Theory of Mind in ASD, SLI, & Hearing Impairment Groups

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What is Theory of Mind (ToM)?

• ToM is the understanding that:
  – other people experience thoughts and emotions that differ from one’s own
  – these thoughts and emotions may cause others to act differently than one might act
Purposes

To determine:

• the efficacy and efficiency of 4 different types of ToM tasks for 5 groups of children

• patterns in ToM performance in 5 groups of children

• Identify potential clinical applications for different manifestations of deficits in ToM
## Participants

<table>
<thead>
<tr>
<th>Group</th>
<th>n (b, g)</th>
<th>M age</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASD</td>
<td>7 (5, 2)</td>
<td>8;7</td>
</tr>
<tr>
<td>SLI/LD</td>
<td>7 (5, 2)</td>
<td>8;5</td>
</tr>
<tr>
<td>Hearing Impairment</td>
<td>7 (3, 4)</td>
<td>8;1</td>
</tr>
<tr>
<td>Typically-developing preschoolers</td>
<td>10 (5, 5)</td>
<td>5;1</td>
</tr>
<tr>
<td>Typically-developing school-age children</td>
<td>9 (4, 5)</td>
<td>8;4</td>
</tr>
</tbody>
</table>
Research Question 1

• Does theory of mind performance vary as a function of group for the following:
  – School-age children with ASD
  – School-age children with hearing loss
  – School-age children with SLI
  – School-age (same-age) typically-developing peers
  – Preschool-age (younger), typically-developing peers
Research Question 2

• Does group performance vary as a function of theory of mind task?
  –false belief task
  –eye direction/facial expression task
  –intentionality task
  –narrative
## Data Analysis

<table>
<thead>
<tr>
<th>Task</th>
<th>Data in the form of…</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intentionality task (monkey)</td>
<td>Correct/Incorrect (1 or 0) for 2 trials</td>
</tr>
<tr>
<td>Eye direction</td>
<td>Correct/Incorrect</td>
</tr>
<tr>
<td>Emotion interpretation</td>
<td>% correct out of 10</td>
</tr>
<tr>
<td>False belief (quarter task)</td>
<td>Correct/Incorrect (verbal and/or nonverbal)</td>
</tr>
<tr>
<td>Narrative-based perspective-taking composite</td>
<td>% story grammar elements related to perspective-taking (internal response+consequence+reaction/total SG elements)</td>
</tr>
</tbody>
</table>
Eye Direction Detection Task Procedure

Point to the cartoon face that is “looking at you.”
Interpretation of Emotions through Facial Expressions Task

“Point to the boy who looks like he is ______.”
False Belief Task Procedure

Quarter Hiding Game:
• Child seated opposite two adults
• Told that if she finds the quarter, she gets to keep it
• Nonverbal Portion
  – Used to evaluate children with SLI and HI fairly
• Verbal Portion
Intentionality Task Procedure

“Mean Monkey”

- Child presented with desired and undesired snack
- Told that Mean Monkey would always steal the snack that she said she wanted, and she would keep the remaining snack
Narrative

• While other ToM tasks examine an individual’s receptive proficiency, a narrative task is an expressive measure.
• The analysis of this task examines how children talk about events that relate to others’ perspectives.
Eye Direction Detection Results

Percent of Children who Answered Correctly

- ASD
- SLI
- HI
- TD 4-6
- TD 6-10
Interpretation of Emotions through Facial Expressions Results

Percent of Children who Answered Correctly

- ASD
- SLI
- HI
- TD 4-6
- TD -10
False Belief Task Results

Percent of Children who Answered Correctly

Nonverbal

Verbal

ASD

SLI

HI

TD 4-6

TD 6-10
Intentionality Results

Percent of Children who Answered Correctly

Trial 1
Trial 2

ASD
SLI
HI
TD 4-6
Narrative Task Results

Percent ToM Story Grammar Elements

- ASD
- SLI
- HI
- TD 4-6
- TD 6-10
Discussion

• Eye Direction Detection:
  – ASD and preschool groups had difficulty with this task, relative to HI and SLI peers
  – This measure may be age-related, eye contact and perspective-taking deficits may explain ASD group’s performance

• Facial Expressions:
  – ASD and HI groups had the most difficulty with this task
    • Perspective-taking and semantic deficit explanations
Discussion

• False Belief
  – ASD: performed better on the nonverbal aspect of the task
  – SLI & HI groups: performed better on the verbal part of the task

• Intentionality
  – required understanding of complex syntax
  – Performance improved for all groups on second trial, and HI and SLI groups improved considerably
Discussion

• Narrative:
  – Relative to TD 6-8 and ASD peers, SLI, HI, and TD 4-6 used proportionately fewer story grammar elements potentially related to ToM

• Flaws of study
  – Small n size
  – 2 HI participants tended to have outlying performance (may have more pervasive deficits beyond hearing; did not control for IQ)
Clinical Implications

- It may be important to consider associated skills of various ToM tasks in intervention
  - False belief and intentionality tasks may require advanced understanding of syntax
  - Focusing on objects vs people for the false belief task

- Performance on intentionality task improved from trial 1 to trial 2 for all groups, suggesting that such skills may improve with direct focus in intervention
Future Directions

• ToM profiles differed between disordered groups, but not always in expected ways, based on previous research
• Continue to understand how skills such as theory of mind may be similar or different between different groups of children with disorders
• Find new ways to address ToM directly in intervention contexts by considering requirements of descriptive/assessment tasks
Selected References


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