Innovations in Theory of Mind Assessment & Intervention for Children with ASD

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Overview of the Afternoon

What
- Define theory of mind (ToM)
- Describe several tasks that can be used to assess ToM
- Identify strategies that support the perspective taking of children and adolescents with ASD

How
- Present key procedures for selected assessments & interventions
- Apply assessment results to intervention planning
- View several video clips of assessment and intervention procedures

Why
- Increase awareness of the importance of ToM assessment
- Provide emerging evidence for ToM interventions
Social Attribution Task (SAT)

Attributing social meaning to ambiguous visual stimuli (Klin, 2000)

- Individuals with ASD narrate the cartoon animation (SAT)
- Results indicate that individuals with ASD identified only about 1/4 of the social elements & 1/3 of attributions were irrelevant to the social plot
Theory of Mind: What is it?

- Generally => ability to take on another’s perspective; ability to attribute mental states to individuals other than self (Altable et al., 2009)
  - Narrow view => acquisition of false belief understanding
  - Broader view => synonym for social cognition
    (Astington, 2005)
Theory of Mind: Multifaceted

Meta-representation
Pretence
Ability to deceive
Mental–physical distinction
Appearance –reality distinction
Seeing leads to knowing
Causes and consequences of feeling/knowing

Visual perspective-taking
Affective recognition
Empathy
Comprehension of mental state terms and speech acts
Understanding sarcasm
Counterfactual reasoning
Second-order thinking
Intentionality
The Smarties task is frequently used to study preschoolers’ theory of mind. Most 3-year-olds answer like the child in the cartoon, which suggests that they fail to realize that other people may have false beliefs that deviate from what the child knows to be true.
Challenges for children & adolescents with ASD

- Establishing joint attention & playing symbolically
- Recognizing and understanding emotions
- Adjusting one’s behavior to accommodate a situation
- Planning one’s own behavior & recognizing the plans of others
- Predicting behavior
- Inferring mental states (Example of terms-next slide)
  - Children with ASD less likely to talk about mental states of characters in px/stories (Baron-Cohen et al., 1986)
Mental-State Words

Think
Know
Jump
Dream
Pretend
Eat
Hope
Wish
Move
Imagine

By 4 years children can pick out words from a list that tell what goes on in the mind.

(Baron-Cohen, 1992)
Challenges for children & adolescents with ASD

- **Writing narrative & expository text** (Brown & Klein, 2011)
  - Adults with HFASD write lower quality narrative & expository texts, & shorter narratives
  - ToM positively associated with writing quality & text length across genres

- **Oral narratives** (Loveland & Tunali, 1993; Tager-Flusberg, 1993)
  - Difficulty understanding listener’s knowledge & affective states
  - Limited awareness of characters’ thoughts or affective states
  - Problems recognizing character goals in stories
Challenges for adolescents & adults with ASD

- Using narratives & communication games
  (Begeer et al., 2010)
  - Adolescents & adults with & without ASD with typical intellectual development
  - Heard a narrative & retold it
    - Those with ASD used fewer mental state terms in story narration => poorer ability to represent interactions in mentalistic terms
  - Played a communication game requiring them to take into account another’s perspective
    - Those with & without ASD showed similar performance, so a systematic ToM deficit seems unlikely => more research needed
Challenges for children & adolescents with ASD

- Understanding deception
- Recognizing false beliefs (Examples next 2 slides)
  - Children with ASD with an MA above 4 years failed the Sally & Ann task when children with Down Syndrome of the same age were successful (Sodian & Frith, 1993);
  - Children with ASD do poorly on these tasks because of their poor cognitive capacity to represent internal beliefs, feelings & thoughts of others (Mundy, Sigman & Kasari, 1993)
The Sally-Anne task is usually administered using puppets or dolls. Like all False Belief tasks it requires the child to take the perspective of another, and to answer questions based on what the other person knows.

1) Sally plays with her ball, puts it in a basket. 2) Then she leaves.
3) Anne moves the ball to a box. 4) Where will Sally look for it?

Where does Anne think Sally will look for the ball?
The ability to infer one person’s mental state. In this case, the child recognizes that Little Red Riding Hood *thinks* that it is her grandmother in the bed, but the child knows it is really the wicked wolf.

Typically developing children recognize this by 4 yrs; MA matched children with autism instead report what they themselves know; may pass it at older MA
Assessment Tasks

- Physical-Causal Story task
  - Context=>show 4 px sequence of child tripping over a rock
  - Questions to ask:
    - What happened?
    - Put these pictures in order to tell the story
    - Why did this happen?
Assessment Tasks

- Eye Gaze task:
  - Context
    - Give child px of a person looking at you & away from you
    - Show child px of face & 4 candy bars
  - Questions to ask:
    - Which person is looking at you?
    - Which candy bar will Charlie choose?
Assessment Tasks

Shared Attention task:

- Context
  - Give child toy car
- Questions to ask:
  - Make the car so I can see it
  - Make the car so I can’t see it
  - Children with ASD have difficulty hiding the car
Assessment Tasks

- Determining expression task:
  - Context
    - Give child px of people who are thinking
    - Give child px of people with different facial expressions
  - Questions to ask:
    - Which one is thinking?
    - Match the people who feel the same.
    - How do they feel?
    - Children with ASD identify thinking expressions & basic feelings; have difficulty with surprise & interpreting reasons for feeling
Assessment Tasks

- Seeing is Knowing task:
  - Context
    - Show child px of 2 girls & a box, explain that one is touching the box & one is looking in the box
  - Question to ask:
    - Which one knows what is in the box?
    - Children with ASD understand seeing but not knowing
Mental-Physical Distinction

Which girl can feed the dog? Which girl can change the size of the dog? Easily passed by 3 years, but older mental-age matched children with autism failed the task.
Deception task:

Context
- Give child a penny

Question to ask:
- Ask child to hide the penny in one hand
- Children with ASD hide object but leave visible clues
Appearance-Reality Distinction

What is this?

A candle shaped like an apple

By 4 years children can identify objects by their dual identity. Children with autism could only name one identity. (Flavell et al. 1986)
Tests of ‘Advanced’ ToM

Designed to assess social cognition in those with HFA & Asperger syndrome

Some well known tests include

- The ‘Reading the Mind in the Eyes’ Test
- Strange Stories
The “Reading the Mind in the Eyes” test
(Baron-Cohen, Wheelwright, Hill, Raste, & Plumb, 2001)
Ann’s mother has spent a long time cooking Ann’s favorite meal; fish and chips. But when she brings it in to Ann, she is watching TV, and she doesn’t even look up, or say thank you. Ann’s mother is cross and says, “Well that’s very nice, isn’t it! That’s what I call politeness!”

Comprehension question: *Is it true, what Ann’s mother says?*

Justification question: *Why does Ann’s mother say this?*
The Animated Theory of Mind Inventory for Children (ATOMIC) 
(Beaumont & Sofronoff, 2008)

- Computerized measure designed to examine ToM of children with Asperger Disorder
  - Includes a scale assessing central coherence (5 items) & its relationship to ToM (12 items)
  - 18 cartoons (1 practice & 17 test items)
  - Represents characters’ complex emotions
  - Displays items with a variety of child, adolescent & adult themes
The ATOMIC: ToM Scenario (Beaumont & Sofronoff, 2008)

Primary school students are running in a race. One student, Jane, narrowly wins the race over a second student, Amanda. At the end of the race, Jane congratulates Amanda on having run a good race. Amanda says to Jane in a jealous tone of voice, “I don’t care that you won. I didn’t really try that hard, anyway.”

QUESTION: How was Amanda MOST likely to be feeling when she said, “I don’t care that you won. I didn’t really try that hard, anyway?”

Who won the race?

a. Jealous    a. Amanda
b. Angry      b. Jane
c. Sad        c. Amanda & Jane tied
d. Unconcerned d. Another competitor
A beach scene is shown with waves crashing on the shore, & several people dressed in swimwear playing & lying on the beach. One man is pictured wearing a jumper, long pants, a woolen hat & a scarf.

