1. Language

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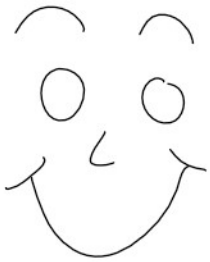
OVERVIEW

1) Words & Rules
   - context free grammar, recursion
   - regular vs irregular verbs - Regular past tense, blocked by semi-regular ir verbs
   - rule based vs connectionist accounts
2) Human language aquisition
   - past tense
   - word segmentation
   - syntactic categories
3) Computational models
   - perceptrons, neural networks
   - probabalistic learning algorithms
   - rule based learning



Words

- children learn 6-10/day
- **Recursion:** grammar rule entities can contain examples of themself
- ~150 irregular verbs
- If word is stored, rule is blocked, otherwise, its applied.
  - memory is faster than applying the rule

For the irregular past tense form in modern english.
- past generation failed to group the rule
- memorised the form as seperate words
- passed the new version to their children

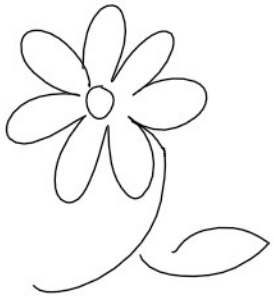
Perceptrons

Frank Rosenblatt (1957)

$w_i \leftarrow w_i + \Delta w_i$ $\Delta w_i = \eta(t-o)x_i$

DEVELOPMENT OF LANGUAGE

1. Vegetative sounds (0-6 weeks)
2. Cooing (6weeks)
3. Laughter (16 weeks)
4. Vocal Play (16weeks - 6 months)
5. Babbling (6 - 10 months)
6. Single word utterances (10-18 months)
7. 2 word utterances (18 months)
8. Telegraphic (2 years)
9. Full Sentences



- A lot of date variation between children
- Somewhere in the 'gap' children develop a concept of what a word is.
  - **Mental lexicon:** associating sound sequences with meaning and their syntax

CONTINUOS SPEECH

- Stress patterns
- Phonetic constraints : eg, every word must contain a vowel
- Statistical regularities
- Social factors

Words create regularities in the sound sequences of language

- We can use **Transitional Probability** to track unlikely transitions between syllables

Word Meaning Clues

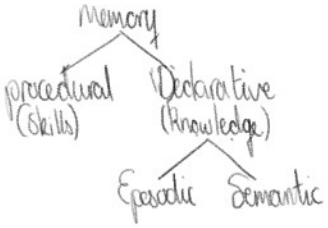
Socio-pragmatic clues: eye gaze, facial expression, inference of semantic intentions
Child-directed speech: facilitator focus on child
Internal assumptions: whole object assumption,
Syntacti- Bootstrapping: exploiting syntactic structure to discover word meaning

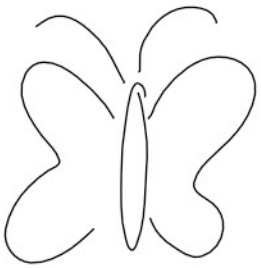
Dendrograms

- most effective for learning nouns, then verbs
- least effective for function words
- mirrors childrens syntactic development
→ could be potential like how children learn (grouping words that appear in same position)

Concepts & Categories

how do we organise our knowledge of the world?





- Concepts improve cognitive economy

Classical Theory

Pros	Cons
- Intuitive - Economical - Easy definitions - Easy membership check	- hard to find definition - borderline cases - typicality effects

Typicality Effect: quicker to judge typical members

Prototype Theory (Similarity based)

- categories organised around prototype
- But! people are able to learn things they shouldn't be able to learn

EXEMPLAR THEORY (SIMILARITY BASED)

- Categories represent a list of previously encountered examples

LEVELS OF CONCEPTUALISATION

Superordinate
Basic - most abstract, learn fastest
Subordinate