

Understanding wh-interrogatives in terms of inferential roles

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1 Sinn and Bedeutung

Sinn (sense) is associated with our grasp of meaning. According to Frege sense is fully public: different language users can grasp the same sense, and grasp of sense is considered to be within the grasp of any competent language user [Fre92].

Bedeutung (denotation) is that part of meaning correlated with truth. It is the normal purpose of senses to pick out denotations, but they may fail to do so.

Frege's distinction was intended to solve a puzzle about identity: how is it that identity statements such as ' $a = b$ ' can be informative, if a and b denote the same thing? The answer is that a and b can be different modes of presentation of the same object, and we can be ignorant or mistaken about their object.

2 Semantics of sense

A *semantics of sense* is one in which notions of truth and denotation are minimised or eliminated altogether, and where instead the semantics is given in terms that can be effectively correlated with human faculties.

A philosophical motivation for such a semantics is the belief that denotational and truth-conditional theories cannot account for our grasp of meaning. Deeply controversial arguments to this end (the so-called acquisition argument and manifestation argument) are advanced in [Dum76]. These arguments are especially influential in the philosophy of mathematics, where highly successful projects have given foundational accounts of much of mathematics with a semantics that makes no use of model-theoretic or truth-conditional concepts.

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A motivation from cognitive science comes from *conceptual role semantics*: 'the meaning of a representation is the role of that representation in the cognitive life of the agent' [Blo98]. [Har86] gives an argument that, for logical constructs, a conceptual role semantics would coincide with an inferential role semantics along the lines of that which I give in this talk.

Another motivation is the idea that a semantics in which issues of sense and issues of denotation are kept clearly apart might give a cleaner semantics than the more commonly followed approach of saturating our denotational account with intensional features. I argue for this in my talk; [Dum73] provides several arguments to this end.

Finally we may be interested in a semantics of sense because we are interested in the features of the account for their own sake: inferential role is clearly of interest in discourse analysis, for example.

There is an alternative approach to providing a semantics of sense: dialogic logic, where meanings of propositions are given in terms of the existence of winning arguments in a dialog between a proponent and an opponent. See the work of Paul Lorenzen, Walter Felscher, Jaakko Hintikka, Andreas Blass.

3 Inferential Role

A deductive argument is an extended speech act characterised by distinctive subordinate speech acts: introducing and discharging hypotheses, appealing to rules of inference, making assertions. Forms of deduction typically can be characterised as *monotonic*, where inference rules are explicit and reliable, or *defeasible* where the application of inference can prove to be mistaken.

Compositionality for inferential role semantics means something different than it does for truth-conditional theories: it means that arguments for complex propositions

can be built up from arguments for simpler propositions. The two kinds of compositionally in general do not coincide.

The two factor semantics I discuss in the talk gives the meaning of propositions in terms of two dual notions: **Assertion condition** – The grounds that justify asserting the proposition; and **Hypothetical contribution** – The consequences of supposing the proposition to hold.

The need for both factors is shown in [Ste99]: certain complexes such as universal quantifiers and conditions exhibit *contravariance* – the assertions conditions for the complex expression depend upon the hypothetical contribution of a subordinate expression, and vica versa.

Describing these constituents is not a sufficient condition for meaningfulness, as can be shown by the examples such as ‘*’:

1. Whenever A then $A * B$;
2. Whenever $A * B$ then A .

If we admit such a connective, then we can deduce anything from anything else. [Pri60] argues that such monstrous connectives showed the need for model theoretic semantics. [Bel62] resisted this conclusion arguing that we only need coherence conditions governing our semantics.

These coherence conditions can be formulated precisely and completely as shown in [Pra65]. The satisfaction of these criteria yields the notion of a *cut-free* argument, which allows us to read off a highly intensional denotational semantics.

Despite these successes, these approaches to semantics have been so far limited to settings that are more or less conducive to the form of semantics. The sticking point is the treatment of individuals and the characterisation of the role they play in propositions: the above mentioned applications all deal with logic and constructive mathematics, where complete formal characterisations of the structure of individuals are, or may be assumed to be, given.

The treatment we give in the talk is based on an idea due to Frege: The sense of a proper name is the mode of presentation of an object. Thus we model the inferential role of a proper name in two parts: its **presentation** – which consists of a criterion for identifying an individual; and its **contribution** – the inferential contribution of an individual.

As stated this definition is purely programmatic: to make use of it we must be able to decompose the inferential role of the predicate and the proper name in sentences such as ‘Paul is dancing’. Without such a decomposition, it is impossible to be sure that either harmony or compositionality prevail in our semantics.

Martin-Löf’s type theory shows how this idea may be applied in the context of constructive mathematics. In the talk I describe a novel application to cases where we have that any individual is capable of being picked out by ostension. Then it is sufficient to understand the incomplete expression ‘- is dancing’ to grasp the paradigmatic ‘This person is dancing’.

The harmony requirement depends upon us being able to ‘join together’ the presentation criteria for individuals with their contribution. So, for example, we must be sure that the way we can specify individuals ‘matches’ their roles in sentences, eg. in:

1. Paul is the tallest person in the room.
2. Paul is dancing.

Such an account would be given in terms of transformation conditions acting upon complex names, reducing their meaning in context to simple conditions that can be understood in terms of non-complex ostensive acts, in a similar manner to Gentzen’s cut-elimination.

4 Application to Questions

Our semantics of questions will be governed by the following judgements about meaning. To grasp the meaning of a question is to know: firstly what would count as an appropriate response to the question, and secondly to grasp the significance of these appropriate responses.

It is important not to oversimplify: responses need not be assertions – they could be consitent answers, or they could be performative utterances (eg. ‘Do you promise not to tell anyone?’ – ‘Yes.’)

Significant responses could be answers, which can be seen as completing the dialogue initiated by the question, or they could frustrate the dialogue, say by disputing a presupposition. To speak in this way is to draw attention to the fact that it is the normal function of a question to elicit an answer, but it may be an appropriate response to supply a response that is not an answer.

We can model this by saying that the semantics of a question is given by:

1. A recognition criterion distinguishing the significant responses from the possible replies;
2. A recognition criterion identifying which responses are answers; and
3. A significance function which transforms responses into propositions.

Constituent questions are especially interesting from the point of view of semantics because they very nicely expose issues about individuals. In this case an answer will consist of, or provide, a mode of presentation. However it cannot consist of just any mode of presentation, since the question specifies a mode of presentation. So part of the criterion of being an answer must involve a novelty condition on modes of presentation.

Conjecture For a simple constituent question, a response is an answer if it provides the mode of presentation of the appropriate categorial type, its significance states that the presented object satisfies the requisite condition, and the mode of presentation is novel to the context.

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