



AUDITORY COGNITIVE SCIENCE SOCIETY

2007 Conference
January 8, 2007
University of Arizona






What is Auditory Cognitive Science?

Study of the representations and processes involved in the perception of complex signals, such as **speech, music and environmental sounds**.



Interdisciplinary:

Psychoacoustics	Cognitive Development	Evolutionary Biology
Auditory Neurophysiology	Audiology	Statistical Modeling
Speech Production	Speech Pathology	Comparative Perception
Speech Perception	Linguistics	Psycholinguistics
Music Cognition	Computational Modeling	



Comprehensive Approach

- Acoustic Structure
- Peripheral Encoding
- Processing in Midbrain
- Cortical Representation
- Informational analysis of behavior (Computational)
- Description of Information processing (Algorithmic)
- Neural Representation (Implementational)

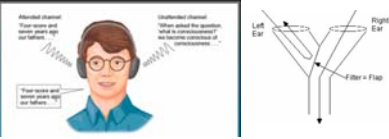
Auditory Cognition

- Extend the definition of audition – Erase the artificial perception-cognition boundary
- Auditory system doesn't end at phonetic processor or the phoneme
- In order to understand audition we need to consider:
 - Auditory representations interacting with lexical and linguistic representations
 - Effects of experience and learning
 - Attention



Audition was initially an important part of Cognitive Science

Early selective attention theories were largely based on shadowing:
E.g., Cherry (1953) Cocktail Party Effect; Broadbent (1958) Filter Model; Treisman (1960) Attenuation Model



George Miller prior to presenting the magic number seven worked on the perceptual confusion of speech sounds.

Claude Shannon's information theory; Chomsky – Skinner debate






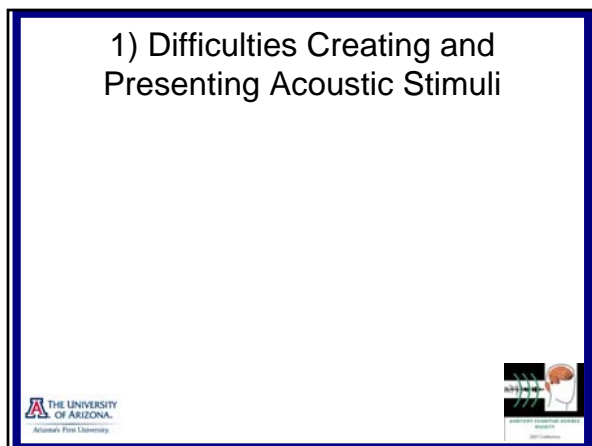
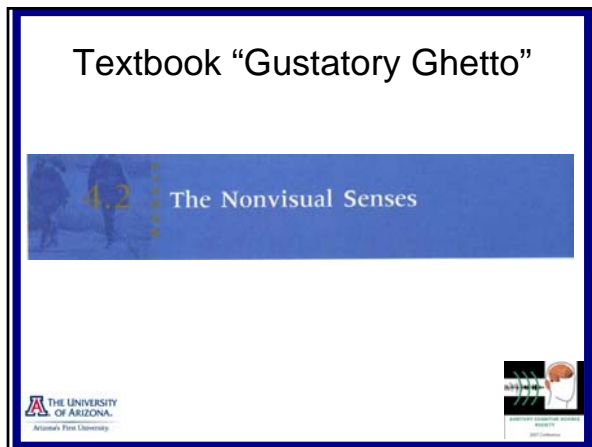
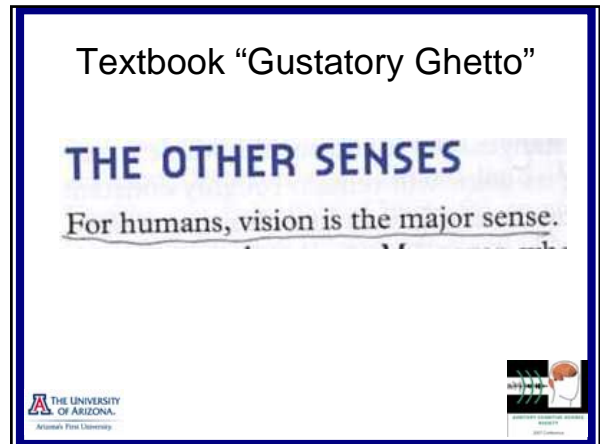
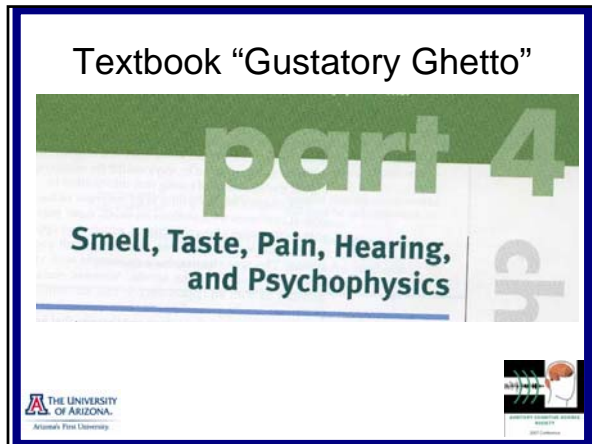
Visual Cognitive Science Hegemony

