

# **Grounding Language in the World: Signs, Schemas, and Meaning**

Deb Roy  
Cognitive Machines Group  
The Media Laboratory  
Massachusetts Institute of Technology

The meaning of words in everyday language depends on two very different kinds of relations. On one hand, words refer to (are about) the world. This relation rests on causal interactions between information and the physical world. On the other hand, agents use words to pursue goals by producing speech acts. A complete model of language must bridge these two kinds of meaning.

These observations have motivated the implementation of a series of situated language processing systems in my lab. I will report on my ongoing attempt to develop a computational framework for language grounding that distills lessons learned from these implementations. Drawing from ideas in semiotics and constructivism, knowledge is represented in terms of signs which are causally connected to their referents, and actions which the agent can perform to verify, acquire, and use knowledge.

This framework may be useful for guiding the development of larger scale situated language processing systems, and may shed light on related cognitive processes.

For papers and other information on this work, see:

<http://www.media.mit.edu/cogmac>  
<http://web.media.mit.edu/~dkroy/>

## **Selected References**

Deb Roy. (Submitted). Grounding Language in the World: Signs, Schemas, and Meaning. Draft version available on line at [www.media.mit.edu/~dkroy/](http://www.media.mit.edu/~dkroy/).

Deb Roy, Kai-Yuh Hsiao, and Nikolaos Mavridis. (2004). Mental Imagery for a Conversational Robot. *IEEE Transactions on Systems, Man, and Cybernetics*, 34(3), 1374-1383.

Deb Roy, Niloy Mukherjee (In Press). Visual Context Driven Semantic Priming of Speech Recognition and Understanding.

Peter Gorniak and Deb Roy (2004). Grounded Semantic Composition for Visual Scenes, *Journal of Artificial Intelligence Research*, Volume 21, pages 429-470.

Deb Roy. (2002). Learning Words and Syntax for a Visual Description Task. *Computer Speech and Language*.

Deb Roy. (2003). Grounded Spoken Language Acquisition: Experiments in Word Learning. *IEEE Transactions on Multimedia*.

Deb Roy and Alex Pentland. (2002) Learning Words from Sights and Sounds: A Computational Model. *Cognitive Science*, 26(1), 113-146.