account for why the truth of certain statements follows from the truth of other statements. This move has several important consequences...There is a lot of information available from utterances that is simply missed in traditional accounts, accounts that ignore the relational aspect of meaning. Semantics must go beyond traditional "patterns of inference". The starting consequence of this is that there can be no syntactic counterpart, of the kind traditionally sought, for the theory of entailment, not just syntactic logical forms, to the semantic theory of consequence. For consequence is simply not a relation between purely syntactic elements.

What's at stake here? A whole lot, I fear. First, utterances - e.g., the makings of assertions - have no logical forms. Of course, they typically involve the production of linguistic tokens, which - by virtue of being of such and such types - may have such forms. (Typically, but not always witness the shaking or nodding of a head, the pointing of an eye, or the raising, all in appropriate contexts of use, of course.) Thus, entailment relations among statements (utterances) can't be assessed in directly in terms of relations holding among sentences in virtue of special aspects of their syntactic shape. Remember what was said above about the main reason for opting out of an account based on statements and for an account based on sentence(type)-in-a-context. If you don't remember, let me (and David Kaplan) remind you:

First, it is important to distinguish an utterance from a sentence-in-a-context. The former notion is from the theory of speech acts, the latter from semantics. Utterances take time, and utterances of distinct sentences cannot be simultaneous (i.e., in the same context). But in order to develop a logic of speech acts, it seems most natural to be able to evaluate several premises and a conclusion all in the same context. (8) (The emphasis by way of underlining is mine - D.I.)

A logic has to do with entailment and validity; these are the central semantic notions; sentences are their linguistic loci. This all sounds reasonable enough except, of course for that quite unmotivated presumption that contexts of use can't be spatio-temporally extended. And it seems correspondingly unreasonable when B&P opt out.

[The sentence "Socrates is speaking" does not follow from the sentences "Every philosopher is speaking", "Socrates is a philosopher", even though this argument has the same "logical form" (on most accounts of logical form) as [""I is an integral multiple of 2", "All integral multiples of 2 are even" (so) "I is even."] In the first place, there is the matter of tense. At the very least the three sentences would have to be said at more or less the same time for the argument to be valid. Sentences are not true or false; they are actions. They are not linguistic items at all; they have no logical forms. Of course, they typically involve the production of linguistic tokens, which - by virtue of being of such and such types - may have such forms. (Typically, but not always witness the shaking or nodding of a head, the pointing of an eye, or the raising, all in appropriate contexts of use, of course.) Thus, entailment relations among statements (utterances) can't be assessed in directly in terms of relations holding among sentences in virtue of special aspects of their syntactic shape. Remember what was said above about the main reason for opting out of an account based on statements and for an account based on sentence(type)-in-a-context. If you don't remember, let me (and David Kaplan) remind you:

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B&P simplify somewhat. It is not required that all three sentences be uttered simultaneously (by one speaker). Roughly speaking, what is required is that the (spatio)temporal locations of the utterance be close together and that the "sum" of their locations overlap with that of some utterance of Socrates. But that isn't all. The speaker must be connected throughout to one and the same individual Socrates, else a pragmatic analogue of the fallacy of equivocation will result. The same (or something similar) could be said about the noun phrase "every philosopher", for such phrases - just like definite descriptions - require for their interpretation a resource situation. One can imagine a case wherein the speaker says over a specified time and at a specified place, connected to one and the same guy named Socrates, exploits two different resource situations contributing two different groups of philosophers, one for each of

...
the first two utterances. (The case is stronger, of course, if we substitute for the second sentence "Socrates is one of the philosophers.")

