Primting effects of spoken and sung emotions on facial emotion recognition in congenital amusia (CA) and high autistic traits (HAT)

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Introduction

Sensitivity to subtle pitch changes plays a fundamental role in the decoding of emotional meaning in music 1 and speech prosody 2. Congenital amusia (CA) and autism spectrum disorder (ASD) are neurodevelopmental disorders with distinctive pitch processing profiles. While hypersensitivity to pitch variations in CA relates to mild impairments in processing prosodic 2 and musical emotions 2, hypersensitivity to pitch variations in ASD benefits the processing of emotional music and plays a seemingly compensatory role in processing emotional prosody 3.

Under a cross-modal affective priming paradigm, we examined how the distinctive pitch processing abilities of individuals with CA and high autistic traits influenced the use of auditory emotional cues in guiding facial emotion recognition.

Methods

Participants
- 12 Mandarin-speaking adults with congenital amusia (4 male)
  - Age: M = 23.58 years, SD = 1.93, range = 22-29
- 27 Mandarin-speaking adults with high autistic traits (6 male)
  - Age: M = 22.56 years, SD = 1.45, range = 20-25
- 36 Mandarin-speaking adults (8 male)
  - Age: M = 23.08 years, SD = 1.99, range = 20-30

Materials
- 64 facial, 64 face-like objects, 16 spoken and 16 sung stimuli obtained from the RAVDESS database 4 and from the book faces 5.
- All stimuli were validated by 20 judges and received an overall average recognition rate of 0.86 (SD = .12).

Procedure

Cross-modal emotion priming - Participants identified emotions in faces or face-like objects (targets) after hearing a spoken or sung word (primes) with either congruent or incongruent emotions.

Simple emotion recognition - Participants identified emotions from the four stimulus types in the absence of priming.

Results

Simple Emotion Recognition

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group x Condition</td>
<td>x^2(6) = 32.22, p &lt; 0.001</td>
</tr>
</tbody>
</table>

Cross-modal Emotion Priming

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Target x Type</td>
<td>x^2(1) = 4.68, p = 0.030, Congruency, x^2(1) = 12.65, p &lt; 0.001</td>
</tr>
<tr>
<td>Prime Type x Congruency</td>
<td>x^2(1) = 17.82, p &lt; 0.001</td>
</tr>
<tr>
<td>Group x Target Type</td>
<td>x^2(2) = 31.69, p &lt; 0.001</td>
</tr>
<tr>
<td>Group x Target Type x Congruency</td>
<td>x^2(2) = 13.18, p = 0.001</td>
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</tbody>
</table>

Discussion

Summary
- The amusic group was less accurate at recognising objects and song than faces.
- The amusic group was also less accurate at recognising objects compared to the HAT and control groups.
- Both spoken and sung cues were integrated during facial and object emotion recognition in the control group.
- Both spoken and sung cues were integrated during object but not facial emotion recognition in the amusic and HAT groups.

Take home message
- The use of pitch as an auditory emotional cue depends on the orientation and proficiency with the visual target.
- The effects of pitch information on visual emotion recognition are generalised across different auditory domains.

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References