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EVIDENCE FOR A THEORY OF LINGUISTIC MEANING

Semantics is the study of linguistic meaning, of the relationships that hold between expressions of language and things in the world [2,4,7,8,9]. This study can be conducted in a precise way using the tools of modern mathematics [3]. The approach is generally called “model-theoretic semantics,” since model theory is the part of logic concerned with the relation

between the linguistic expressions of mathematics and the mathematical structures they describe.

Sometimes this approach to semantics is called “formal semantics”, presumably because it looks very formal to those outside the tradition. It is an unfortunate expression, since it suggests a connection with Formalism, Hilbert’s philosophy of mathematics. Hilbert tried to reduce talk about mathematical objects to talk about mathematical expressions, in hopes that the problematic questions about mathematical objects might reduce to less problematic questions about finite mathematical expressions. Had this program succeeded, it would have reduced mathematical activity to a purely formal activity, to the manipulation of expressions by formal rules. And nothing could be more out of the spirit of genuine semantics. In any event, the enterprise was doomed from the start, as we have all learned from Gdel’s Theorem.

Model theory does not study linguistic expressions *per se*, but the relationships that hold between linguistic expressions and parts of the world. It is usually judged by how well it accounts for entailments between sentences, why it is that a sentence like *Socrates is mortal* follows from *All men are mortal* and *Socrates is a man*. As such, the field is one of the success stories of modern philosophy. It has greatly clarified many formerly obscure issues in both logic and mathematics, such as those surrounding the relationship between proof and truth.

But the heritage of model theory, however illustrious, is a mixed blessing. For the founders of modern logic—Frege, Russell and Whitehead, Gdel, and Tarski - were preoccupied with the language of mathematics[5,6]. Because of this preoccupation, many assumptions and attitudes about this language were built into the very heart of model theory, and so came to be assumptions about the nature of language in general. These assumptions have made it increasingly difficult to adapt the ideas of standard model theory to the semantics of natural languages.

In this article we argue that there is much more evidence than just entailments for which a semantic theory must account, evidence that in fact causes us to look with some skepticism on the very idea of entailments between sentences. The evidence consists of insights of philosophers of language, and linguists into the way natural languages work. Barwise J. and Perry G. call these insights *six semantic universals of human languages* [1, 28]. Most of these universals are at odds with assumptions built into standard model theory. Barwise J. and Perry G. take these phenomena as central to an adequate semantic theory, not just minor headaches to be explained by amending the semantics of first-order logic, a theory that evolved before their ubiquity was recognized.

The six universals are, in order of treatment: the external significance of language, the productivity of language, the efficiency of language, the

perspectival relativity of language, the ambiguity of language, and, finally, the mental significance of language[1,28]. Let's see how the theory of situation semantics deals with the first three of these insights.

THE EXTERNAL SIGNIFICANCE OF LANGUAGE

It is a fact that we use language to convey information about the world, and that much of what we as individuals know, we learned by being told. Take the following example: Pete takes cat Murka to the vet because she is limping badly. The doctor takes an X-ray, examines it, and tells Pete "She has a broken leg." His utterance contains information about Murka, that she has a broken leg.

On a simple-minded account, such as the one we adopt, the doctor's utterance describes a certain state of affairs, that of Murka's having a broken leg. The parts of the sentence - *she*, *has*, *a*, *broken*, and *leg* - have meanings because of the way they are used in English. As a result of these meanings, in tandem with various facts about the doctor's particular utterance, these expressions describe situational elements and put them together into a simple situation. We call this situation the *interpretation* of the statement, and propose to identify the external significance of the statement by means of it.

It is clear that the external significance of statements so identified must be explained by a genuine semantic theory. We further claim that a clear explanation of what situations a statement describes and how it achieves this provides a key that can be used to unlock the mystery of linguistic meaning.

There are some serious problems that must be faced by such a claim. We list some here.

The Priority of Information

The first problem is a problem for any model theoretic account of the information-carrying capacity of language. The information conveyed by the doctor's utterance was not the sentence used, for the sentence

She has a broken leg

by itself isn't even about Murka. Nor is the vet's utterance, even considered as a whole, information about Murka, though it is getting closer. The utterance *conveyed* information about Murka, the same information that was conveyed to the vet by the X-ray, that her leg was broken. Information can be carried by language but information is not language; in fact, information is prior to language. If the whole incident had taken place in a different linguistic community, the doctor would have used a different expression, in a different language, to convey this same piece of information. If our theory of language is going to capture this ability of utterances to convey a piece of information we must have the information there to be conveyed.

This means that we must have a way of representing the way the world is, one that is independent of the language whose meanings we are trying to

study. In this regard, standard model theory is woefully inadequate, for the structures it uses to represent the world all pre-suppose some specific language.

Let's put the matter a different way. Imagine the vet's saying of Murka "She has a broken leg," when in fact she has a sprained leg. There are two (currently relevant) different mistakes the vet might have made, two different empirical, contingent facts he might have gotten wrong. Most likely the vet would be wrong about Murka thinking she has a broken leg, when in fact it is only sprained. But he might have been wrong about the meaning of *broken*, thinking that it meant sprained. An omnipotent being interested in making sure the vet was always right could have rectified things in two ways; by breaking Murka's leg, or by changing the meaning of *broken*. The first would be to change the world so as to make accurate what was conveyed by the utterance; the second would be to change the language so that the utterance conveys different information. A theory that can't tell the difference between two such changes is not going to capture the relation between language and information.

The Underdetermination of Information by Interpretation

Having seen that the information a statement conveys is independent of the language used to make the statement, we might be tempted to try identifying the information contained in a statement with the situation it describes—that is, with its interpretation. But there are problems associated with that assumption also. For example, there can be different sentences, describing the same situation but carrying different information. If the vet had said either "Murka has a broken leg" or "Your cat has a broken leg", the interpretation would have been the same, the state of affairs of Murka having a broken leg. However, the statements carry different information. For from the different statements a third party (or Pete) could have learned that Murka was (a) female, (b) named Murka, or (c) Pete's cat. They are facts that the vet can exploit to describe a certain state of affairs; they are not part of the described state of affairs; but neither should they be lost in the informational account of the utterance.

Another problem to be considered is that there are all kinds of information in a statement in addition to facts about the situations it describes. For example, the vet's statement conveys information about his beliefs, about the language he speaks, information about how far away he is, and so on.

This raises a related issue. There are all kinds of utterances that don't describe situations at all: questions, commands, jokes, requests, promises, and so on. But all kinds of utterances convey information, about what the questioner wants to know, what the commander commands or the requester requests, or what the promiser intends to do. Our focus on information and the interpretation of utterances really amounts to both a claim and a methodological strategy.

Our claim is that the primary function of language is to convey information and that the meanings of expressions are what allow them to convey the information they do. Our strategy is to investigate the linguistic meanings of indicative sentences and their parts by exploring the ability of statements made using them to convey information.

THE PRODUCTIVITY OF LANGUAGE

One of the most remarkable (and most remarked upon) features of human language is our ability to use and understand expressions never before uttered. Out of a finite stock of words we are able to understand any of a potentially infinite list of expressions. For example, out of the six words *barked, dog, the, that, at, Marina* we can form, among others, the following meaningful expressions:

Marina

The dog that barked at Marina,

The dog that barked at the dog that barked at Marina,

The dog that barked at the dog that barked at the dog that barked at Marina,

and so on. One senses that there is a fixed mechanism at work here, that what each of these successive expressions refers to depends on the reference of the previous one; or perhaps it is the case that the meaning of each depends on the meaning of its predecessor in some systematic way.

Frege assumes that both are the case, that the sense of a complex expression is a function of the senses of its parts, and that the reference of the whole is a function of the reference of its parts. In fact he uses this as a working assumption to figure out what the reference of an expression is when it isn't obvious. This is what led him to the conclusion that the reference of a sentence had to be a truth value.

The assumption that the meaning of a whole is a function of the meanings of its parts is called the *Principle of Compositionality*[1,31]. It obviously expresses an intuition that people have about their language, however vaguely understood. It is something to be made precise in a semantic theory, to state how the meaning of an expression depends on those of its parts and vice versa.

Barwise and Perry's theory distinguishes between the meaning of an expression and its interpretation in a particular utterance[1,59]. They prove that a version of compositionality holds of meanings, but not of interpretations.

THE EFFICIENCY OF LANGUAGE

The productivity of language has often been considered to be essential to the learnability of language. In fact, though, there is another phenomenon on which productivity is dependent, but which is usually accorded much less respect. Productivity emphasizes the possibility of using ever more complex expressions to describe things around us. But what is important, after all, is

of a fixed unambiguous expression. It is clear that for this to happen at all, the interpretation of an expression must be a product of factors some of which are fixed solely by language, and others, which vary with the expression's use. The former we call the linguistic meaning of the expression, the latter its context of use. The context needs to be broken down into three further factors, features of the context that are exploited in different ways in getting from the linguistic meaning of an expression to what it happens to signify on a particular occasion of use. We call these the discourse situation, connections, and resource situations. These three components require further investigation.

References

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Резюме

В данной статье представлены главные факты, касающиеся человеческого языка, которые следует принять во внимание при объяснении теории значения и теории лингвистического значения, в частности. Особое внимание уделено внешнему значению языка, продуктивности языка и его эффективности, а также приоритету информации и взаимоотношениям информации и интерпретации.