**QUESTION:** Was there anything that looked out of place?

a. Yes, clothing that man was wearing  
b. Yes, sunglasses that man was wearing  
c. Yes, some people were wearing hats & others were not  
d. No, everything in the scene looked normal

**What was the weather like?**

a. Cloudy & raining  
b. Sunny & windy  
c. Sunny with clouds in the sky  
d. Sunny with no clouds in the sky
Limitations of Traditional ToM Assessments

Influenced by cognitive & linguistic factors
- Almost always require a verbal MA of about 4 years

Influenced by motivational & situational factors

Limited in content coverage
Most suffer from ceiling effects

Questionable social validity

Mode of presentation differs & can influence results  
(van Buijsen et al., 2011)
“Interest in people with high-functioning autism can obscure the fact that most people with the disorder have moderate to severe learning difficulties. In classic autism this may be about 75%, and more than half of those affected develop no appreciable language. This means that theory of mind deficits in autism have only been examined in a fraction of sufferers; typically experiments include only children with verbal mental ages of above 4 years” (Doherty, 2010).
Two ToM Tools Developed at UVM

Theory of Mind Task Battery  (Hutchins & Prelock)
Theory of Mind Inventory  (Hutchins, Prelock & Bonazinga)
Direct measure of child performance

16 questions within 9 tasks
Arranged in ascending difficulty
From basic facial expression recognition to complex 2nd order false beliefs
Previously named the *Perceptions of Children’s Theory of Mind Measure* (PCToMM; Hutchins, Bonazinga, Prelock, & Taylor, 2008)

Now a 47 item parent-report measure

Items designed to tap all
mentioned ToM dimensions

Website can be used to

- Access information about reliability and validity
- Generate reports (subscale, composite scores, percentiles)
- Allow parents to use the tool=>password is tomi2011
<table>
<thead>
<tr>
<th>ToM Component</th>
<th>Example Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pretence</td>
<td>My child can pretend that one object is a different object (for example, pretending a banana is a telephone).</td>
</tr>
<tr>
<td>Ability to deceive</td>
<td>My child understands that people can lie to purposely mislead others.</td>
</tr>
<tr>
<td>Mental–physical</td>
<td>My child understands that when someone is thinking about a cookie, they cannot actually smell, eat or share that cookie.</td>
</tr>
<tr>
<td>distinction</td>
<td></td>
</tr>
<tr>
<td>Intentionality</td>
<td>My child understands whether someone hurts another on purpose or by accident.</td>
</tr>
<tr>
<td>Empathy</td>
<td>My child is able to put himself/herself in other people’s shoes and understand how they feel.</td>
</tr>
<tr>
<td>ToM Component</td>
<td>Example Item</td>
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<tr>
<td>-------------------------------</td>
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</tr>
<tr>
<td>False beliefs</td>
<td>If I put my keys on the table, left the room, and my child moved the keys from the table to a drawer, my child would understand that when I returned, I would first look for my keys where I left them.</td>
</tr>
<tr>
<td>Idiomatic language</td>
<td>If I said “Let’s hit the road!” my child would understand that I really meant “Let’s go!”</td>
</tr>
<tr>
<td>Certainty</td>
<td>My child understands that when someone makes a ‘guess’ it means they are less certain than when they ‘know’ something.</td>
</tr>
<tr>
<td>Speech acts</td>
<td>My child understands that when a person promises something, it means the person is supposed to do it.</td>
</tr>
<tr>
<td>Visual perspective-taking</td>
<td>My child understands that if two people look at the same object from a different standing point, they will see the object in different ways.</td>
</tr>
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<td>Example Item</td>
</tr>
<tr>
<td>-------------------------------</td>
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</tr>
<tr>
<td>Affect-based behavior</td>
<td>My child understands that when someone says they are afraid of the dark, they will not want to go into a dark room.</td>
</tr>
<tr>
<td>Seeing leads to knowing</td>
<td>My child understands that to know what is in an unmarked box, you have to see or hear about what is in that box.</td>
</tr>
<tr>
<td>Mental state terms</td>
<td>My child understands the word ‘think’.</td>
</tr>
<tr>
<td>Sarcasm</td>
<td>If it were raining and I said in a sarcastic voice “Gee, looks like a really nice day outside,” my child would understand that I didn’t actually think it was a nice day.</td>
</tr>
<tr>
<td>Counterfactual reasoning</td>
<td>My child understands the word ‘if’ when it is used hypothetically as in, “If I had the money, I’d buy a new house.”</td>
</tr>
<tr>
<td>ToM Component</td>
<td>Example Item</td>
</tr>
<tr>
<td>-------------------------</td>
<td>------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Humor</td>
<td>If I said “What is black, white and ‘read’ all over? It’s a newspaper!” my child would understand the humor in this play on words.</td>
</tr>
<tr>
<td>Shared attention</td>
<td>My child is able to show me things.</td>
</tr>
<tr>
<td>Affective recognition</td>
<td>My child understands that, when I show fear, the situation is unsafe or dangerous.</td>
</tr>
<tr>
<td>Second-order thinking</td>
<td>My child understands that people often have thoughts about other peoples’ thoughts.</td>
</tr>
</tbody>
</table>
Response Arrangement

