Theory of Mind:
Going to the Heart of Autism Spectrum Disorder and Social Communication Disorder

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- BYU paid for Dr. Westby’s airline and shuttle fares to Provo.
- Lee Robinson has nothing to disclose.

Ubuntu

Development of theory of mind is dependent on attuned interactions with others

An ideology that highlights the unity of humanity and emphasizes the importance of constantly referring to the principles of empathy, sharing, and cooperation in our efforts to resolve our common problems.
The ability to attribute mental states—beliefs, intents, desires, pretending, knowledge, etc.—to oneself and others and to understand that others have beliefs, desires, and intentions that are different from one's own

Cognitive Theory of Mind


Pinocchio needs to ToM to be human

Pinocchio becomes sentient: The blue fairy gives Pinocchio the ability to feel, perceive, be conscious and to experience subjectivity. The Blue Fairy gave Pinocchio cognitive ToM

BUT to become fully human, he must be brave, truthful, and unselfish, and he must learn to chose from right and wrong; his conscious will be his guide. He must develop affective ToM


**Affective Theory of Mind**

- **Affective ToM**: awareness and reflection on one’s own emotions; ability to recognize or infer what others are feeling (understanding the emotions of others cognitively)
- **Affective empathy**: drive to respond appropriately to others’ emotions


**Cognitive ToM**

<table>
<thead>
<tr>
<th>First Order</th>
<th>Second Order—directed toward picture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive ToM (24 trials)</td>
<td></td>
</tr>
<tr>
<td>Cog1 12 trials</td>
<td>Cog2 6 trials</td>
</tr>
<tr>
<td>Task: attribution of thoughts to the triangle character</td>
<td></td>
</tr>
</tbody>
</table>


**Affective ToM**

<table>
<thead>
<tr>
<th>First Order</th>
<th>Second Order—directed toward picture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Affective ToM (11 trials)</td>
<td></td>
</tr>
<tr>
<td>Aft 12 trials</td>
<td>Aft 6 trials</td>
</tr>
<tr>
<td>Task: express the feeling of the triangle character</td>
<td></td>
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</tbody>
</table>


Joe and Anna are setting the table for a festive dinner at the dining room. Anna pours Joe a glass of water, but some water spills on his new shirt. Joe says: “It’s nothing, I will change the shirt later.” Anna puts the glass on the table and goes to look for a paper towel to dry Joe’s shirt. When she leaves the dining room, Joe takes his handkerchief and dries the shirt and the table. Anna peeks into the dining room, sees what Joe is doing, and so she doesn’t bring a paper towel. Anna returns to the dining room.

Types of theory of mind


Cognitive intrapersonal ToM: I know that in books, foxes are usually bad.

Cognitive interpersonal ToM: The goose doesn’t know the fox is there but we do. We know fox’s intention is to eat a goose and duck.

Affective interpersonal ToM: We realize that goose is nervous/worried.

Affective empathy: We might feel worried/frightened for goose and duck.

Mirror Neuron System

A mirror neuron is a neuron that fires both when an animal acts and when the animal observes or hears the same action performed by another. Thus, the neuron "mirrors" the behavior of the other, as though the observer were itself acting.

- Visual mirror neurons
- Auditory mirror neurons

**Neural Networks Subserving ToM**

**Cognitive ToM**
- Temporoparietal junction (particularly right)
- Dorsal lateral prefrontal
- Superior temporal sulci (STS)
- Temporal poles
- Dorsal medial prefrontal cortex (mPFC)
- Precuneus/posterior medial cortex


**Neural Networks Subserving ToM**

**Cognitive ToM**
- Dorsal lateral prefrontal
- Temporoparietal junction (particularly right)
- Superior temporal sulci (STS)
- Medial prefrontal cortex (PFC)
- Temporal poles
- Precuneus

**Affective ToM**
- Inferior lateral frontal
- Ventro-medial/orbital frontal lobe (more left)


**Affective Empathy**

- Amygdala
- Inferior frontal
- Insula

Sample stories

- Physical: Out behind the big red barn at the edge of the walnut grove is the most magnificent pond in the neighborhood. It is wide and deep, and shaded by an old oak tree. There are all sorts of things in that pond: fish and old shoes and lost toys and tricycles, and many other surprises.
- People: Old Mr. McFeeblebee is a gray wrinkled old farmer who wears gray wrinkled old overalls, and gray wrinkled old boots. He has lived on this land his whole life, longer even than most of the trees. Little Georgie is Mr. McFeeblebee’s nephew from town.
- Mental: Mr. McFeeblebee doesn’t want any little boys to fish in the pond. But little Georgie pretends not to notice. He likes fishing so much, and besides, he knows he can run faster than anybody in town. Georgie decides to run away really fast if Mr. McFeeblebee sees him fishing.


Brain Regions for Reasoning about People

- After age 9, TPJ responds primarily to mental information

More active when processing info about people than nonsocial info:
- Temporo-parietal junction (TPJ)
- Posterior cingulate cortex
- Medial prefrontal cortex


Intrapersonal ToM

- Cortical Midline structures
  - Medial prefrontal
  - Anterior, middle, posterior cingulate
  - Precuneus

Evaluative and self-reflective aspects of self

Neural Networks Facial Processing

- Intraparietal sulci
- Superior temporal sulci (STS)
- Anterior temporal poles
- Inferior occipital gyri
- Fusiform gyri


The student’s guide to social neuroscience. New York: Psychology Press.

Facial Processing

Core System
- Visual Analysis

- Superior temporal sulci
- Changeable aspects of face - perception of eye gaze, expression and to movement.
- Fusiform gyrus: Invariant aspects of face - perception of unique identity.

Extended System
- Fusiform gyrus: Invariant aspects of face - perception of unique identity.
- Anterior temporal lobe: personal identity, name, and biographical information.
- Auditory cortex: prosodic speech perception.
- Intraparietal sulcus: spatially directed attention.