PsychInfo search
"Visual Cognition"
636 Entries

PsychInfo search
"Auditory Cognition"
18 Entries

Google Search on "Auditory Cognitive Science" – 6 entries



3) Auditory Cortex is not as accessible as Visual Cortex

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4) It is difficult to incorporate time into computational pattern recognition models

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5) Loss of Speech as a conceptual test bed

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1) Difficulties Creating and Presenting Acoustic Stimuli

- Basic soundcards exceed capacities of previous specialized presentation equipment
- Signal Processing Programs:
 - Praat
 - Adobe Audition (CoolEdit)

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2) Visual Illusions have been known for centuries

Phonetic Context Effects, Phonemic Restoration, Auditory Induction, Sine-Wave Speech, McGurk Effect

From Saberi & Perrott (1999)

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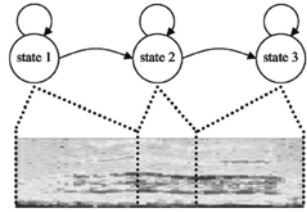
3) Auditory Cortex is not as accessible as Visual Cortex

Activation of the Auditory Cortex by Speech Sounds

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4) It is difficult to incorporate time into computational pattern recognition models

Dynamic Time Warping Hidden Markov Models



5) Loss of Speech as a conceptual test bed

Speech isn't special!
But you are.



Now is the time for an Auditory
Cognitive Science!



Schedule

9:30 – 9:45	Welcome and Introduction
9:45 – 10:15	Julie Liss , ASU: Speech and Hearing Science <i>Predicting Intelligibility from Auditory Cognitive Models</i>
10:15 – 10:45	Barbara Cone-Wesson , UA: Speech, Language, and Hearing Sciences
10:45 – 11:15	Lori Holt , Carnegie Mellon University: Psychology <i>Speech Perception Cognition</i>
11:15 – 11:45	Information about ACSS
11:45 – 1:00	Lunch
1:00 – 1:30	Rebecca Gomez , UA: Psychology <i>Adventures in Infant Language Learning</i>
1:30 – 2:00	Brad Story , UA: Speech, Language, and Hearing Sciences <i>Relation of Hierarchical Layers of Vocal Tract Structure and Movement to Speech Acoustics</i>
2:00 – 2:30	Yvonne Slinger , UCLA: Head and Neck Surgery <i>Lateral Asymmetry in the Peripheral and Central Auditory System</i>
2:30 – 3:00	Andrew Lotto , UA: Speech, Language, and Hearing Sciences <i>The Theory of Auditory Relativity</i>
3:00 – 3:30	Break
3:30 – 4:00	Glenis Long , CUNY: Speech & Hearing Sciences <i>Impact of Cochlear Nonlinearity on Perception</i>
4:00 – 4:30	Michael Dorman , ASU: Speech and Hearing Science
4:30 – 5:00	Free For All (or Why Brad is Wrong)

