1 Agent Communication

In this lecture, we cover macro-aspects of intelligent agent technology: those issues relating to the agent society, rather than the individual.

Speech acts: a theory of how utterances are used to achieve intentions is a theory of how language is used by people every day to achieve their goals and intentions.

Most treatments of communication in (multi-)agent systems borrow their inspiration from speech act theory.

Lecture 8: Agent Communication
Searle (1969) identified various different types of speech acts:

- representatives: such as informing, e.g., 'It is raining'
- directives: such as requesting, e.g., 'Please close the door'
- commisives: such as promising, e.g., 'I promise to...
- expressives: where someone expresses a mental state, e.g., 'thank you!'
Here is the semantics for request:

\[ s \text{believes } h \text{can do } y \text{ (you don't ask someone unless you think they can do it)} \]

\[ s \text{believes } h \text{ can do } y \text{ (you don't ask someone unless they believe they can do it)} \]

\[ s \text{ can do } y \text{ unless you think something is going to happen} \]

\[ s \text{ believes } h \text{ can do } y \text{ (you don't ask someone unless they believe they can do it)} \]

\[ s \text{ believes } y \text{ (you don't ask someone unless they believe something is going to happen)} \]

\[ s \text{ requests } \phi \text{ (request(s' request))} \]

\[ s \text{ believes } \phi \text{ (you believe something is going to happen)} \]

\[ \neg s \text{ believes } \phi \text{ (you don't believe something is going to happen)} \]

\[ s \text{ wants } \phi \text{ (you want something)} \]

\[ \neg s \text{ wants } \phi \text{ (you don't want something)} \]

\[ s \text{ values } \phi \text{ (you can do something)} \]

\[ \neg s \text{ values } \phi \text{ (you can't do something)} \]

\[ s \text{ believes } \phi \text{ (you believe something is going to happen)} \]

\[ s \text{ can do } y \text{ (you can do something unless you think something is going to happen)} \]

\[ s \text{ believes } \phi \text{ (you believe something is going to happen)} \]

\[ s \text{ can do } y \text{ (you can do something unless you think something is going to happen)} \]

\[ s \text{ values } \phi \text{ (you can do something)} \]

\[ \neg s \text{ values } \phi \text{ (you can't do something)} \]

\[ s \text{ believes } \phi \text{ (you believe something is going to happen)} \]

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More recently, the Foundation for Intelligent Physical Agents (FIPA) started work on a program of agent standards — the FIPA basic structure is quite similar to KOML.

The actual content of the message:

- 5ª Informº and 5ª Requestº

"Inform" and "Request" are the two basic performatives in FIPA.

http://www.csc.liv.ac.uk/~mjw/pubs/imas/
For the "inform" performative...

The content is a statement.

Pre-condition is that sender:
- does not believe that recipient already intends to perform action.
- believes recipient is capable of performing this action.
- intends action content to be performed.

*For the "request" performative...

The content is an action.

Pre-condition is that sender:
- intends that the recipient believe the content:
  - holds that the content is true or not.
  - does not already believe that the recipient is aware of whether
    content is true or not.
- believes recipient capable of performing this action.
- intends that recipient perform action.

*For the "inform" performative...