Viewer with autism

Normal Comparison Viewer


Viewer With Autism

Neuotypical viewer

Face Scanning


Cortical Underconnectivity


Social Neuroscience of ToM

Neurochemistry & ToM
• Higher dopamine levels predict better ToM performance; lower dopamine levels predict lower ToM performance
• Intranasal oxytocin improves ability to infer mental state
• Long-term elevated cortisol levels (response to stress) charge brain architecture
  – Smaller orbitofrontal cortex


Genotypes and ToM/empathy
• Children with these genotypes who are reared in negative social environments (abuse/neglect) are likely to have lower levels of ToM/empathy.
  – Short form of DRD4 (dopamine receptor gene)
  – Low-activity MAOA genotype (monoamine oxidase A—metabolizes stress hormones)
  – AA or AG allele of OXTR gene (oxytocin receptor)

### Epigenetics and ToM

- "epi" means above; "genome" refers to all of an individual's genetic information.
  - Thus, the epigenome is information about us that is stored outside of our DNA
  - Special chemicals called tags can become attached to the nucleotides of our DNA or to our histone proteins, and, depending on the nature of these tags, specific genes can either be silenced (prevented from being expressed as protein) or pushed to become more active (so that the abundance of a particular protein in our cells will rise).

### Epigenetics


ToM in Communication Disorders

- Autism
  - All aspects of ToM significantly affected
  - Cognitive ToM tends to develop in children with high-functioning autism or Asperger
- Language impairment
  - Delays in development of most aspects of ToM
  - Fewer mental state & emotional words than typical children
- Attention deficit-hyperactivity disorder
  - May have delays in ToM development
  - Higher levels of inter- and intrapersonal ToM affected
  - Particular deficits in intrapersonal ToM for self-regulation of behavior and emotions

ToM in Communication Disorders

- Deafness
  - Delays in ToM (particularly for Deaf of hearing parents)
  - Delays associated with language but greater than expected from language levels
  - Poor identification of emotions and recognizing causes of emotions
- Blindness
  - Delays in cognitive ToM
  - Difficulties identifying emotion in tone of voice
- Children who experience abuse/neglect
  - ToM deficits in affective empathy often most marked

ToM in Communication Disorders

- Children involved as bullies, victims, & bully-victims
  - Likely deficits primarily in affective empathy in bullies
  - Others may have ToM deficits in any or all areas
- Persons with traumatic brain injury (TBI)
- Persons with degenerative brain conditions
  - Alzheimer’s disease
  - Frontotemporal dementia
  - Amotrophic lateral sclerosis
  - Parkinson’s disease
- Persons with psychiatric diagnoses
  - Psychopaths
  - Borderline personality disorders
  - Narcissists
### Development toward Theory of Mind

<table>
<thead>
<tr>
<th>ToM Development Levels</th>
<th>Intervention Stages</th>
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<tbody>
<tr>
<td>• Birth: Primary intersubjectivity</td>
<td>Developing pre ToM/</td>
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<tr>
<td>• 8 months: Secondary intersubjectivity</td>
<td>pre sense of self (intersubjectivity)</td>
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<tr>
<td>• 17 months:</td>
<td>Developing sense of self/pretend/pre level 1 ToM</td>
</tr>
<tr>
<td>Symbolic/representational skills</td>
<td></td>
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<tr>
<td>– Pretend play</td>
<td></td>
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<tr>
<td>– Awareness of self</td>
<td></td>
</tr>
<tr>
<td>– Language</td>
<td></td>
</tr>
<tr>
<td>• 3 years: Narrative skills</td>
<td>Developing First Order ToM</td>
</tr>
<tr>
<td>• 4 years: Theory of mind (1st order)</td>
<td>Developing Second and higher-Order ToM</td>
</tr>
<tr>
<td>• 6 years: Theory of mind (2nd order)</td>
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<tr>
<td>• 7+ years: Other higher-order ToM</td>
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<tr>
<td>– Emotional dissemblance</td>
<td></td>
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<tr>
<td>– Figurative language</td>
<td></td>
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<tr>
<td>– Irony/sarcasm</td>
<td></td>
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<tr>
<td>– Social faux pas</td>
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</tbody>
</table>

### Stage 1 Characteristics

- Primary intersubjectivity
- Secondary intersubjectivity

### Developing pre ToM/ pre sense of self (intersubjectivity)
- Characteristics of those ready for this level
  - not responsive readily to those around
  - no or limited referencing
  - limited initiation of interaction
Developing pre ToM/pre sense of self

<table>
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<tr>
<th>Intervention Objectives</th>
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<tr>
<td><strong>Intrapersonal</strong></td>
</tr>
<tr>
<td>- develop emotional sharing, referencing, coregulation</td>
</tr>
<tr>
<td>- develop motor imitation, affective imitation, and imitation with objects</td>
</tr>
<tr>
<td><strong>Interpersonal Cognitive</strong></td>
</tr>
<tr>
<td>- develop motor imitation and imitation with objects</td>
</tr>
<tr>
<td>- pivotal response training (RDI used here)</td>
</tr>
<tr>
<td><strong>Interpersonal Affective</strong></td>
</tr>
<tr>
<td>- develop emotional sharing, referencing, coregulation</td>
</tr>
<tr>
<td>- develop affective imitation (RDI used here)</td>
</tr>
</tbody>
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In attuned interactions: trigger mirror neurons
Lay foundations for affective ToM
Effects of sensory impairments

Types of joint attention 3- to 18-months

- **Responding joint attention (RJA):**
  - Infant follows the direction of gaze, head turn, and or point gesture of another person.
- **Initiating joint attention (IJA):**
  - Infant uses eye contact and or deictic gestures (pointing or showing) to spontaneously initiate coordinated attention with a social partner.
  - Type of protodeclarative: infant is seeking interaction with another simply for the sake of sharing an experience.
- **Initiating behavior requests (IBR):**
  - infant uses eye contact and gestures to initiate attention coordination with another person to elicit aid in obtaining an object or event.
  - IBR is a protoimperative; it is used for less social but more instrumental purposes.

Responding to Joint Attention (RJA)

Infant follows the direction of gaze, head turn, and or point gesture of another person. (Early Social Communication Scales)
Initiating Joint Attention: Show

- Infant uses eye contact and or deictic gestures (pointing or showing) to spontaneously initiate coordinated attention with a social partner.
- Type of protodeclarative: infant is seeking interaction with another simply for the sake of sharing an experience.

