

Rule-Based Systems

- Any system based on rules
- Expert system is a special case of rule-based system
- One advantage of rule-based systems: you don't have to change the basic program, you just change the rules

Dialogue Systems

- Any program used to converse with a computer
- Often rule-based
- For practical reasons, “converse” often includes typing instead of speech
 - Don’t have to worry about the computer understanding your speech
 - Use a chat window interface instead

Current Level of Spoken Language Understanding by Computers

- Computers can do a good job of understanding if the vocabulary is very small
 - E.g., banking system—just numbers
- Airline system
 - Larger but still largely closed vocabulary
 - Dates, times, cities, etc.
 - Computer can do a decent job, but not perfect
- True dialogue system
 - Requires natural language understanding
 - Phonology, disambiguation of syntactic and semantic ambiguity, pragmatics, world knowledge...
 - Examples

Some Examples

- Eliza: played the therapist
- Parry: played the patient (paranoid)

Eliza

- Joseph Weizenbaum, MIT
- 1960's
- Said to be based on Carl Rogers' theory of therapy
 - Non-directive
 - Respectful of personhood of client
 - So was it really Rogerian?
- Rule-based dialogue system
 - Saw typed sentence
 - Ran through rules, looking for match
 - Produced output sentence
 - E.g.: I like to <verb> □ Why do you like to <verb>?
- Many rules were universally applicable
 - I.e., didn't matter what input was
 - E.g.: "How does that make you feel?"

What Eliza Knew (& Didn't)

- What Eliza did not have
 - Semantics
 - Pragmatics
 - World knowledge
 - Examples of problems this caused (try it!)
- Had only shallow syntactic understanding
 - Treated sentence as list of words, not as tree
 - Examples of problems this caused (try it!)

Evaluation of Eliza

- Many versions on web today are more sophisticated than the original
- Try it! (in class/at home)
- Original version didn't even switch pronouns
 - I hate my dog □ Why do you hate ___ dog?
- Did Weizenbaum's secretary really think she was talking to a real person?
 - Was the program really good enough?
 - Or just expressing society's anxieties about computers, equality of the sexes, etc.?

Parry

- See Parkison, Colby & Faught for details
- Colby wanted to test his mental model for paranoia
- Read appendix of Parkison, Colby and Faught for sample conversation with Parry
- Regardless of its success (or lack of it) as a model of paranoia, how did Parry do as a conversationalist?
 - What did it understand or misunderstand?
 - What caused those problems?

Questions to Ask about Parry's Processing Stages

- In which stage(s) did Parry do:
 - Phonetics and phonology
 - Morphology
 - NP syntax
 - VP syntax
 - Semantics
 - Pragmatics
- Why did the stages come in the order they did?

Parry's Processing Stages

1. Clean up input
 - Standardize capitalization and punctuation (why necessary?)
 - Not glamorous but necessary
 - Think about how people type in email, chat windows, and text messaging

2. Morphological analysis
 - Expand contractions (why?)
 - Identify inflectional endings and store this information in variables
 - Identify semantically useful derivational endings
 - 80 suffixes
 - 3500 words
 - Spelling correction
 - Why necessary?
 - Why in this stage?

Processing (2)

3. Replace selected multi-word phrases by synonyms
 - Why?
 - About 350 idioms
4. Identify noun phrases
5. Simplify verb phrases
 - Identify tense, modal verbs, adverbs and subject-verb inversion
 - Store this information in variables
6. Replace additional multi-word phrases by synonyms
 - About 250 idioms
7. Identify clauses
 - About 20 simple clause patterns

Processing (3)

8. Identify nested structure of clauses
 - Which one is the main clause syntactically?
 - Which one contains the main semantic information?

9. Identify concepts of interest to Parry
 - About 2000 concept patterns