Human Language Processing

• We understand language incrementally, word-by-word
  
  • How do people construct interpretations?

• We must resolve local and global ambiguity
  
  • How do people decide upon a particular interpretation?

• Decisions are sometimes wrong!
  
  • What information is used to identify we made a mistake?

  • How do we find an alternative interpretation?

• Answers can reveal important details about the underlying mechanisms
Theories of Sentence Processing

- Explanatory and descriptive goals
- Theories of parsing typically determine …
  - what architecture is assumed: modular? symbolic? ...
  - what mechanism is used to construct interpretations?
  - which information sources are used by the mechanism?
  - which representation is preferred/constructed when ambiguity arises?
- Linking Hypothesis: Relate theory/model to observed measures
  - What cognitive processes does the measure reflect, how can this be related with aspects of the model’s processing or memory

Topics

- Human language processing: Reading times, eye-tracking, EEG/ERP
- General and Philosophical Issues
  - Modularity versus Interaction
  - Marr’s levels, Rational theories
  - Experience-based versus innate mechanisms
- Syntactic Processing
  - Psychologically plausible parsers: Incrementality, Memory Load and Ambiguity
  - Theories of Syntactic Ambiguity Resolution (Frazier, Pritchett)
  - Reanalysis & Monotonic Parsing (Pritchett; Sturt & Crocker)
Topics

- Probabilistic Models
  - Lexical category disambiguation (Corley & Crocker)
  - Syntactic parsing (Jurafsky)
  - Wide coverage sentence processing (Crocker & Brants)
  - Other rational approaches: Informativity (Chater, Crocker & Pickering)
- Interactive Models (McRae et al)
  - Multiple competing constraints, non-modular
  - Setting model parameters from corpora and off-line experiments

Topics

- Linking Hypotheses: There are two kinds of theories/models involved when we model human language behaviour:
  - The model of the cognitive system itself (at any of Marr’s levels)
  - A theory that links some aspect of that system to a particular empirical measure (reading time, ERPs, visual attention, etc.)
- Most common linking theories in computational psycholinguistics:
  - Reanalysis (in serial processing models)
  - Pruning of unlikely parses, parse re-ranking (in bounded parallel models)
  - Surprisal – a computational theory, but which a mechanistic interpretation
  - Cycles for analysis to exceed threshold, reflects time need to reconcile constraints.
Relating Models with Data

Course Assessment & Materials

- Course assessment:
  - Satisfactory completion of all tutorials
  - Exam at end of course = 100% of grade
    - Responsible for all material discussed in the lectures & tutorials
    - Reading: Lecture material, tutorials, key papers

- Materials
  - Lecture overheads and recommended readings
    - available from the course web page
  - All tutorial material
Structure of the exam

- **Exam structure**:
  - Part 1: Short questions (8 or 9), all obligatory (approx 50%)
  - Part 2: Do 2 out of 3 long questions (approx 50%)

- **Materials for the exam**: 1 side (not both) of A4 paper, hand-written, with anything you want on it. A simple calculator is allowed. No smartphones.

- **Duration**: 100 minutes

- **Time place**: Meeting Room, Mon 29.01.2018 @ 14:00 *sharp*

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Key Readings ...