Initiating Joint Attention Point

- Infant uses eye contact and or deictic gestures (pointing or showing) to spontaneously initiate coordinated attention with a social partner.
- Type of protodeclarative: infant is seeking interaction with another simply for the sake of sharing an experience.

IBR Point

- Infant uses eye contact and gestures to initiate attention coordination with another person to elicit aid in obtaining an object or event.
- IBR is a protoimperative; it is used for less social but more instrumental purposes.
Implications of Types of Joint Attention

- **Responding joint attention:** Primary intersubjectivity
  - Associated with EF and language in ASD
  - Early deficit in deaf children
  - Not a marker for ASD in children over 30-36 months
  - Deficit diminishes with age
- **Initiating joint attention:** Secondary intersubjectivity
  - Associated with EF and language in ASD
  - Typically is problematic in children with ASD across ages
- **Initiating behavior request:** Secondary intersubjectivity
  - High rates may reflect an impulsive and object-driven style of behavior; associated with greater externalizing or disruptive behaviors in later life

Social Communication Rating Scale

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Little or no understanding of desired behavior. Absence of skill, even with support.</td>
</tr>
<tr>
<td>2</td>
<td>Minimal understanding of desired behavior. Some emerging skill with limited range of application with maximum support.</td>
</tr>
<tr>
<td>3</td>
<td>Basic or moderate understanding of desired behavior. Can apply in some contexts with moderate support.</td>
</tr>
<tr>
<td>4</td>
<td>Moderate to strong understanding of desired behavior. Can apply in a range of contexts with minimal support. Requires additional experience.</td>
</tr>
<tr>
<td>5</td>
<td>Strong understanding of desired behavior. Competent demonstration of skill across contexts with little or no support.</td>
</tr>
</tbody>
</table>

Maximum support – can be environmental; manipulating toys and context

Engagement =

- **Shared attention:** the child is interested in gaining and keeping the partner’s attention
- **Reciprocity:** a back and forth rhythm is evident in the interaction
- **Shared intention:** the child initiates and responds to communication bids

Types of Joint Engagements

- **Unengaged**: Child is not actively attending to any one object or person
- **Object engaged**: Child is actively playing with a toy or object in a functional way; no other person is involved in the activity
- **Person engaged**: Child is actively interacting with another person without toys or objects (e.g., singing songs, pat-a-cake)
- **Supported joint engagement**: Child and adult are interacting with a toy or an object, but the child is not initiating or overtly aware of the adult's interaction and effect on the interaction
- **Coordinated joint engagement**: Child and adult are both actively interacting. Child is clearly aware of adult's presence; both parties are initiating during the interaction


Intrude

- Insist on joining in even if the child doesn’t welcome you at first
  - The keeper strategy
  - Hiding and searching
  - Get in the way
  - Join in the play
  - Intrude to carry on conversations

Hanen *More than Words*

Neural Substrates for IJA & RJA

### Stage 2 Characteristics

- Sense of self
- Pretend play
- Developing descriptive and narrative language

### Sense of Self


### Developing sense of self/pretend/pre level 1 ToM

- Characteristics of those ready for this level
  - responsive to those around
  - references; engages in turn taking
  - requesting behaviors
  - functional use of objects
### Developing sense of self/pretend/pre level 1 ToM

<table>
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<th>Intervention Objectives</th>
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<tr>
<td><strong>Intrapersonal</strong></td>
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<tr>
<td>- develop pretend behaviors</td>
</tr>
<tr>
<td>- develop awareness of physical and psychological self</td>
</tr>
<tr>
<td>- develop autobiographical memory by self talk/parallel talk</td>
</tr>
<tr>
<td><strong>Interpersonal</strong></td>
</tr>
<tr>
<td>- develop pretend skills</td>
</tr>
<tr>
<td>- develop descriptive language skills</td>
</tr>
<tr>
<td>- identify primary non-social emotions in self and others</td>
</tr>
<tr>
<td>- identify emotions associated with situations</td>
</tr>
<tr>
<td><strong>Affective</strong></td>
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### Play Prompt Hierarchy

- General verbal prompt: “What toy should we pick?”
- Specific verbal suggestion: “Let’s play with the Dora doll.”
- Verbal command: “Get the Dora doll.”
- Verbal command with gesture: Saying, “Get Dora,” while pointing to Dora.
- Partial physical prompt: Nudging the child’s arm toward Dora.
- Full physical prompt: Fully helping the child get Dora.


### Episodic/Autobiographical Memory

- Memory of autobiographical events (times, places associated emotions, and other contextual knowledge) that can be explicitly stated
- Properties of episodic memory:
  - a subjective sense of time (or mental time travel)
  - connection to the self
  - autonoetic consciousness: a kind of consciousness that accompanies the act of remembering which enables an individual to be aware of the self in a subjective (emotional) time.

Knowing is more factual (semantic) whereas remembering is a feeling that is located in the past (episodic).

Developing Episodic/Autobiographical Memory

- Recall/talk about past experience
- Relate emotions linked to the experience
- Reflect on/evaluate the experience
- Use mental state terms when talking about the experience (think/thought, know, remember, forget, believe, emotion words, hope, idea, plan)
- Journal writing


Primary (universal) Emotions

- happy
- sad
- mad
- surprised
- disgusted
- afraid

Associating Emotions (nonsocial) and Situations
Sad

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lonely</td>
<td>Disappointed</td>
<td>Discouraged</td>
<td>Desponding</td>
<td>Agonizing</td>
<td>Maudlin</td>
</tr>
<tr>
<td>Lost</td>
<td>Tearful</td>
<td>Gloomy</td>
<td>Devastated</td>
<td>Anguished</td>
<td></td>
</tr>
<tr>
<td>Sad</td>
<td>Heartache</td>
<td>Discouraged</td>
<td>Disillusioned</td>
<td>Condemned</td>
<td></td>
</tr>
<tr>
<td>Tired</td>
<td>Homesick</td>
<td>Dismayed</td>
<td>Grave</td>
<td></td>
<td></td>
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<tr>
<td>Upset</td>
<td>Troubled</td>
<td>Distraught</td>
<td>Overwrought</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Weak</td>
<td>Empty</td>
<td>Pining</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Withdrawn</td>
<td>Grieving</td>
<td>Subdued</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Resigned</td>
<td>Tormented</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mind Reading: The Interactive Guide for Emotions