It must certainly seem that too much of the baby is being tossed out with the water; but there are alleged to be (compensating?) gains:

There is a lot of information available from utterances that is simply missed by traditional accounts, accounts that ignore the relational aspect of meaning. If someone comes up to me and says, "Melanie saw a bear," I may learn not just that Melanie saw a bear, but also that the speaker is somehow connected to Melanie in a way that allows him to refer to her using "Melanie." And I learn that the speaker is somehow in a position to have information about what Melanie saw. A semantic theory must go far beyond traditional "patterns of inference" to account for the external significance of language. A semantic theory must account for how language fits into the general flow of information. The capturing of entailments between statements is just one aspect of a real theory of the information in an utterance. We think the relation theory of meaning provides the proper framework for such a theory. By looking at linguistic meaning as a relation between utterances and described situations, we can focus on the many coordinates that allow information to be extracted from utterances, information not only about the situation described, but also about the speaker and her place in the world. [3]

A. A Mild Anti-Climax?

Despite the heroic sentiments just expressed, B&P scarcely eschew sentences, a semantic account of which they are, after all, aiming to provide. In the formal account statements get represented by n-tuples of (of course), one element of which is the sentence uttered; and if you like, it is the sentence-under-syntactic-analysis. (This last bit is misleading, but not terribly.) Other elements of the tuple are a discourse situation and resource situations, we can focus on the many coordinates that allow information to be extracted from utterances, information not only about the situation described, but also about the speaker and her place in the world. [3]

Before touching on that issue, let me raise another and related feature of the account. This is the decision of B&P to let English sentences be treated as n-tuples (of course), one element of which is the sentence uttered; and if you like, it is the sentence-under-syntactic-analysis. (This last bit is misleading, but not terribly.) Other elements of the tuple are a discourse situation and resource situations. Anyway, there is the sentence. Given that, how about their logical forms?

Next, and centrally, there is English. The decision to present a semantic theory of English directly may make the end product look even more different than it is. It certainly has the effect of depriving us of those familiar structures for which familiar "theorems" can be specified, and thus reinforces the sense of loss for speakers after a certain brand of entailments. Some may already feel the tell-tale symptoms of withdrawal from acute addiction.

There is, however, more to it than that - or maybe the attendant liberation is enough. For instance, are English quantifiers logical conjunctions, and if so, which ones? Which English quantifiers correspond to which "formal" quantifiers? Is there really a sentential negation operator in English? Well, surely "It is not the case that" seems to qualify; but how about "not"? And how about conjunction?

Consider, for example, a statement made with the sentence (1) Joe admires Sarah and she admires him. Let us confine our attention to the utterances in which (1) has the antecedent relations indicated by (1'). Joe admires Sarah-2 and she-2 admires him-1. Hence, in conjunction of two sentences, a statement made with (1) in the way [with the conjunction - D.I.] indicated by (1') is not a conjunction of independent statements. [3]

In general if ul and u2 are two statements with the same discourse situations and connections (and resource situations?), some sense can be made out of a (sic) conjunctive or (sic) disjunctive statement, with ul and u2 as "parts." But this is not true of arbitrary statements. Moreover, as in the case above, if we have a (sic) conjunctive statement, there may be no coherent decomposition of it into two independent statements. Talk of conjunction "and" disjunctive statements is likely to be wildly misleading. For the latter suggests, quite wrongly, that the utterer is either asserting one "disjunct" or the other. "A statement made using a disjunctive sentence is not the disjunction of two separate statements." (3.)

In an appendix to "Situations and Attitudes", B&P suggest an analogue of propositional logic for statements within a very simple fragment of ALIASS. There is no (sentential) negation and no conditional; but more to the point, there are no unrestricted laws of statement entailment, e.g., between an arbitrary "conjunctive statement" and its two "conjuncts." Things get even worse when we add complex noun phrases to the fragment. The mind boggles.

V THE PROPOSITIONAL ATTITUDES

Here I shall be mercilessly brief. The conventional wisdom, from Frege through to its logical culmination in Montague, has been that conventional attitude constructions are referentially opaque; more particularly, that substitution of co-designative singular terms within them does not preserve the truth-value of the whole. Within that orthodoxy there has been disagreement as to whether they are also hyperintensional; that is, as to whether

*See [1] passim; but especially the first two sections.

