Natural Language Understanding and Action Control
(JSPS Grant in Aid for Creative Scientific Research)

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Background
- Change in our living environment
  - Move from physical to information space
- Research necessary in the future
  - The construction of a friendly human interface that contributes to creation of new information society in the 21st century, where a symbiotic relationship is generated between humans and machines
  - Natural language understanding is a key research theme in this

Language understanding and actions
- The handling of linguistic phenomena in the context of actions
  - Situation dependent language understanding
  - Speech acts
  - Discourse Structure
- The visualization of the results of natural language understanding as agent actions
  - Necessity of deep natural language understanding
  - Disambiguation of vagueness

Interdisciplinary research
- We need interdisciplinary research to extract a novel theory from:
  - Computer science
  - Artificial intelligence
  - Linguistics
  - Computational linguistics
  - Philosophy
  - Psychology

Experimental system
- A prototype system integrating
  - Speech recognition
  - Natural language understanding
  - Computer animation

Architecture of prototype system

- Syntactic Analysis
- Semantic / Context Analysis
- Deep Case Analysis
- Ellipsis Handler
- Intention Extraction (Speech Act)

- Acoustic Processor
- Linguistic Decoder
- Language Understanding (LUN)
- Knowledge Base
- Common Sense Knowledge
- State of Virtual World

- Execute Actions
- Action Planning
- MTM
- STM
- LTM
Research topics
- Language understanding
  - Analysis of spoken language
  - Dealing with ambiguities and vagueness
  - Discourse analysis
- 3D software robot
  - Software robot free from physical constraints
  - Lip sync. and natural face expression
- Theory on language and action
  - Speech act theory
  - Cognitive modeling of language understanding

Contributions to other research fields
- Computational linguistics
- Artificial intelligence
- Pragmatics
- Speech act theory
- Applications
  - Sign language system
  - Entertainment
  - Computer graphics

Organization
- 25 university professors from various fields
  - Computational linguistics
  - Computer graphics
  - Linguistics
  - Robotics
  - Speech recognition
  - Cognitive science
- 5 year-project (2001-2005)

Future research
- Speech Recognition + NLU = Speech Understanding
- Strongly coupled theory of language and actions
- Incorporation of AI approaches
- Para-linguistic phenomena