Today’s Outline

• Continuation of lecture 3
• Chapter 6 in Altmann
• Reynolds & Besner (2005)

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
Organizing the Mental Lexicon

- In dictionaries, words in alphabetic languages are organized alphabetically.
- The first letter usually loosely represent the first sound/phoneme in the word
- Phosphate /ˈfɒs fət/ vs foster /ˈfɔs tər/
- What about other languages that are not represented by alphabets?
- Chinese dictionary: radical and number of strokes ➔ independent of sound, shape and meaning

Accessing Mental Lexicon

- By phonemes? By syllables?
- But languages have different speech forms (e.g., rhyming, syllabic and melodic structures), different language, different access route?
- French syllables are more salient than English syllables.
- French: ba-lance
  English: bal-lance

Mehler and colleagues

- Examine whether syllable is the perceptual unit for organizing and accessing the mental lexicon
- Instruction: Respond when hear the target syllable /ba/
- Syllable-monitoring task.
- Faster RT if /ba/ is in the word, but longer RT if the target syllable is not in the word.
- French speakers organize mental lexicons according to syllable-sized chunk.
- English speakers? No, not syllables...
Smallest detail in the vocal tract...
• *worm* /wɔrm/ vs. *word* /wɜrd/
• Co-articulation:
  – Producing more than one sound at a given time
  – Shape of vocal tract when producing a phoneme accommodates the production for surrounding phonemes
  – Mostly occurs within a syllable
• In French, there is co-articulation in /bal-con/ but not in /ba-lance/.
• In English, /l/ is co-articulated with the /a/ in /ba/ and the /a/ in /lance/.

Is this difference important?
• English and French speakers use these small perceptual detail to eliminate irrelevant words phonemically.
• Marlen-Wilson & Warren
• Lexical decision task: Decide whether a given word is a real word.
  • *word* and *word*
  • *w* and *w* faster and slower

Problems of the syllable-monitoring experiment
• What does this task measure?
• Intended to measure the acoustic route to mental lexicon, but actually measured what is *in* the lexicon.
• RT depended on availability of the target syllable? The more neighbours, the slower the response.
• Perhaps the French speakers only processed /ba/ without considering the /l-conn/ or /l-lance/, i.e. before co-articulation.
• Faster RT is not a consequence of syllable (mis)match.
Summary of Chapter 4

• Toddlers begin building up their mental lexicons at about 10 mos.
• Although not essential, early precursors of language include social interaction and environmental input.
• Nouns and verbs are the basic units of understanding meaning in objects and events.
• The order and meaning of nouns and verbs in a sentence require understanding of grammar (internal structures of a sentence).

Summary of Chapter 5

• The ability to organize and access the mental lexicon could be language specific.
• Adults use syllable-sized chunks as perceptual unit. But they rely on much finer detail to identify the word.
• Co-articulation helps French speakers more than English speakers.
• Research paradigm is questionable.

Review of Lecture 3

• 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 through phoneme or syllable
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
- Responses are finished even before the end of the presentation of the word → interpretation
- Response time correlates with distinguishable sounds within a word, e.g., slander

Access vs. Activated

Lexical Decision Task

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

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 → thin
- If acoustic mismatch deactivates the lexical candidate for recognition, how can we recognize a sentence?
- Context-sensitive tolerance
- Depending on what word follows thin: if *book* follows, then thin → thin. If *slice* follows, then thin → 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 $\rightarrow$ complex neural circuitries
• Lexical entries $\rightarrow$ 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
2. Prime “money” or “river”
Activation of Lexical Entries

- Confound with frequency? Bank with river is less frequently used as in bank with money.
- Low frequency entries → 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 word are activated.

Tanenhaus

- Tanenhaus: both verb and noun forms of a word are activated.
- 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 sound enters our ears, 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 sound. All this happens with context as a backdrop.

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?