*Hostly because of the sheer "sex appeal" of the issues involved, and partly because of the availability of the relevant text. It has been their treatment of the propositional attitude contexts that has made B&P a cause celebre among philosophers. This is not to say that I do not want to do my part, by somewhat underplaying this whole fangle.
substituting necessarily co-designative terms or logically equivalent sentences within them preserves truth-value. Montague himself thought they were not hyperintensional; but he encountered the other view. (And sketched an account to handle it.) Barwise and Perry have the unique distinction of believing that said contexts are at least intensional and yet transparent to substitution of singular terms. This position is both solitary and thought to be incoherent. If it were in fact untenable, that would be most unfortunate for them, as it is more or less mandated by their adopting an approach centered on the external significance of language.

Indeed, there is supposed to be a proof that it is incoherent. The argument in question, which B&P call the slingshot, is sometimes supposed to show that all sentences with the same truth-value must designate the same thing; and hence, of course, that truth-values must be the primary semantic values of sentences. More usually and somewhat more technically, it has been supposed to show that if a sentential context allows substitution of logically equivalent sentences and co-designating definite descriptions salva veritate, then that context must be truth-functional. More clearly: that all modes of sentence composition are truth-functional unless they're opaque. That is, the only contribution made by a sentence, so embedded, to the whole can be its truth-value.

In fact, the slingshot is not a "knockdown proof" that it is incoherent. It is recognized by many of the major slingers. (See, for instance, [16, 17].) Instead, in all of its forms, it rests on some form or other of two critical assumptions:

1. logically equivalent sentences are intersubstitutable in all contexts salva veritate; or, such sentences have the same semantic value
2. the semantic value of a sentence is unchanged by a co-referential singular term.

B&P reject the assumptions that underlie the slingshot. Here, too, especially with respect to the second assumption, tricky technical issues about the treatment of singular terms - both simple and complex - in a standard logic with identity are involved. B&P purposely ignore these issues. They are interested in English, not in sentences of a standard logic with identity; and anyway, those very same issues actually get "transformed" into precisely the issues about singular terms they do discuss, issues having to do with the distinction between referential and attributive uses of (complex) singular terms. (See their discussion in [2] and chapter 7 of [3].) To show my strength of character, I'm not going to discuss the way the story goes like this: the syntactic and semantic rules of the language associate to each sentence type a type of situations or states-of-affairs; intuitively, the type actualizations of which would be accurately, though partially, described by any statement made using the sentence. Thus:

Consider the sentence "I am sitting". Its meaning is, roughly, a relation that holds between an utterance and a situation: a just in case there is a (spatio-temporal) location a and an individual a is sitting at a. The extension of this relation will be a large class of pairs of abstract situations. [3].

Now consider a particular utterance of that sentence, say by Mitch, at a specific location a.'

Then any situation that has [Mitch] sitting at a will be an interpretation of the utterance. Because an utterance usually describes lots of different situations, or at any rate partially describes them. Because of this, I may use the form as when we think of the interpretation as the class of such situations. Then we can say that the situations appearing in the interpretation of our utterance vary greatly in how much they constrain the world... When uttered on a specific occasion, our sentence constrains the described situation to be a certain way, to be like one of the situations in the interpretation. Or, one might say, it constrains the described situation to be one of the interpretations. [3].

A. The Relation Theory of Meaning

With respect to the end-result, what's crucial is that B&P reject the alleged central consequence of the slingshot: that the primary semantic value of a sentence is its truth-value. Of course, given what we have already said, a better way to put this is that for them, although statements are bearers of truth-values, the primary semantic value of a statement is not its truth-value.

That honor is accorded to a collection of situations or events. Very roughly, the story goes like this: the syntactic and semantic rules of the language associate to each sentence type a type of situations or states-of-affairs; intuitively, the type actualizations of which would be accurately, though partially, described by any statement made using the sentence. Thus:

Consider the sentence "I am sitting". Its meaning is, roughly, a relation that holds between an utterance and a situation a just in case there is a (spatio-temporal) location a and an individual a is sitting at a. The extension of this relation will be a large class of pairs of abstract situations. [3].

