Sex Differences in Gray Matter Correlates of Finger Gnosis

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Introduction

Finger gnosis (sense) is ability to identify and individuate fingers

Gerstmann’s Syndrome show impairments in: (1) finger gnosis
(2) ability to differentiate hands
(3) writing (4) arithmetic

Finger gnosis correlated with number skills and arithmetic

Related in 9-12-year-old children
Not related in 5-8-year-old children

What is the developmental trajectory of this relationship and associated neural correlates?

Methods

- Finger Gnosis Test
  
<table>
<thead>
<tr>
<th>EVENT ORDER</th>
<th>EVENT DESCRIPTION</th>
<th>NUMBER OF TRIALS</th>
<th>POINTS POSSIBLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Participants are shown tasks</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Phase 1: One finger touched with pointer</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>Phase 2: Two fingers touched with pointer</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Scores normalized between 5 to 10 correlated with gray matter volume (MRI)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PARTICIPANTS (N = 46)

  n = 23 7y-10y male children
  n = 23 7y-10y female children

Results

- Finger Gnosis & GMV Correlations

Conclusions

Gray matter volume of frontoparietal and cerebellar networks may be crucial for finger gnosis development

Development of finger gnosis appears to be sexually dimorphic

FEMALES

  Left Cerebellum
  Rectal Gyrus
  Right Frontal Gyrus
  Left Precuneus
  Right Postcentral Gyrus
  Left Precentral Gyrus

Difference could be connected to spatial ability, also sexually dimorphic

Future Directions

Design a finger gnosis test that is consistent across age groups

Connectivity study linking structural and functional neural correlates

Experiment that correlates finger sense and numerical ability:
  - Finger Gnosis task
  - Different math skill tasks

References