Coding Mom’s Talk in Storytelling

• Simple cognitions
  – He remembers
  – He’s thinking hard
  – She doesn’t realize
  – They didn’t even know
  – They are really pretending

• Cognition clarification
  – He remembers that he has not done the bedroom yet
  – He puts all the makeup back so Mummy doesn’t know what they’ve been up to


Coding Mom’s Talk in Storytelling

• Simple affect
  – They’re too excited
  – The baby’s happy
  – Carl looks worried

• Affect clarification
  – He’s getting quite angry ‘cos dogs don’t like cats
  – She’s so happy to get into the party

• False belief ending
  – Mum doesn’t know what happened while she was gone
  – He tidies up the whole house so Mum can’t see what they’ve been up to
  – Does Mum know what happened?
Results of Sally-Ann False Belief

- **ToM scores of typical children**
  - Significantly correlated with frequency of mother’s clarifying references to cognition and explanation of mother’s false belief
  - Not significantly correlated to simple references to cognition (e.g., “he remembers.”)

- **ToM scores of children with ASD**
  - Significantly correlated with mother’s clarifying references to emotions


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Stage 3 Characteristic: First Order Cognitive

- Predicting what someone is thinking or feeling

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Affective ToM: Understanding desire

Tom hates lettuce  
Peter likes lettuce very much

2 persons have different desires about the same object

Cognitive ToM: Knowledge Access

“Here’s a chest. What do you think is inside the drawer?” Open the drawer and show child the contents: Let’s see. There’s a toy duck inside.

“Jim has never seen inside this drawer. Does Jim know what is inside this drawer?” (target question) “Did Jim see inside the drawer?” (memory question)


Affective ToM: False Belief

Belief influences emotions
How does the rabbit feel?

- Happy
- Alright
- Angry
- Scared

Affective Self-ToM: Regulating Emotions


Affective Self-ToM: Regulating Emotions

Affective Self-ToM: Regulating Emotions

Emotion Dissemblance/Hiding Emotions

Developing Level 1 ToM

- Characteristics of those ready for this level
  - Demonstrates an emergent sense of self
  - Engages in pretend

Developing Level 1 ToM

<table>
<thead>
<tr>
<th>Intrapersonal</th>
<th>Interpersonal Cognitive</th>
<th>Interpersonal Affective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness of what one knows, doesn’t know, remember, forget</td>
<td>Develop vocabulary of sense verbs (see, hear, smell, taste, feel) mental state verbs (think, know, guess, etc) and emotions words</td>
<td>Infer persons'/characters' emotions from situations - predict persons' emotions/behaviors in a situation</td>
</tr>
<tr>
<td>- child engages in reflection to develop autobiographical memory</td>
<td>- develop verb complements</td>
<td>- identify nonsocial and social emotions in others</td>
</tr>
<tr>
<td>- strategies to begin to regulate one’s own behavior/emotions</td>
<td>- cognitive flexibility – more than one way to do a task</td>
<td>- engage in role play</td>
</tr>
</tbody>
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Language Progression for ToM

- Verbs of Perception (hear, see, smell, taste, feel)
- Verbs of intention/desire (want, need, like, desire, hate)
- Verbs of communication (e.g., say, tell, ask) with sentential complements
- Verbs of cognition (e.g., know, don’t know, think, believe, guess, remember, forget) with sentential complements
- Verbs of cognition with complements that are false (Michaels thinks there’s a unicorn in the yard).


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Modules 1: Perceptions & Actions

Who sees the pinata?

Yes! Grandma sees the pinata. She sees it with her eyes.

Yes! Grandma sees the pinata with her eyes.

Module 2: Comparing Sense Verbs

Who hears a mosquito?
Yes! Mrs. Lopez hears a mosquito. She hears it with her ears.
Yes! Mrs. Lopez hears a mosquito with her ears.
Yes! Mrs. Lopez hears a mosquito with her ears and Sophie feels a mosquito.

http://www.laureatelearning.com

Module 3: Who is/is not sensing?

Who smells the skunk?
That's right! Lisa smells the skunk.
Yes! Lisa smells the skunk but Matt doesn't.

http://www.laureatelearning.com

Module 4: Who perceives what

Who sees the cat dancing?
Yes! Baby Ethan sees the cat dancing.
Yes! Baby Ethan sees the cat dancing and Officer Wilson sees the cat sleeping.

http://www.laureatelearning.com
Sentence Complements:
Bootstrapping False Belief

- Communication verbs
  - Mom said she bought apples, but look, she really bought oranges.
  - Jim asked Mark where the candy is.
  - Jason told us how to do the math problems.

- Mental verbs
  - Lucy thinks the moon is made of green cheese.
  - Marks believes Mark knows where the candy is hidden.
  - Alisa forgot where she parked her bike.


Complex Sentences that Explain

- Fish Eagle was enraged when she realized that Hyena had tricked her.
- Pangolin decided to teach Hyena a lesson because he had tricked fish eagle to get her fish.
- The hyenas thought they were climbing to reach sweet meat in the sky, however, they were really climbing up to the moon.
- Although Fish Eagle knew the yellow ball in the sky was the moon, she wanted the hyenas to think it was sweet meat.