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B. On Logical Equivalence

If the primary semantic value of a sentence is a collection of situations or a type of situations, then it is not surprising that logically equivalent sentences - sentences true in the same models - might not have the same semantic values, and hence, might not

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*One point to make, though, is the following: the indexical personal pronouns are certainly singular terms. Frege's genuine line on the referential opacity of propositional attitude contexts certainly seems at its shakiest precisely in application to such pronouns and in general to indexical elements. And remember if B&P are right, there is an element of "indexicality" in the use of proper names. If Mitch believes that David is dead wrong and I'm (that) David, then Mitch believes that I'm dead wrong. If Mitch believes that I'm dead wrong and I say David Israel is dead wrong, then Mitch believes that (this) David Israel is wrong. [14, 15]

*I should note that neither "situation" nor "event" is a technical term in Situation Semantics; though "event-type" is.
be inter substitutable salva semantic value. Consider the two sentences: (1) Joe eats and (2) Joe eats, and Sarah sleeps or Sarah doesn't sleep. Let's grant that (1) and (2) are logically equivalent. But do they have the same "referent" or semantic value?

If we think that sentences stand for situations..then we will not be at all inclined to accept the first principle proposed by the slingers. The logically equivalent sentences just do not have the same subject matter, they do not describe situations involving the same objects and properties. The first sentence will stand for all the situations in which Joe eats the second sentence for those situations in which Joe eats and Sarah sleeps plus those in which Joe eats and Sarah doesn't sleep. Sarah is present in all of these. Since she is not present in any of the situations that "Joe eats" stands for these sentences, though logically equivalent, do not stand for the same entity. (Obviously B&P are here ignoring the "indexicality" inherent in proper uses of proper names - D.I.) [3]

Notice that without so much as a glance in the direction of a single propositional attitude context, we can see how B&P can avoid certain well-known troubles that plague the standard model-theoretic treatments of such constructions. Moreover and most importantly, they gain these fine powers of discrimination among "meanings" without following either Frege into a third realm of sense or Fodor (?) deep into the recesses of the mind. The significance of sentences, even as they occur in propositional attitude contexts, is out into the surrounding world.**

VI THE BOTTOM LINE

What's the bottom line? Clearly, it's too soon to say. Indeed, I assume many of you will simply want to wait until you can look at least at some treatment of some fragment of English. Others will like as not the idea of how the project of Situation Semantics might be realized computationally. For instance, it is clear even from what little I've said that the semantic values of various kinds of expression types are going to be quite different from the norm and much thought will be needed to specify a formalism for representing and manipulating these representations adequately. Again, wouldn't it be nice to be told something at least about the metaphysics of Situation Semantics, about situations, abstract, actual, factive and tense - all four type figures in some way in the account; about events, event-types, courses-of-events, schema, etc? In fact, it would be nice. Some, no doubt, were positively lusting after the scoop on how B&P handle the classic puzzles of intensionality with respect to singular terms. And so on. All in good time.

What I want to do, instead, is to end with a claim, Barbara Grosz's claim in fact, that attention should be paid. At the moment, the bottom line with respect to Situation Semantics is not, I think, to be arrived at by toting up technical details, as bedazzling as these will doubtless be. Rather, it is to be gotten at by attention precisely to THE BIG PICTURE.

The relational theory of meaning, and more broadly, the centrality in Situation Semantics of the "flow of information" - the view that that part of this flow that is mediated by the uses of language should be seen as "part and parcel of the general flow of information that uses natural meaning" - allows reasons hope for a theoretical framework within which work in pragmatics and the theory of speech acts, as well research in the theory of discourse, can find a proper place. In many of these areas, there is an abundance of insight, harvested from close descriptive analyses of a wide range of phenomena - a range hitherto hidden from both orthodox linguists and philosophers. There are now even glimmerings of regularities. But there has been no overarching theoretical structure within which to systematize these insights, and those scattered regularities, and through which to relate them to the results of syntactic and formal semantic analyses. Situation Semantics may help us in developing such a framework.

This last is a good point at which to stop; so I shall.

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