

Meaning and Links: A Semantic Odyssey

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I have been asked about the paper "What's in a Link": how it came to be, what was happening in the field at the time, and how the ideas have evolved since then. This talk will describe my perspective on some of the things that I saw happening around me that led me to write the paper, some of the background thoughts that led to the ideas presented there, and how some of those ideas have evolved since then. In this abstract, I will list some of the threads that I will discuss and provide some of the relevant references.

"What's in a Link" (Woods, 1975), advocated a standard of rigor for the representational conventions used in semantic networks and pointed out some of the different things that a link can be used for and some of the confusions that were present in many informal notions of network representation. The message of that paper has been well received, and my goals of stimulating more attention to the semantics of representational devices has been gratifyingly realized.

Since then, many semantic network systems have made an effort to make clear distinctions about such issues as structural versus assertional devices and the distinctions between kinds and instances. Moreover, a substantial body of work in "terminological subsumption" and related issues has focused on the expressive power of representational primitives and the computational consequences of various representational mechanisms, including a substantial body of work stimulated by the KL-ONE knowledge

representation system (Woods & Schmolze, 1992).

One of the issues raised in "What's in a Link" was the difference in perspective between the fields of linguistics and logic when it came to talking about semantics. My perspective includes an opinion on what is still missing from both, based on my work on semantic interpretation of English questions for a question-answering system (Woods, 1967, 1978) and thoughts about what would be required for a theory of meaning for artificially intelligent systems.

Over time, many people have responded to the need for increased rigor in knowledge representation by turning to first-order logic as a semantic criterion. This distresses me, since it is already clear that first-order logic is insufficient to deal with many semantic problems inherent in understanding natural language as well as the semantic requirements of a reasoning system for an intelligent agent using knowledge to interact with the world (Woods, 1987). First-order logic is a powerful tool but not the only tool we need. One issue that troubles me is the belief that the notation is unimportant and that only a declarative semantics matters. In the early KL-ONE work and subsequent endeavors, I have pursued the idea that the notation is important for the way in which it supports computational reasoning algorithms (Woods, 1986).

In 1991, extending ideas from "What's in a Link" and KL-ONE, I wrote a paper focused on the issue of subsumption and its role in defining

conceptual taxonomies for organizing knowledge (Woods, 1991). In this article, I introduced a notion of intensional subsumption and a way to separate the quantificational import of a link from the underlying domain-specific relationship that a link might represent, and I discussed the algorithmic as well as the semantic issues associated with the proposed representational conventions.

Since 1991, I have been experimenting with applying this technology to the problem of automatically organizing knowledge to improve people's access to on-line information (Woods, 2004).

In this talk, I will attempt to knit these threads together and discuss where we go from here.

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