Enhancing Empathy

- Study
  - Elementary and high school students participate in either acting or visual arts/music
  - Advance theory of mind assessed (faux pas and higher-order ToM)
  - Empathy assessed via Index of Empathy for Children or Basic Empathy Scale and response to videos

- Results
  - Both elementary and high school students in acting class had significantly higher performance on empathy measures
  - High school students in acting classes had higher post scores on ToM tasks

Assessing Episodic Memory

- Autobiographical interview: generate details about a past or future event in response to a cue word
  - Describe a specific time in the past (for adults: few weeks, few years; children: few months)
  - Imagine a time in the future the word makes you think of (for adults: few weeks, few years; for children: few months)
- Words
  - Positive: friend, easy
  - Negative: naughty, tired
  - Neutral: bath, book


Mental Time Travel for the Future

- The ability to project oneself into the future to pre-experience an event
- Allows one to imagine oneself in the future
- Can involve one developing a plan that takes into account one’s specific situation
- Supports the formulation of future-oriented goals and implementation of the behavioral guidance system necessary to achieve them

Cognitive Resources for Episodic Future Thinking

- Working memory: the manipulation of previous memories to imagine future events takes place in the working memory
- Self-awareness: to realize that one’s self and one’s future is separate from that of other individuals.
- Declarative memory: the theory of memory for the future is using memory for future needs rather than immediate needs. One is intentionally able to think about and plan for the future, rather than spontaneously remembering when faced with a particular situation.
- Time dimensions: an understanding of the distinction between past, present and future.
- Inhibition of stimulus driven responses: the ability to stop oneself from being distracted by irrelevant stimuli
Future Thinking


Counterfactual Reasoning

• Imagining alternatives to reality
• Conditional propositions, containing an antecedent and a consequence (e.g., If Matt had run, he would have caught the bus.)
• People can imagine alternatives that are better or worse than reality, e.g., if only I hadn't been speeding, my car wouldn't have been wrecked or if I hadn't been wearing a seatbelt I would have been killed.
• Can affect people's emotions, such causing them to experience regret, guilt, relief, or satisfaction, their social ascriptions such as blame and responsibility, and their causal judgments.
• Counterfactuals often take the form of "if-then" conditional propositions in which the "if" specifies a personal action and the "then" specifies a goal.

Pretending & Counterfactual Reasoning

• Engage the same component cognitive abilities:
  – disengaging with current reality
  – making inferences about an alternative representation of reality
  – keeping this representation separate from reality.
  – Both require the ability to create false premises and generate conclusions from these premises.

Kids at Hope – Training Mental Time Travel

I am a kid at hope
I am capable of success
I am a kid at hope
I will look at the world and say yes
I have dreams for the future
I will climb to reach those dreams

Everyday I have __ inside me
Everyday I have people to guide me
We can climb
If you slip and fall I will throw you a rope
I am the kid at hope
I am the kid at hope

http://kidsathope.org

Chronesthesia: Mental Time Travel

• Ability that allows humans to be constantly aware of the past and the future


Stage 4 Characteristics

• Second order ToM
  – Predicting/knowing what one person thinks another person thinks/feels
Stage 4 Characteristics

- Higher order ToM
  - Predicting/knowing what person A thinks that person B thinks that person C thinks...
  - Awareness that a person can say one thing but be thinking something else, e.g.,
    - Lies: He knows that they think he will lie.
    - Figurative language
    - Sarcasm and Faux Pas


Second-Order False Belief

- John and Mary are together in the park. In the park there is also an ice cream man in his van.
- Mary would like to buy an ice cream but she has left her money at home. She is very sad. “Don’t be sad,” says the ice cream man, “you can fetch your money and buy some ice cream later. I’ll be here in the park all afternoon.” "Oh, good,” says Mary, “I’ll be back in the afternoon to buy some ice cream. I’ll make sure I won’t forget my money then.”

- So Mary goes home…. She lives in this house. She goes inside the house. Now John is on his own in the park. To his surprise he sees the ice cream man leaving the park in his van. “Where are you going?” asks John. The ice cream man says, “I’m going to drive my van to the church. There is no one in the park to buy ice cream; so perhaps I can sell some outside the church.”
- The ice cream man drives over to the church. On his way he passes Mary’s house. Mary is looking out of the window and spots the van. “Where are you going?” she asks. “I’m going to the church. I’ll be able to sell more ice cream there,” answer the man. “It’s a good thing I saw you,” says Mary. Now John doesn’t know that Mary talked to the ice cream man.
Second-Order False Belief

• Now John has to go home. After lunch he is doing his homework. He can’t do one of the tasks, so he goes over to Mary’s house to ask for help. Mary’s mother answers the door. “Is Mary in?” asks John. “Oh,” says Mary’s mother, “She’s just left. She said she was going to get an ice cream.”
• Test question: So John runs to look for Mary. Where does he think she has gone?
• Justification question: Why does he think she has gone to the_____?

2nd & 3rd Order ToM

• Johnny and Bob are best friends. They really enjoy playing football together. Johnny and Bob both want to play on the school football team. The school football team plays every Monday after school. Johnny thinks that he is not as good at football as Bob is. He thinks that the football manager is more likely to choose Bob for the football team. But the football manager thinks that both Johnny and Bob are good football players. He wants them both to play in the school football team. But the manager knows that Johnny doesn’t think he will get on the team.

ToM Level 2:
a) Johnny doesn’t know that the manager wants both him and Bob on the team.
b) Johnny thinks that the manager wants both him and Bob on the team.

ToM Level 3:
a) The manager thinks that Johnny knows he wants him to be on the football team.
b) The manager knows that Johnny doesn’t know that he wants him to be on the team.
Figurative Language

Figure of Speech

- Emma has a cough. All though lunch she coughs and coughs. Father says, “Poor Emma, you must have a frog in through throat!”
- Is it true, what Father says to Emma?
- Why does he say that?

Lies

Cognitive
- Stealing your friend’s iPod and then telling him you haven’t seen it and have no idea where it is.

Affective
- Telling your grandmother that her meatloaf is delicious when you really hate the meatloaf.

Theory of Mind: Faux Pas

- James bought Richard a toy airplane for his birthday. A few months later, they were playing with it, and James accidentally dropped it. “Don’t worry” said Richard, “I never liked it anyway. Someone gave it to me for my birthday.”
- Did someone say something he/she should not have said?
- What did he/she say that should not have been said.
- What did James give Richard for his birthday?
- Did Richard remember James had given him the toy airplane for his birthday?

Cognitive Sarcasm

Joe went into the bank manager’s office and couldn’t find anywhere to sit down because all the chairs were occupied with documents and folders. An unorganized pile of letters and documents were randomly set on the table. Joe said to the bank manager: “Your office is so tidy!”

Affective Sarcasm

Joe’s dad was supposed to pick him up after chess club at 6 p.m. By the time he recalled that he had to pickup his son, it was 7 p.m. Dad found Joe standing tired and frightened out in the rain. When they got home, Joe was crying and told his mom what had happened. Mom said: “You are such a good father!”


