P6 Perceptual narrowing in speech and face recognition in infants: Domain-general vs. domain-specific mechanisms in attunement and its modification

Antonia Götz¹, Anna Krasotkina², Gudrun Schwarzer² & Barbara Höhle¹
¹Universität Potsdam, ²Justus-Liebig Universität Gießen

Neural correlates of perceptual narrowing in speech and face processing in infants and adults:

Research Question:
- Can neural discrimination of non-native speech and other-race faces be maintained in the absence of behavioral discrimination as suggested by Scott et al. (2006) for monkey faces and Rivera-Gaxiola et al. (2005) for speech at 9 months? And are these effects also maintained in adults?
- If perceptual reorganization is a domain-general process, we assume to find such residual neural evidence for speech and face processing.

Hypotheses:
- Speech perception: weaker neural mismatch response to a non-native compared to a native sound (Conboy & Kuhl, 2011)
- Face perception: weaker neural mismatch to other-race faces compared to same-race faces

Method

<table>
<thead>
<tr>
<th></th>
<th>Face</th>
<th>Speech</th>
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</thead>
<tbody>
<tr>
<td><strong>Participants</strong></td>
<td>24 German adults</td>
<td>29 German adults</td>
</tr>
<tr>
<td>31 German 9-month-old infants (n = 12 included in analysis)</td>
<td>28 German 9-month-old infants (n = 18 included in analysis)</td>
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<td><strong>Stimuli &amp; Paradigm</strong></td>
<td>Single Oddball</td>
<td>Double Oddball</td>
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<tr>
<td>Other-Race faces</td>
<td>Tone Deviant: Cantonese high-rising (T25) vs. mid-level tone (T33)</td>
<td>Vowel Deviant: /e/ vs. /i/</td>
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<tr>
<td>Same-Race faces</td>
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</tbody>
</table>

Results: Adults

Speech

- Mismatch Negativity for Tone and Vowel Deviants in adults; stronger neural response for vowels compared to tones

Face

- Mismatch response to deviants for both (same- and other-race) faces; reversed polarity for Asian vs. Caucasian faces

Preliminary results: Infants

Speech

- Standard vs. Tone Deviant
- Standard vs. Vowel Deviant

- In infants only mismatch response to tone deviant not to vowel deviant

Face

- Asian Standard vs. Asian Deviant
- Caucasian Standard vs. Caucasian Deviant

- Mismatch response is less clear compared to adults; data suggests different ERP pattern for Asian vs. Caucasian faces

Discussion:

- Adults show mismatch response to non-native tone contrast. This is in line with findings from our behavioral experiment (Götz et al., 2018)
- Adults show for both (same- and other-race) faces a mismatch response, but the other-race effect is manifested in a reversed polarity for Asian vs. Caucasian faces
- Preliminary results from infants provide evidence of neural maintenance of tone discrimination at an age where behavioral discrimination was not found (Götz et al., 2018)
- Preliminary results from infants’ face perception indicate a mismatch response to other-race as well as same-race faces; additionally the data suggest different ERP pattern for Asian vs. Caucasian mismatch responses (e.g., at CPz electrodes)
- Preliminary results from infant data may indicate residual neural evidence of non-native speech and other-race face perception

Research questions for second funding period:

Neural underpinnings of perceptual narrowing in speech and face perception using fNIRS

- Does perceptual narrowing between the ages of 6- and 9-months go along with changes in the brain regions that are activated during the processing of speech and faces?
- Comparing hemodynamic responses to the exposure to native or non-native speech or own- and other-race faces.

References:


