20180131 COGS 101b Lecture Notes

Cabinet COGS101b Lecture Notes

Accumulated Knowledge shapes our perception

Bottom-up Processing: Processing data based on the “raw data” the information that reaches the sensory receptors

Top-down Processing: Using knowledge, models, ideas, expectations to interpret sensory information

Unconscious inference:

1. Our perceptions are the result of unconscious assumptions, or inferences, that we make about the environment.
2. We perceive those objects and events that under normal circumstances would be most likely (top-down) to produce the received sensory stimulation (bottom-up).

Word-superiority effect

see Reicher, 1969.

Letters within a word are processed more rapidly than single letters.

Well-formedness

How probable the string is in English (“FI” vs. “HX”)

Nonsense words that are well-formed show better recall of letters than individual letters.

Word Frequency & repetition priming

Frequent words and recently seen words are more easily recognized.

Feature Net

Activation Level: The current status or “energy level” of a detector will determine how much more input is needed for the detector to fire.

Response threshold: When this is reached the detectors will send a signal to the other detectors it is connected to.

Bigram Detectors

Helps explain well-formedness.

A feature net that has an additional layer where some two letter sequences are more primed than others, hence, more common sequences have a lower response threshold than less common sequences.

This helps resolve ambiguity by biasing detectors towards certain letters, even when the features of the letters are ambiguous. i.e. in “CORN” the “O” may be occluded, which could mean its a “Q” or “U”, but because “CO” is more frequent, the word detector resolves to “CORN”.

All of this activity happens in a distributed fashion; the network’s “knoweldge” is not locally represented anywhere.

However, these same effiencies lead to errors of perception.

Geons & Recognition by Components (RBC)

See Biederman, 1987

Geons: Like a feature net or alphabet for 3D objects

Just like words are composed of letters, objects are composed of “geons” geometric ions.

Features:

1. Cross Section
    - Straight vs. Curved
2. Axis
3. Size of Cross Section
4. Termination of Geon hwen nonparallel

Most critical components in Geons

- Corners
- T-junctions
- Boundaries between parts

Viewponit dependent recognition

See Hayward & Williams, 2000

Opposite to RBC

Matching current view with views stored in memory

- Feature net builds up image of whole objects
- BUT object detectors reprsent what the object looks like from a specific angle

Can recognize only if you can match current view with a stored memory - mentally rotate object to find a match.