Multiple Levels of ToM

Story 2. MUM’S BIRTHDAY

There was a little girl called Anna who had a big problem on her mind. It was her mum’s birthday the very next day. Anna wanted to get her mum a birthday present, but she just didn’t know what to buy. She thought and she thought. Tomorrow was nearly here! Anna remembered that her brother, Ben, had already asked mum what mum would like most of all for her birthday. Ben was out riding his bike so Anna decided to look around his room to see if she could find what present he had got for mum. Anna went in and found a big bunch of beautiful flowers with a little card that said: “Happy Birthday Mum, love from Ben.” Anna thought to herself: “mum must want flowers for her birthday!” Just as Anna was leaving the room, Ben was coming up the stairs, but he didn’t see Anna leaving his room. Anna didn’t want Ben to know that she had been snooping around his room, so she said to Ben: “Ben, have you got mum a birthday present?” Ben thought for a minute, he didn’t want Anna to copy him and get mum the same present, so he said: “Yes, Anna, I have. I have got mum some perfume. What have you got for her?” Anna replied: “Err, nothing yet, Ben!” and she walked away.


Multiple Levels of ToM

- ToM level 1
  - Anna thinks Ben has bought mom some perfume
  - Anna knows Ben has bought mom some flowers
- ToM level 4
  - Ben thinks that Anna believes that he knows that mom wants perfume for her birthday.
  - Bens thinks that Anna knows that he knows that mom wants flowers for her birthday.

• **Context** is the totality of elements within the observing person and in the spatial and temporal surrounding of a stimulus that influence the perception of that stimulus and the meaning that is given to it.

• **Context sensitivity** is the ability to discover within the collection of elements contextually relevant information and to ignore unimportant things.

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**Intervention Objectives**

<table>
<thead>
<tr>
<th>Intervention Objectives</th>
<th>Intrapersonal</th>
<th>Interpersonal Cognitive</th>
<th>Interpersonal Affective</th>
</tr>
</thead>
<tbody>
<tr>
<td>--strategies for learning</td>
<td>--develop vocabulary for secondary and social emotions</td>
<td>--attend to multiple features in context to interpret emotions</td>
<td></td>
</tr>
<tr>
<td>--goal-directed planning, problem solving</td>
<td>--develop complex syntax with dependent clauses</td>
<td>--figurative language</td>
<td></td>
</tr>
<tr>
<td>--reflection on one's knowledge/emotions</td>
<td>--develop multiple meanings for words</td>
<td>--sarcasm</td>
<td></td>
</tr>
<tr>
<td>--self presentational skills</td>
<td>--figurative language</td>
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</tbody>
</table>

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**Developing Level 2 ToM and More**

• Darius’s neighbor just got a new dog that really likes kids.
• Darius’s neighbor just got a new dog that really likes kids, but Darius was once bitten by a dog.
• Reena has to give a big speech tomorrow in front of her entire school.
• Reena has to give a big speech tomorrow in front of her entire school, and Reena loves to give speeches.

---

Cues for Recognizing Others’ Feelings

• Body cues
  – I could see that one
    • A smile or laugh
  – I might be able to see that one if I look close
    • Trembling hands
  – I could not notice that one, so I would have to ask
    • Butterflies in stomach


Cues for Recognizing Others’ Feelings

• Situational cues
  – Context
    • The boy has just scored a goal in soccer
    • The girl is at the animal hospital with a sick pet
    • The boy is at the school dance and about to ask someone to dance
  – Individual information
    • She is not at all shy, she is very outgoing and like to talk in front of groups
    • He is not a very good athlete and does not like to play sports
    • She has had a very bad day.


Vary Parameters

• Emotion: cover a variety of emotions
• Intensity: from weakly felt to intensely experienced emotions
• Character demographics: vary gender, age, and other relevant variables
• Proximity: situations that are familiar to students and situations that have less direct relevance

Example scenario

• Tyler is an 11-year-old who lives with his mother and father. He has no brothers or sisters, although his aunt and uncle live nearby with three cousins who are near his age. Tyler has trouble with academics in school, but he excels in art. Small for his age, he is not a very good athlete. However, he has a good sense of humor and has a number of close friends, most of them kids he has known since preschool. One day, on the playground after school, his friends invite him to join the kickball game. He joins, but does not play well, being tagged out each time after he kicks and dropping a few balls while fielding. As the game winds down, it is Tyler’s turn to kick. There are two runners on base and his team is down by one run.

Appreciating and Sharing Other’s Feelings: Situation Cards

• Identify: Who is the target person? The person’s name, age, gender, and family details should be provided
• Personal information: background and personal information (e.g., likes/dislikes, temperament) to help player understand and appreciate so that the person’s emotional reaction can be gaged
• Situation: description of what is happening to the person is needed, with enough details so student can guess the emotions being experiences


Person Cards

• Sandra has had a terrible day. She is tired from not getting enough sleep and she forgot her lunch and so had to eat food her friends gave her. She is feeling particularly irritated with Person 2 because Person 2 did not say hi to her when they got to school.
• Paul is very nervous today because his mother has been sick and she was going in for tests to see if something was really wrong with her. However, Paul got some good news today: he received an A on his social studies test. And Paul is feeling excited to hang out with Person 2 because he really likes Person 2.

**Situation Cards**

- Two people on school bus heading back from a field trip during which students learned about an important historical play and also got to eat ice cream.
- Two people are at a birthday party together eating cake and talking.
- Two people are playing in a game of baseball together after school. The game is an important one for the school’s team and the score is tied late in the game.
- Two friends are walking home from school in the rain. One person has an umbrella and the other forgot his.