20-unit continuum with the following anchors:

Definitely   Probably    Undecided  Probably   Definitely
Not       Not

4.6
Scores

Summed and averaged
Range 0-20
Higher values reflect greater ToM competence
Psychometric Evaluation: Sample Characteristics

ASD (n = 135)

Ages 2 – 17 (M = 10)

Diagnosis
- Autistic Disorder = 52%
- PDD-NOS = 22%
- Asperger Syndrome = 21%
- Other = 5%

Language Level
- Nonverbal = 15%
- Limited speech = 18%
- Verbal = 67%

TD = (n = 124)

Ages 2 = 12 (M = 7)

All (50% males; 50% females) were native English speakers
No history of disability including uncorrected visual or hearing impairment
Psychometric Evaluation:
Sample Characteristics

Race/Ethnicity
- Asian = 2.1%
- African American = 6.4%
- Hispanic Latino = 7.8%
- White = 79.4%
- Other = 4.3%

SES: $Md = $65,000$

Education: $M = 15.5$ years

Respondents represented 14 states
- All major regions represented
- Urban, suburban, and rural communities represented
Psychometric Evaluation

Test-retest reliability (14 – 70 days)

- \( r = .89, \ p < .01 \)

Internal consistency: \( \alpha = .98 \)

Scores for the ASD sample significantly lower \( (M = 10.8) \) than typically developing sample \( (M = 15.6), \ p < .01 \).
Typical Sample

Mean ToMI Score vs Age (Years)

- Factor 1
- Factor 2
- Factor 3

Age (Years)

- 2 - 3 n = 7
- 3 - 4 n = 20
- 4 - 5 n = 14
- 5 - 6 n = 12
- 6 - 7 n = 13
- 7 - 8 n = 10
- 8 - 9 n = 14
- 9 - 10 n = 13
- 10 - 11 n = 9
- 11 - 12 n = 5
- 12 - 13 n = 4

Scores:
- Factor 1: 16.3 (1.4), 16.5 (2.2), 16.6 (2.4), 18 (1.3), 18.1 (1.7), 16.5 (1.8), 18.8 (0.7), 18.4 (1.2), 18.5 (1.5), 18.5 (1.5), 18.1 (1.2), 18.2 (2.4)
- Factor 2: 11.2 (2.4), 9.2 (2.4), 11.9 (3.3), 13.4 (2.9), 13.5 (2.9), 17 (2.1), 17 (2.1), 17 (4.8), 17 (4.8), 17 (2.1), 17 (2.1), 17 (4.8)
- Factor 3: 19.3 (1.3), 19.4 (1.3), 19.5 (1.3), 20 (2.3), 19.8 (1.2), 19.8 (1.2), 19.9 (1.2), 20 (2.3), 19.9 (1.2), 19.9 (1.2), 20 (2.3), 19.9 (1.2)
ASD Sample

Mean ToMI Score

Age (Years)

- Factor 1
- Factor 2
- Factor 3
ASD and Typical Sample

Mean ToMI Score

Age (Years)
ASD Sample: 
ToMI by receptive vocabulary

![Bar chart showing Mean ToMI Score]

- Limited language: 7.67
- Normal range: 12.02
- Language precocious: 17.37
Psychometric Evaluation

For ASD sample, ToMI correlated with:

- **ToM Task Battery** (Hutchins, Prelock, & Chace, 2008)
  \[(r = .66, p < .01)\]

- **Peabody Picture Vocabulary Test-4** (Dunn & Dunn, 2007)
  \[(r = .73, p < .01)\]
Psychometric Evaluation

Factor Analysis

- Factor 1 ~ Advanced ToM: Complex Recursion, Mind as Active Interpreter and Social Judgment (16 items)
- Factor 2 ~ Basic ToM: Metarepresentation and Developmentally Related Understandings (19 items)
- Factor 3 ~ Early ToM: Reading Affect and Sharing Attention
ToMI and Response to Parental Distress:

Our most recent efforts to validate the ToMI involve comparisons of ToMI scores to observations of children’s behavioral responses to parental distress.
K.F.

