Psych 156A/ Ling 150:
Psychology of Language Learning

Lecture 3
Sounds I

Quick Quiz 1
Will commence as soon as the quizzes are passed out.
15 minutes, open-note, non-collaborative.

15 minutes left

Quick Quiz 1
Will commence as soon as the quizzes are passed out.
15 minutes, open-note, non-collaborative.

5 minutes left
Quick Quiz 1

Will commence as soon as the quizzes are passed out.
15 minutes, open-note, non-collaborative.

1 minute left

Announcements

Reminder: Homework 1 is due this Thursday, 4/10/08. It must be handed in during class. Typed homework preferred for legibility reasons.

Lecture notes are also now available in black & white (with a white background).

New information on the web page: reference readings. Like the lecture notes, these will be posted after the class session.

Learning Sounds
Sounds of Language (Speech Perception)

Learner’s job: parse continuous stream of speech into sentences, clauses, words, syllables, and phonemes

\[
\text{big vs. dig}
\]

Phonemes are language-specific. \( /r/ /l \) is a phonemic contrast (changes word’s meaning) in English but not in Japanese.

Lisa = Risa for some of my Japanese friends.

Kids of the world require knowledge of phonemes before they can figure out what different words are - and when different meanings are signaled by different words.

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About Speech Perception

Important: Not all languages use the same sounds. Languages draw from a common set of sounds.

Child’s task: Figure out what sounds their native language uses. meaningful sounds in the language: “contrastive sounds” phonemic contrasts

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Acoustic-Level Information

Includes: timing and frequency
Tones: frequency
Acoustic-Level Information

Includes: timing and frequency
Tones: frequency (close-up)

Vowels combine acoustic energy at a number of different frequencies
Different vowels ([a] "ah", [i] "ee", [u] "oo" etc.) contain acoustic energy at different frequencies

Listeners must perform a 'frequency analysis' of vowels in order to identify them (Fourier Analysis)
Acoustic-Level Information

Language sounds
Female Vowels (close up)

Synthesized Speech

Allows for precise control of sounds
Valuable tool for investigating perception

Acoustic-Level Information

Language sounds
Timing: Voicing
Acoustic-Level Information

Language sounds
Timing: Voice Onset Time (VOT)

60 ms

English VOT production

Not uniform - there are 2 categories

Perceiving VOT

‘Categorical Perception’: /d/ vs. /t/

Decision between /d/t
Time to make decision
Discrimination

Same/Different
0ms  60ms

Why is this pair difficult?
(i) Acoustically similar?
(ii) Same Category?

Same/Different
0ms  10ms

Same/Different
40ms  40ms

Discrimination

A More Systematic Test

D 0ms  ⬤  20ms  D

D 20ms  ⬤  40ms  T

T 40ms  ⬤  60ms  T

Within-Category Discrimination is Hard

Cross-language Differences

R  L

R  L
Cross-Language Differences

English vs. Japanese R-L

Cross-Language Differences

English vs. Hindi
alveolar [d]
retroflex [D]

Human and Non-Human Perception

Perceptual biases shared with other animals:
Discriminate native language rhythm only when played forward, not backward

Categorical discrimination of some contrasts (ex: voice onset time "d" vs. "t")
Human and Non-Human Perception

Perceptual biases possibly shared with other animals:

- Preference for speech over acoustically matched non-speech sounds
- Sensitivity to cues that indicate word boundaries

(From cognitive neuroscience studies): unique cortical activation to forward speech vs. backward speech