**Social Communication Rating Scale**

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Little or no understanding of desired behavior. Absence of skill, even with support. No awareness or self‐monitoring.</td>
</tr>
<tr>
<td>2</td>
<td>Minimal understanding of desired behavior. Some emerging skill with limited range of application with maximum support. Awareness and self‐monitoring (skill set must be taught???) must be explicitly taught.</td>
</tr>
<tr>
<td>3</td>
<td>Basic or moderate understanding of desired behavior. Can apply in some contexts with moderate support. Some awareness and self‐monitoring behaviors displayed with supports and reminders. Skill set???</td>
</tr>
<tr>
<td>4</td>
<td>Moderate to strong understanding of desired behavior. Can apply in a range of contexts with minimal support. Requires additional experience. Awareness and self‐monitoring is more evident with some independence. Skill set???</td>
</tr>
<tr>
<td>5</td>
<td>Strong understanding of desired behavior. Competent demonstration of skill across contexts with little or no support. Awareness and monitor; adjust own performance.</td>
</tr>
</tbody>
</table>

**Regulating Emotions: Intrapersonal ToM**

Executive functioning requires understanding of one’s own mental processes and theory of mind requires inhibitory ability

Intrapersonal Affective ToM:
Identify Feeling Happy/Anxious

- When do you feel happy?
- How do we know when we are happy?
- How does your face look? (look in mirror)
- What thoughts do you have? Do you feel friendly?
- How are your energy levels? Do you feel you have energy to do what you want?
- How do you move your body? Do you feel light or heavy?
- How does your voice change?


How Happy are You?

1. A little happy
2. A little more happy
3. Medium happy
4. Very happy
5. Very, very happy

- Happy
- Proud
- Thrilled
- Excited
- Pleased
- Satisfied
- Ecstatic

Examples

- Someone gives you a new bicycle
- You are eating a cereal you like
- You found your shoes
- Your brother turns on your favorite TV show
- You are eating your favorite breakfast
- Your teacher told you that you did good work
- You just won your favorite game
- Your mother says she loves you
Emotional Thermometers

- Ecstatic/euphoric
- Blissful
- Elated
- Joyful
- Happy
- Glad
- Pleased
- Contented
- Comfortable

- Enraged
- Incensed
- Livid/furious
- Angry
- Aggravated
- Provoked
- Irritated
- Annoyed
- Bothered

How does your body feel when relaxed?

- What happens to your heart?
- What happens to your breathing?
- What happens to your muscles?
- What happens to your face?
- What happens to your thinking?

Clues that you feel angry/anxious

- Increased heartbeat
- Fast breathing
- Muscles tense
- Making a fist
- Red face
- Frowning
- Shaky voice
- Loud voice
- Crying
- Thinking of hurting someone

- Sweaty palms
- Lump in throat
- Gritting teeth
- Flappy hands
- Headache
- Itchy skin
- Tingly tummy
- Wobbly knees
- Feeling dizzy
- Jumping up and down
Basic and Self Conscious Emotions

- Self conscious emotions require more complex processing of information, particularly social information, than basic emotions.
- Self-conscious emotions are rooted in social interaction between people, but also the evaluation of, and judgment of, individuals by themselves and others.
- Self-conscious emotions require the ability to form stable self-representations (me) and to focus attention on those representations or to self-reflect.
- Self conscious emotions depend on the capacity to represent oneself and another in a common space, and to be concerned with the views of another, they do not require, as self-conscious evaluative emotions, the additional need to compare oneself, or one’s behavior, with internalized cultural standards, rules or goals.

Basic Emotions (nonsocial)


Basic Emotions Nonsocial

Self Conscious Emotions

- Guilt
- Confidence
- Embarrassment
- Shame
- Pride
- Envy
- Confidence
- Jealousy
- Trust
- Loneliness

Self conscious emotions require more complex processing of information, particularly social information, than basic emotions.

Self-conscious emotions are rooted in social interaction between people, but also the evaluation of, and judgment of, individuals by themselves and others.


Social Emotions

Pretend you are this girl (beige sweater, left). What are you thinking? What do you see that tells you what she’s thinking?

Pretend you are this man. What are you thinking? What do you see that tells you what he’s thinking?


Good & Bad Thoughts

Feel Bad/Not Helpful Thoughts
• I'm a loser
• They will laugh at me
• I'm not good at homework
• I can ask someone to teach me
• Everyone hates me
• No one can help me

Feel Good/Helpful Thoughts
• I'm a winner
• Maybe they think I'm funny
• My mom or dad can help
• I can ask someone to teach me
• But my family loves me
• I can ask for help
• I can stay calm
• It's not about winning, it's about having fun
• Relaxing makes me feel better
• I can try again next time
• Good choice

Metacognition/Intrapersonal ToM

Our hero! Totally flexible, trying to figure out people's wants and needs to keep other people calm while also getting his turn to play and to speak as well.

Superflex is a great problem-solver and can think of many different solutions to one problem.

https://www.socialthinking.com/
Emotion Regulation Strategies

Model of Emotion Regulation

Situation selection  | Choosing to place oneself in particular contexts and not others
Situation modification  | Direct efforts to change the situation to modify the emotional impact
Attentional deployment  | Gates particular cues into the appraisal process, allowing some aspects of the situation to become the focus of attention, while excluding others
Cognitive change/appraisal  | Modify the meaning of particular cues once those cues have gained access to the appraisal process
Response modulations  | Affects the outputs of the appraisal process; control processes can suppress or augment manifestations of one’s emotional state

Haunted House Conversation: What to Notice

- Gestures
- Voice and intonation
- Sound effects
- Topic maintenance
- Amount of time CD is talking
- Amount of time the clinician is talking
- Is CD responsive to his listener?
- Do you understand what he is talking about?
- Do you think he is telling the truth?
- What is your impression of CD right now?
Activities
- Videos
- Dialogue from books
- Role plays
- The “conversation game”

Purpose of the “conversation game”
- Teach conversation rules
- Practice conversation rules
- Assess the conversation

The “conversation game” rules
- Pick a topic from a cup
- Partner makes a comment then “passes the turn” to the other player with either a question or a comment and a pause
- Each comment or question must be contingent on what the last person said
- Each time we play the rules change

Intrapersonal ToM in Academics

**Think Aloud**

**Strategies to Build Inferential Comprehension**

**Think Aloud**

Students read silently as teacher reads aloud.

Teacher thinks through tricky spots and:

Make predictions:

"From the title I think this will be about..."

**Think Aloud**

Teacher thinks through more difficult parts of the text and:

Describes the pictures you form in your head about the information.

And it was over there, while my father and mother and I were driving in icy weather just north of Oslo, that our car skidded off the road and went tumbling down a rocky ravine." (The Witches, pg 7)

"I have a picture of this scene in my head and this is what it looks like..."