15-year-old male diagnosed with Autistic Disorder
Enjoys video games, American History, science and sports
Verbal (uses language in a variety of ways to communicate with others)
ToNI-4 = 80 (9\textsuperscript{th} %)
PPVT-4 = 75 (5\textsuperscript{th} %)
ToMI score = 9.04
(see report form)
J.M.

8 year old male diagnosed with Autistic Disorder
Enjoys trains, snuggling, and Disney movies
Nonverbal
ToNI = 101 (52\textsuperscript{nd} %)
PPVT-4 = 54 (1\textsuperscript{st} %)
ToMI score = 10.13
(see report form)
S.L.

11 year-old male diagnosed with Autistic Disorder
Enjoys cars, videos, and interacting with peers
Verbal (uses language in a variety of ways to communicate with others)
TONI-4 = 87 (19%)
PPVT-4 = 78 (7th %)
ToMI score = 12.1
(see report form)
J.D.

17 year old male diagnosed with PPD-NOS
Enjoys music, the computer, and creating works of art (wind chimes)
Limited speech (uses meaningful 2-3 word phrases on a regular basis)
ToNI-4 = 90 (25th %)
PPVT-4 = 54 (1st %)
ToMI score = 13.46
(see report form)
S. N.

12.7 year old male diagnosed with Asperger’s
Enjoys science & the computer
Has OCD tendencies
ToNI-4 = 100 (50\textsuperscript{th} %)
PPVT-4 = 126 (96\textsuperscript{th} %)
ToMI score = 15.74
(see report form)
ToMI: Connections to Practice

Create profiles of social cognitive strengths & challenges

Used in conjunction with other measures

Identify potential intervention targets

- Consider factors (subscale scores) to establish areas of intervention focus
  - Early Emerging ToM: Reading Affect & Sharing Attention
  - Basic ToM: Developing Metarepresentation
  - Advanced ToM: Complex Recursion, Mind as Active Interpreter & Social Judgment
ToMI: Connections to Practice

Look within subscales to identify specific areas of strength/weakness to guide treatment planning

Identify general developmental level to select appropriate treatment program
KF Report: What to do next?

Early => 12.86 (some challenge with affect recognition related to early perspective taking)

Basic => 10.64 (overall start here)

Advanced => 5.15 (not yet ready for this)

Possible interventions: social stories and comic strip conversations related to emotions, false beliefs, deception; emotions library
JM Report: What to do next?

**Early**=>13.30 (some challenge with intentionality)

**Basic**=>10.55 (overall start here)

**Advanced**=>7.76 (not yet ready for this)

Possible interventions: social stories focused on perspectives of others, emotions & use of mental state terms; *emotion library*
SN Report: What to do next?

Early=>16.71
Basic=>14.84 (overall start here)
Advanced=>15.38 (can move to this)

Possible interventions: comic strip
conversations focused on emotions, pretense, & deception
ToMI: Conclusions

- Administration is not complicated by child memory, linguistic, cognitive & motivational factors
- Appropriate for individuals with ASD (even those with the most limited language)
- Quick and easy to administer and score
- Does not suffer from ceiling effects (ASD) or practice effects
- Good evidence for reliability and validity
- Can be used to guide treatment planning
Strategies to Support ToM

Comic Strip Conversations & Social Stories™

- Make explicit what others are thinking
- Translate the ‘secret code’ involved in social interaction into ‘practical, tangible information’ (Gray, 1998)
- Help children inform, advise and reflect upon social situations from a person’s actual experience by visually presenting the information
CASE EXAMPLE: Learning about Zach & his Family

Interview
- Asked to reflect on problem behaviors, communicative challenges & perspective taking deficits
- Theme emerged: defiant & aggressive behavior when things don’t go ‘Zach’s way’

Record Review
- 5 year old with ASD
- V & NV IQ=>1 SD below Mean

ToM Assessment =>ToMI and a ToM task battery indicated:
- Early Emerging ToM competencies were developing (e.g., identifying emotions)
- Basic and Advanced ToM skills not yet demonstrated (e.g., false belief, seeing leads to knowing, second order reasoning)
CASE EXAMPLE: Learning about Zach & his Family

