Going Beyond Literal Command-Based Instructions: Extending Robotic Natural Language Interaction Capabilities

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The Problem
Robots should be able to understand (and generate) utterances whose meanings are not directly derivable from their semantics (as in the exchange to the right).

Robots must be able to understand these types of utterances because they comprise the majority of natural human dialogue for social reasons (e.g., politeness). Robots must be able to generate these types of utterances in order to be perceived as following those same social conventions.

Furthermore, this pragmatic understanding and generation must be possible in the face of uncertainty.

Our Approach
Our approach makes use of a set of pragmatic rules for both understanding and generation. These rules are represented using the following form:

(Utterance) U ^ (Context) C => (Intention) I

The Dempster-Shafer Theory of Evidence is used to represent and reason about the robot's uncertainty: the certainty of each Utterance, Context, Intention and Rule is represented by its uncertainty, the certainty of each Utterance, Context, Intention and Rule is represented by its uncertainty, the certainty of each Utterance, Context, Intention and Rule is represented by its uncertainty. The certainty of each Utterance, Context, Intention and Rule is represented by its uncertainty.

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