



Possible avenues to explore..

- Use example from robotics and avoid knowledge representations which rest on symbolic, human generated descriptions of the world.
- Systems must connect internal representations to external physical entities.
- Proposes a theory of Language grounding



Desiderata for a Theory of Language Grounding

- 1. Unification of representational primitives objects, properties, situations should be constructed from the same set of primitives.
- 2. Cross-modal Translatability represent Information derived from perception and language in a common form
- Integrated space of actions Motor and speech acts should be expressed in a single integrated space of actions

Theory of signs, projects and schemas

- A sign is a physical pattern that which only exists as a sign relative to an interpreter.
- · Signifies an object
- Three classes:
- Natural shaped by nomic physical laws. The agent is attuned to specific sensory input and can only detect signs that appear within those channels.
- Indexical
- Intentional situate beliefs relative to the frame of reference. Necessary as parameters for control.

Beliefs about signs

- a-signs : "a distribution over all possible observations within an input channels domain"
- form elements of schemas that enable an agent to encode signs and make context-dependent predictions about the observation of new signs

d-signs: belief about the output of a discrete categorization process which maps a continues domain a-sign to a discrete domain.

Ripley – 'a conversational helping hand'

- Ripley, to investigate connections between natural language semantics, perception, and action
- Ripley is a custom constructed manipulator robot designed for grounded language experiments
- Features 7 DOF, hardcoded to look up and "make eye" contact with people.
- A visual subsystem that tracks regions and maintains correspondence between regions.
- Detection and tracking of a region "an object that is instantiated in Ripley's mental model"
- It understands a limited set of spoken requests.
- There is a spatial language interpreter which maps requests into goals with respect to objects in Ripley's mental model.

Intentional signs

- Used for goal driven communication.
- "what's this fly doing in my soup" issuing a directive to get a new bowl of soup.
- Intentional signs are physical directives that stand for something to someone
- Speech acts are assembled using lexical units
- pairs of a-signs, d-signs connected to defining schemas through projections
- . A speech categorizer is implemented using Hidden Markov Models.