Intervention Individualized
- Considered Zach’s aggressive behavior, its frequency & explosiveness
- Sought to promote Zach’s understanding of the causes & consequences of his own & others’ mental states to change behavior

Zach’s Social Story
- Descriptive sentences to provide information about context
- Perspective sentences to explain causes & consequences of his behavior (*It makes my mom & dad sad when I throw a fit.*) including ‘thinking’ sentences (*They might think, ‘I wish we could make Zach happy.’*)
- Directive sentences to offer more socially acceptable behavior (*If I get mad or disappointed, I can use my words to talk to my mom & dad.*)

Zach’s Comic Strip Conversation
- Talking & thinking bubbles used to revisit a recurring problem, highlighting what people do, say, and think
Social Story Research (Prelock & Hutchins, 2006)

HOME Based (3 tx/week)
Immediate intervention group
Wait intervention group

3 Stories
Behavior
Communication
Perspective taking
Social Story => Outcome Measures

- Theory of Mind Inventory
- Theory of Mind Task Battery
- Communication skills
- Daily Diaries
"Hey, let's play in the water."

(Victoria)  (Mom)  (Sister's name)
I'd like to swim by myself.

I would like to play for a while and then I will stop.

I'd like to play all day long.

I just want to lay in the sunshine.

We'd like to get out of the water. We're done.
Victoria: I'm going to cry, I just know it. I'm upset.

Victoria: Not okay.

Mom: If Mom [NAME] want to stop for now, that's O.K.
"Thanks for playing in the water today. It was fun!"

(Sister's Name)  (Victoria)

It makes me so happy when I see Victoria trying to understand other's feelings.

Mom
HOME

I hate everything you do, I hate you.

I hate you, too.

I am sad that Timothy said he doesn't like me.

Timothy

Name
I am so mad, I just want to give her a time out.

I am mad because you switched me.

I want that toy.

I want to play with that toy.

Timothy

Name
Timothy: Please share, don't play with my toys.

Name: OK.

I don't know how to tell Timothy that I want that toy. I need my picture book.
I feel nice because she used her words instead of scratching me.

Tommy asked me nicely, I like it when Timothy uses my words.

Timothy

plead don't scratch me again.

Okay Timothy

Name
confidence that targeted prob

BASELINE

INTERVENTION

FOLLOW-UP

Perspective-taking SS:
When a friend tries to help

Communication SS:
How to tell people what I'm feeling

Behavior SS:
Getting dressed in the morning

Day (*story read)
New Research (Hutchins & Prelock, 2010)

50 participants
2 to 17
3 conditions
- CSC
- SS
- SS + CSC

ToM, affective task, video analysis, etc. used to assess learning
Training ToM (Fisher & Happe, 2005)

- Rules for thinking about beliefs (‘photos in the head’):
  - When a person sees something, they have a thought in their head--picture
  - Thought pxs can stay in person’s head & used to look for things
  - Different people have different thought pxs
  - Sometimes thought pxs can be out of date
  - Thought is like a thought px, only we can’t see it
Theory of Mind Training
(Gevers et al., 2006; Steerneman et al., 1996)

Manualized treatment

- 16 weekly sessions, 90 minutes each
- 5-6 children at a time, age within 3 years of each other
- Parents joined last 15 minutes to brief on assignments for next meeting on how to promote social cognition through game playing & story telling
Theory of Mind Training
(Begeer et al., 2011; Gevers et al., 2006; Steerneman et al., 1996)

53 structured sessions focusing on ToM skills
- Listening to others & making acquaintances
- Understanding differences between fantasy & reality
- Assessing social situations
- Recognizing others’ intentions & emotions
- Placing oneself in the thoughts & feelings of others
- Understanding deception
- Using imagination
Theory of Mind Training
(Begeer et al., 2011; Gevers et al., 2006; Steerneman et al., 1996)

Randomized controlled trial

- Compared to controls, 8-13 year old children with ASD & normal intelligence improved their conceptual ToM skills
- Self-reported empathic skills & parent report of social behavior did not improve
- Results did not provide strong evidence for effectiveness of ToM training on daily life mindreading skills
## Effects of ToM & Social Skill Training for one 11 year old with ASD (Feng et al., 2008)