**Think Aloud**

Make connections explicit:

Show how to link prior information stated in the text to new information in text. "I remember about...and now...."

I remember the author had described how witches dressed. One important thing was they wore gloves. Now the author tells us about a woman wearing gloves "Gloves! She was wearing gloves!" (Dahl, 'The Witches' pg 36)
Think Aloud

Demonstrate fix-up strategies:
Show how to make sense of the passage.
“I’d better reread,” or “I’ll read ahead and see if I
can get some more information.”

Think Aloud

After you complete reading and Think Aloud,
encourage students to add their own thoughts to
yours.

Features of Questioning the Author
(QtA)

• Addresses text as product of fallible author
• Deals with text through open-ended, goal-
directed, teacher-posed questions
• Takes place in the context of reading as it
occurs
• Encourages discussion in which students
grapple with ideas in the service of
constructing meaning

with questioning the author. New York: Scholastic.
Characteristics of QTA Discussion

• Students do the work of the thinking and discovering on their own
• Students begin to see the difference between what the author says and inferring what the author means
• The tone of the interaction is meant to be positive

Questioning the Author

• Goal: Initiating queries
  – What is the author trying to say here?
  – What do you think the author wants us to know?
  – What is the author talking about?


Questioning the Author

• Goal: Follow-up queries
  – So what does the author mean right here?
    • That’s what the author said, but what did the author mean?
  – Does this make sense with what the author told us before?
  – How does this connect to what the author told us earlier?
  – Why do you think the author tells us this now?
Narrative Queries

• How do things look for this character now?
• How does the author let you know that something has changed?
• How has the author worked that out for us?
• Given what the author has already told us about this character, what do you think he’s up to?
• How is the author making you feel right now about these characters?
• What is the author telling us with conversation?

Observations

Stanley in hole
Lizards with yellow spots on him
Lizards aren’t biting him
Seems to be looking up at someone
Doesn’t look happy
Old chest in background
Many lizards on chest

Inferences

Maybe the chest is really important; Stanley was told to look for things in the holes.
Why aren’t the lizards biting? Is something protecting him?
Maybe he’s looking at the warden, cause she wanted him to find something.
Maybe the chest is what the warden had been looking for.
The warden can’t get the chest ’cause the lizards are on it.
Won’t be able to get what’s in the chest.

Observation/Inference Rubric

• Observations
  1. Few observations
  2. Many observations but not specific or detailed
  3. Many observations including ones that are specific and detailed
• Inferences linked to observations
  1. Some inferences but they are not based on observations
  2. Bases inferences on observations but does not show the relationship
  3. Bases inferences on observation and shows the relationship
• Inferences
  1. Makes few inferences or inferences that have no basis
  2. Several good inferences, but explanations may be fairly obvious
  3. Many good inferences, including ones that show depth of thinking

Mrs. Katz at Passover

Sad, lonely

She told him stories, fed him good food, and danced with him

Mrs. Katz & Larnel

Tush was missing

Worried, anxious

Because they thought Tush might have been hit by a car

Mrs. Katz

Tush had kittens

Ecstatic because she was a bubbe

Larnel when he was grown

Appreciative, love for Mrs. Katz

Because Mrs. Katz had been like a grandmother to him and his children

Perspectives

Mr. Sugihara

Events

Jews

Willing to listen; asked Japanese government what to do

Many people come to the embassy

Terrified; desperate to escape Nazis

Says can't help; asks again; concerned for Jews

Government denies visas

More people gather; increasing worry, terror

Concerned about self; compassionate, worried about Jews' safety

Sugihara decides to go against government

Thrilled, relieved

Exhausted; worried about family and Jews

Sugihara writes visas

Grateful

Concerned, then relieved when hears from survivors

Sugihara leaves address at Israeli embassy in Japan

Treasured visas, felt great respect; wished to honor him

Question-Answer-Relationships

• Where is the answer?
  – Right there!
    Words are right there in the text
  – Think and search!
    Words are in the text, but not spelled out for you. Think about what the author is saying.
  – Where is the answer?
    You and the author!
    Think about what you have learned and what is in the text.
  – Where is the answer?
    On your own!
    Answer is in you head.

QAR (Question-Answer-Response)
Passage to Freedom: The Sugihara Story

- Right there
  - Why were the Sugihara family living in Lithuania?

- Think and search
  - In what ways did Hiroki’s life change after the Polish Jews came to his house?

- Author and you
  - What is a visa?
  - Why didn’t Mrs. Sugihara help write the visas?

- On your own
  - Can you think of someone else who has risked his or her own life to save other persons?

Predicting Dialogue & Thoughts

Hattie                                               Ella
Wouldn’t you like to try my bracelet instead?
Let me try on your necklace.
Oh, no! That’s all I have from my mother.
I can make her be my personal maid.
Wouldn’t you like to try my bracelet instead?
Hattie figures out that Ella has to do anything she tells her to do

Feedback & Intrapersonal ToM

Person
- The blocks are all crooked and in one big mess. I’m very disappointed in you.

Process
- The blocks are all crooked and in one big mess. Maybe you should find another way to do it.

Neutral: That house you built with Legos has no windows.

Feedback & Intrapersonal ToM

Those who received person-feedback
- Role-played crying, helpless behavior
- She should cry and go to bed
- The teacher got mad and went home
- My sister saw and got upset that there were no windows
- He should get a timeout

Those who received process-feedback
- I would say it's not finished yet
- I can do it better if I take my time
- I'll make another building with windows
- I would say it's not finished yet, then I could cut out squares from paper and paste them on the house

Feedback & Intrapersonal ToM

Person-oriented
- You're a good boy
- I'm proud of you
- You're very good at this
- I like the way you...

Process-oriented
- You tried really hard
- You found a good way to do it; could you think of other ways that would also work?

Neutral: The bus you drew has no windows


How did Pinocchio become fully human?
- The Blue Fairy gave him cognitive ToM
- He had to develop affective ToM; particularly affective empathy; he risked his life to save Geppetto.
- Geppetto and Jiminy Cricket provided experiences to assist in his development of affective interpersonal and intrapersonal ToM