Sensation & Perception

Guest Lecturer: Eswen Fava
Infant Music & Language Perception
October 30, 2008

What we'll be covering today...

• Introduction to infant hearing
  • Overview of infant language perception
  • Introduction to infant music perception
  • NIRS methodology in context
  • Example from masters data re: infant music perception

Hearing: Babies are good listeners

• Infants on higher side of freq thresholds (v. adults) - for noise
  • Infants discriminate between tones better than adults
  • Adults freq discrimination ~1%
  • Why?

Hearing: Beginnings of Language Perception

• Mom’s voice v that of other women?
  • Infant Directed Speech (IDS) AKA “Motherese”
  • Pitch contours

Babbling & Early Sounds

• Babies actively produce sounds from birth
  • Production of sound occurs in 4 stage process
  • ~6 mos, cultural differences in pre-speech begin to emerge
  • Exposure to speech necessary

Early Language Comprehension

• Categorical speech perception
  • Recognizing consonants
  • Infants' discrimination ability (specialized abilities) rapidly improves
  • ~6 mos lose ability to discriminate non-native language
  • Coarticulation (say “zip lip” and “back lip”)
  • Different speakers
Categorical Speech Perception

<table>
<thead>
<tr>
<th>Group 1</th>
<th>Group 2</th>
<th>Group 3</th>
</tr>
</thead>
<tbody>
<tr>
<td># bahs</td>
<td>60</td>
<td>10</td>
</tr>
<tr>
<td># gahs</td>
<td>10</td>
<td>60</td>
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<tr>
<td>perceived change</td>
<td>Y</td>
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Segmenting Fluent Speech

- 6 mos
- Segment fluent speech into separate words
- Stress patterns in words
- Pitch
- Pauses
- Made up languages

Hearing: Music Perception

- Infant preference: consonance / dissonance
- Rhythm preferences?
- Perception of melodies

Methods for Assessment:
Unlocking the secrets of babies’ sensory capabilities

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<th>CNS: Neurological anatomy</th>
<th>CNS: Single-cell &amp; intercellular physiology</th>
<th>CNS: Aggregated cortical electrical activation</th>
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CNS (Pros & Cons)

- Neurological anatomy
  - Presumption?
  - Problem?
- Single-Cell & Intercellular Physiology
  - “Trigger feature” (e.g., place cells in vision)
  - Limitations (3)?

CNS (Pros & Cons)
Optical Imaging: NIRS (Near-Infrared Spectroscopy)

- Presumption?
- Measure?
- Why useful?
Master's Experiment Introduction

• Classical music, like speech, uses pitch as a salient feature of its structure

• Infants may process music and language in a similar way because they possess many of similar qualities such as pitch, timbre, rhythm, tempo, and stress

• EEG and ERP research has generally demonstrated right temporal signals when adults (both expert and novice) and children are exposed to music

  • (in comparison with left lateralized signals when both populations are exposed to speech)

Master's Experiment Methods

• Infants 5-10 months in age (N=17)

• Infants wore a NIRS headband with bilateral probes on the T3 and T4 temporal areas from the 10-20 System

Master's Experiment: Results (Hemodynamic Functions)

Speech Trials

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The End... thanks for coming!

"bye!"