<table>
<thead>
<tr>
<th>Training Content</th>
<th>Skills Trained (using multimedia animation)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stage 1</strong></td>
<td></td>
</tr>
<tr>
<td>Entry level ToM</td>
<td>Identifying desire-based emotion &amp; basic belief</td>
</tr>
<tr>
<td>Emotional expression</td>
<td>Expressing own emotions &amp; controlling anger</td>
</tr>
<tr>
<td><strong>Stage 2</strong></td>
<td></td>
</tr>
<tr>
<td>Advanced ToM</td>
<td>Understanding 1\textsuperscript{st} &amp; 2\textsuperscript{nd} order false belief</td>
</tr>
<tr>
<td>Conversational interactions</td>
<td>Greeting &amp; expressing needs appropriately</td>
</tr>
</tbody>
</table>
Effects of ToM & Social Skill Training-Teaching Procedures (Feng et al., 2008)

Teacher
- Presents ToM episode in animation
- Verbally explains the episode
- Asks questions about the episode

Student=>responds to questions
- Incorrectly: teacher provides prompts (animation cue, question cue, direct prompt)
- Correctly: teacher provides verbal praise
Effects of ToM & Social Skill Training-Teaching Procedures (Feng et al., 2008)

Teacher-Student role play the episode
Teacher summarizes episodes’ main points
Student shares experiences related to the episode
Assessment probe occurs
• 80% correct with 3 consecutive probes=>small group training & next episode
• <80% correct=>return to original episode
Effects of ToM & Social Skill Training-
Results (Feng et al., 2008)

ToM & social skill training => improvements in ToM acquisition via learning outcomes evaluation probes & increased social interactions across time & settings during 1-1 training, small group training, maintenance & follow-up phases

Teachers, mother & peers responded positively to the intervention
Teaching Children with ASD what other people see (Gould et al., 2011)

Multiple exemplar training procedure (8-12 trials) used to teach 3 preschool children with ASD what other people can see (simple perspective-taking skill); using pictures, children were asked to identify what a person saw based on the direction of eye gaze. Participants generalized learning to novel tasks but not to probes in the natural environment.
FaceSay: Improving Social Skills using avatars in computer-based intervention (Hopkins et al., 2011)

Three Games included in the TX

1. Amazing Gazing=> teaches children to attend to eye gaze & respond to JA; children must touch the object the avatar is looking at

2. Band aid Clinic=> teaches children facial processing & facial recognition; a portion of avatar’s face is distorted & children must select appropriate ‘band aid’ to fix the face
FaceSay: Improving Social Skills using avatars in computer-based intervention (Hopkins et al., 2011)

Three Games included in the TX

3. Follow the Leader=>teaches children to attend to subtle eye movements to improve ability to discriminate facial expressions;
   a. First Level: children identify identical emotional facial expressions by selecting Yes or No
   b. Advanced Level: children change avatar’s expression to match the avatar’s twin
FaceSay: Improving Social Skills using avatars in computer-based intervention
(Hopkins et al., 2011)

Objectives=>examine impact of FaceSay on
1. Emotion & facial recognition
2. Social behaviors in the natural environment

Methods=>49 children with ASD
1. 24 in High functioning group
2. 25 in Low functioning group

Treatment=>12 sessions of FaceSay over 6 weeks in school
Outcomes (assessed pre-post TX)

1. Emotion recognition: Ekman & Friesen’s (1975) photos & schematic drawings
3. Social Skills Rating System (Gresham & Elliott, 1990):
4. Social Skills Observation: two, 5 minute assessment during recess
FaceSay: Improving Social Skills using avatars in computer-based intervention (Hopkins et al., 2011)

Results

1. Emotion recognition: LFA & HFA both improved significantly
2. Facial recognition: HFA improved significantly
3. Social Skills Rating System: LFA & HFA improved significantly
4. Social Skills Observation: LFA & HFA improved significantly
Implications for ToM Intervention Research

Strategies have been effective in lab-based experiments.

Generalization & maintenance of intervention gains within the natural environment is more problematic.

Since ToM deficits are seen by age 2, interventions are needed to address early deficits in children with ASD.

(Howlin, 2008)


References


References


References


Acknowledgements

We gratefully acknowledge the contribution of graduate and undergraduate students who have been involved in this research over the years. We also thank our professional contacts from around the country who assisted in data collection. We extend deep gratitude to the families from around the country who participated in this research and the families in Vermont who welcomed us into their homes.