The Computer's View of Semantics

The knowledge base designer who provides information to the system has an intended interpretation and interprets symbols according to that intended interpretation. The designer states knowledge, in terms of propositions, about what is true in the intended interpretation. The computer does not have access to the intended interpretation – only to the propositions in the knowledge base. Let KB be a given knowledge base. As will be shown, the computer is able to tell if some statement is a logical consequence of KB. The intended interpretation is a model of the axioms if the knowledge base designer has been truthful according to the meaning assigned to the symbols. Assuming the intended interpretation is a model of KB, if a proposition is a logical consequence of KB, it is true in the intended interpretation because it is true in all models of KB.

The concept of logical consequence seems like exactly the right tool to infer implicit information from an axiomatization of a world. Suppose KB represents the knowledge about the intended interpretation; that is, the intended interpretation is a model of KB, and that is all the system knows about the intended interpretation. If KB⊨g, then g must be true in the intended interpretation, because it is true in all models of the knowledge base. If KB⊭g, meaning g is not a logical consequence of KB, there is a model of KB in which g is false. As far as the computer is concerned, the intended interpretation may be the model of KB in which g is false, and so it does not know whether g is true in the intended interpretation.
Given a knowledge base, the models of the knowledge base correspond to all of the ways that the world could be, given that the knowledge base is true.

The Human's View of Semantics

The description of semantics does not tell us why semantics is interesting or how it can be used as a basis to build intelligent systems. The basic idea behind the use of logic is that, when a **knowledge base designer** has a particular world to characterize, the designer can choose that world as an **intended interpretation**, choose meanings for the symbols with respect to

that world, and write propositions about what is true in that world. When the system computes a logical consequence of a knowledge base, the designer can interpret this answer with respect to the intended interpretation. A designer should communicate this meaning to other designers and users so that they can also interpret the answer with respect to the meaning of the symbols.

The logical entailment "KB⊨g" is a semantic relation between a set of propositions (KB) and a proposition it entails, g. Both KB and g are symbolic, and so they can be represented in the computer. The meaning may be with reference to the world, which is typically not symbolic. The ⊨ relation is not about computation or proofs; it provides the specification of what follows from some statements about what is true.