PSYC 3640
Psychological Studies of Language

When letters combine:
Building words and constructing a mental dictionary

October 2, 2007

Today’s Outline
• Language studies in the news
• Review of lecture 3
• Chapter 6 in Altmann
• Reynolds & Besner (2005)
• Video

Language study in the news
• Study speech errors to speculate how the mental dictionary is organized
• Animals, children, signers
• Spoonerism: big dog – dig bog
• Speech errors: collision of motor commands rather than as substitution of mental symbols

Review of Lecture 3
• Acquiring word meaning
• Building connection between sound and meaning
• Factors affecting children word learning development
• Dissociating mental and observable worlds
• Word learning: nouns and verbs
• Core rudimentary knowledge of grammar
• Semantics and syntax in meaning acquisition
• Organizing and accessing mental lexicon
What are words?

- Symbolic representation of meaning
- Morpheme: smallest unit of meaning
- 1 word ≠ 1 morpheme (or 1 meaning)
- Types of morpheme:
  - Stem: break
  - Suffix: breaks, breaking, breakable
  - Prefix: unbreakable
  - Infix: rare in English

Latin Word Roots

- Above/over
- After
- Again
- Against (mentally)
- Come
- Feet
- Forward
- Know (a mental thing)
- Know (a physical thing)
- Supra/super
- Post
- Re-
- Anti
- Vene
- -Ped-
- Pro-
- -cogni-
- -science-

Assessing Meaning (Revisit)

- Using sound as cues does not prove to be the most effective way.
- Remember phosphate and foster?
- Exercise 1: Imagine you walk into the grocery store, what do you have in mind as a shopping list?
- Exercise 2: Imagine you are going to host a party this weekend, who do you have on your mental guest list?
- Under what circumstance would you generate a list using sound as a cue?

Interpreting Sound

- Word-shadow: To repeat as quickly as possible what is presented auditorily through headphones
- Not simply repeating sounds → interpretation
- Word-monitor: press a button as soon as a particular word is presented
- Response are finished even before the end of the presentation of the word → interpretation
Access vs. Activated

Lexical Decision Task
- Judge whether a presented word is a real word
- Similarity in both shape and sound: Broom vs. Broam/Broom vs. Breek
- Frequency: Computer vs. Compurgator
- Relatedness for a previously presented item:
  Syringe → Doctor
  System → Doctor

Cross-modal Priming
- Prime presented auditorily and target presented visually
- Faster RT if present visual target prime (ship) half-way through the auditory prime (Captain)
- Similar RT between prime and control if present at the end of the auditory prime

Access vs. Activated
- Activated precludes access.

Acoustic Mismatch

• Leads to a rapid decline in the activation of a lexical entry
• *Book*, but not *boog*, primes *page*
• Recall the power of phoneme in speech perception
• Context of the sentence/phrase is important for recognizing the right word
• Co-articulation
• Categorical perception does not apply to vowels

Hameethathimboo

• Drop word-final consonant
• Thin → thim
• If acoustic mismatch deactivates the lexical candidate for recognition, how can we recognize a sentence?
• Context-sensitive tolerance
• Depending on what word follows thim: if *book* follows, then thim → thin. If *slice* follows, then thim → thin.

Sound in Context

• Thin tree
• Thin book
• Thin carpet (thing carpet)
• Association of a combination of sounds
• Storage for all possible combinations in all context?
• Rules?

Lexical Entries

• Lexical entries → complex neural circuitries
• Lexical entries → activation of these complex neural circuitries
• Do we activate all the possible meaning associated to a word?
Swinney of the 1970s

• Compatibility of word meaning and sentence context
• Cross-modal priming

1. He swam across to the far side of the river and scrambled up the bank before running off
   or
   He walked across to the far side of the street and held up the bank before running off

Activation of Lexical Entries

• Confound with frequency? Bank with river is less frequently used as in bank with money.
• Low frequency entries \(\rightarrow\) inactivated? Or deactivated by context?
• General conclusion: a network of semantically related words is activated when a semantically ambiguous word is presented
• Tanenhaus: both verb and noun forms of a

Tanenhaus

• Tanenhaus: both verb and noun forms of a word are activated
• \textbf{Watch} as in time-piece or looking
• Syntactic categories are not listed separately in the mental lexicon

So, how do we do it?

• When speech sounds enter our ear, a network of lexical entries is activated.
• All the meanings compatible with the sound sequences are activated.
• Then context enters the picture. Inappropriate network of lexical entries is suppressed on the basis of context
Summary of Chapter 6

- Organization of mental lexicon is meaning-based, although it may be activated by sound.
- No consensus in the field on how wide a word’s network (or neural circuit) is in the mental lexicon. (how to measure it? 😊)
- Access to meaning relies on activation of semantically related network
- Activation and access depends on frequency, similarity in shape, form or

Reynolds and Besner (2005)

Previous Research

- DRC model:
  - Nonlexical route: spelling-sound correspondence for regular words
  - Lexical route: whole-word association between orthography and phonology for exception words
- What is the role of context?
- The two routes in DRC model can be viewed as two tasks. Borrowing from the task switching research, switching between tasks will lead to cost in response time (RT)

Main Question (Hypothesis)

- If a cost between tasks is observed, then the two routes are used (and switched) ➔ use of lexical and sublexical knowledge
- Switched trials ➔ slower RT
- Non-switched trials ➔ faster RT
  ➔ Supports the dynamic contextual control account, refutes the time criterion account and a static contextual control account
Methods

- 16 undergraduates
- 100 irregular words (deaf, scent, weird)
- 100 nonwords (bronk, swooch, holf)
- Name the words presented as quickly as possible
- Word/nonwords presented in predictable sequence

Results

Conclusion

- Dynamic contextual control account
- Switch cost in RT (i.e., cost between switch and stay trials) implies switching between lexical and sublexical processing in naming
- Longer RT in naming nonwords than exception words implies combination of lexical checking and response time homogenization.

Future Directions

- Practice effect on switch cost?
- What induces the switch cost? Frequency of the exception words?
- Is readers’ skill level a factor?