PSYC 3290
Psycholinguistic

When letters combine:
Building words and constructing a mental dictionary

January 21, 2008

Today’s outline

• Continue from last lecture...
  – Administrative issues
  – Legality of syllable
  – Articles: what’s important?
• Research report
• Review of lecture 2
• Altmann’s Chapters 4 and 5

Legality of Syllables

• /upstu/ vs /utspu/
• Language-specific?

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Research report

• Due in 2 weeks, 3 pages MAX. doubled-spaced
• Choose an empirical article from the list or by yourself (let me know in advance)
• Answer these questions:
  1. What are the previous findings reported in the article?
  2. What is the major research question in the article?
  3. Describe the main experimental task(s).
  4. Describe the results pertaining to the research question identified in 2.
  5. What is the general conclusion?
  6. Suggest one future research direction.

Review of lecture 2

• Babies know more about language than we expected. Mostly, they comprehend the prosodic factors in language
• Babies can also differentiate between syllables and even phonemes.
• Phoneme perception can be illusory.
• Categorical perception is not specific to human and speech sounds. This ability is more likely to be auditory related.
• This ability predisposed babies to the concept of word boundaries.

Where do we stand now?

Sound  ───>

Meaning
How does baby manage to understand meaning?

• Children do not simply imitate.

• Language use and intention.

He must be hungry

This looks like something I can shake.

Ma... ma

Two research goals

• Acquisition of individual words
  → learn meaning in each word
  → enough to communicate?

• Combination of words to sentences
  → order of words
  → syntax
  → grammar

Learning words

Phonology: vocal play, canonical babbling
Lexicon: first word, word spurt, derivational/compound morphology
Grammar: length of word combination, question forms, grammatical morphemes
Communication: communicative purposes, conversation, narrative skills

Birth 12mos 24mos 36mos 48mos

Understanding One-word stage Producing word combination Experimenting with sentences
Reception vs. Expression
• Individual differences is larger in reception than in expression (or production)
• Performance in reception is usually better than expression
• Control of fine movements of the articulatory system
• Late talkers usually catch up at around 20 mos
• By 24 mos, individual differences in expressive performance level would be less apparent.
• Age does not explain the whole developmental picture of lexicon.

Gershkoff-Stowe & Hahn (2007)
• Half of 16-18 mos toddlers were given training on learning a set of unfamiliar objects. The other half received no training.
• Toddlers received training comprehended more words than their control peers at the end of the experiment.
• They also generalized laboratory training experience to acquiring the meaning of another set of low-practice stimuli.

What affects development in learning words?
• Environmental factors
  – Birth order → the need to express himself or herself
  – Speech environment → Social Economic Status (SES)
  – nutrition
• Biological factors
  – Brain development: synaptogenesis
  – Protomap and protocortex hypotheses
  – Motor control of lips, tongue, larynx...etc.
• Psychological factors
  – Cognitive processes: function of labels and reference
  – Pretend play
Moving word task
(Bialystok & Martin, 2003)

child-produced

Pretend Play
• Symbolic representation
• Using an object to represent another
  → Using language to represent meaning
• Vygotsky’s social approach of development
• Emotional attachment is precursor to language
• Follow rules and take on assigned role
• Interaction first introduced by adults (scaffolding), then representation becomes internalized → higher cognition
• Language and cognition
Acquiring Meaning

- Nouns predominate toddlers’ lexicon until about 3 years old
- Association? Not all the time…
- Then how?
- Intonation (or other prosodic factors) attracts toddlers’ attention → motherese
- But that’s not enough…
- How does the word associate with the furry animal and not just part of it?

Basic Research Paradigm

Concepts to be studied:
- Nouns – novel labels
- Verbs – novel action
- Using eye fixation time or embedding one object into another, researchers can also examine whether the toddler refers to the whole object or to parts of it.

Markman’s 80s studies

- Toddlers assume a novel word refers to a whole object, not just part of it.
- Mutual exclusivity of familiar label. If the name is familiar to the toddler (e.g., cup), then the novel label cannot refer to the object cup → it has to be either
  - Part of the familiar object; or
  - Another new object
Where do these assumptions come from?

- Primitive perceptual sensitivities → could be stemmed from associative learning, not necessarily related to language
- Associative learning: non human-specific ability to associate a certain response (label) to a certain stimulus (object or event)
- Theory of mind (ToM): the ability to understand (and communicate) another person’s intention and beliefs → dissociated interaction between mental and observable worlds.

ToM task

Nouns and Verbs

- Nouns are acquired earlier than verbs
- Nouns are observable in the physical world. Verbs may or may not be.
- Nouns refer to objects. Verbs refer to events that often involve more than one object.
Vocabulary

Spurt


Zorking

• Supplying food
• eating

Why important?

• “Zorking” is interpreted based on the structure of the sentence they hear and the structure in observable world
  → verb-learning is not one-on-one mapping
• Verb learning is acquired on the basis of a rudimentary knowledge of grammar.
• Noun and verb learning opens the door to describing mental world through language
  → mapping world structure to linguistic structure
Gertner, Fisher & Eisengart (2006)

- Toddlers (25 and 21 mos olds) spent more time looking at the matching condition.

Learning Grammar

- When about 50-100 words are acquired, children start to make meaningful combination
- Inflectional morphology: adding a morpheme to add more information to the meaning of a word
- Word order: “eat cookie”, but not “cookie eat”
- Chomsky: no rule is explicitly taught and children’s ungrammatical sentences do not get correction → innate ability
- Grammatical sentence production does not necessarily rely on grammatical sentence reception

Sequence of Syntactic Categories

The girl knew the language was beautiful.

det / n / v / det/ n / v / adj

The boy ate the pizza slept well

The bee read the news grew stupid
Internal Structure of a Sentence

- Constituents of the sentence:
  - subject
  - verb
  - object

Where does “grammar” come from?

- Genes? Pinker: crude innate knowledge about word types and their roles in language → universal to all languages
- Being sensitive to one thing does not necessarily imply innate structural knowledge of that thing
- Is this knowledge specific to linguistics or general cognition about the observable world?
- Deacon (1997): Innateness provides a convenient explanation for everything.

Non-innate Alternatives

- Morgan: There are cues as hints for the internal structures in sentences → prosodic structure
- Durational changes: slight lengthening of vowels before major boundaries of a constituent
- Pitch changes: fall before a boundary, rise after a boundary

The girl knew the language was beautiful.

Prosody can aid language learning.
Where does language come from anyway?

• The kind of language you learn is what you have been surrounded by.
• Critical period: 6-12 years (before puberty)
• Languages are created by human, e.g., creole
• Learning mechanism is not specific to speech, but also sign language.
• We are predisposed to learn (or create) language.

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 /ˈfɑːtʃəʊn/ vs foster /ˈfɒstər/
• 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* /wɜrm/ 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 *worb*  
\[ \begin{array}{c}
g\downarrow\text{faster} \\
g\downarrow\text{slower} \\
\end{array} \]
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 /-con/ or /-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.