A Strategic Approach to Inference Generation in Reading: The ACT & Check Strategy

Kim Murza, Ph.D., CCC-SLP
University of Northern Colorado

Metro Speech Language Symposium
January 30, 2015
4:00-5:15
Advance Organizer

1. Discuss the rationale for targeting inference generation

2. Explain the process of inference generation in reading

3. Discuss the categories of inference generation as described by Magliano and Graesser (1991)

4. Describe the ACT & Check Strategy Intervention

5. Collaborate with peers to determine plausible inference category questions for a provided excerpt
Why Focus on a Strategic Approach to Inference Generation?

- Inference generation has been shown to be critical to successful reading comprehension (Anderson & Pearson, 1984; Snow, 2002)

- Skilled readers are actively engaged in their approach to reading (Pressley, 2002; Pressley & Afflerbach, 1995; Westby, 2004)

- Inference generation skills are included throughout the ELA Common Core State Anchor Standards

- Results of a randomized controlled trial with adults with high-functioning autism spectrum disorder suggest it works

- Many of our language disordered students are not generating inferences as they read!
Anchor Standards Related to Inference

- **CCSS.ELA-Literacy.CCRA.R.1**
  - Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

- **CCSS.ELA-Literacy.CCRA.R.6**
  - Assess how point of view or purpose shapes the content and style of a text.

- **CCSS.ELA-Literacy.CCRA.SL.3**
  - Evaluate a speaker’s point of view, reasoning, and use of evidence and rhetoric.

Research Results

- 25 adults with high-functioning autism (13 treatment, 12 control)
- One hour, twice a week for six weeks, in groups of 3–5
- Based on a research-validated instructional methodology designed to teach strategies to students (Ellis, Deshler, Lenz, Schumaker, & Clark, 1991)
Positive and Statistically Significant Results (Murza et al., 2014)

<table>
<thead>
<tr>
<th>Area</th>
<th>Effect Size</th>
<th>95% Confidence Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inference generation in reading*</td>
<td>.97</td>
<td>.17 to 1.76</td>
</tr>
<tr>
<td>Metacognitive ability*</td>
<td>1.41</td>
<td>.56 to 2.26</td>
</tr>
<tr>
<td>Reading comprehension: main idea questions*</td>
<td>1.15</td>
<td>.32 to 1.97</td>
</tr>
<tr>
<td>Reading comprehension: predicting questions*</td>
<td>.80</td>
<td>.01 to 1.59</td>
</tr>
</tbody>
</table>

* p < .05

- Statistically significant results were not found in the areas of reading comprehension: factual and clarifying questions or overall broad reading comprehension. Statistically significant results were also not found in the area of social inference generation.
Conceptualizing Inference Generation

• The cognitive process of connecting information from a variety of sources to come to a conclusion.

Background knowledge + Contextual cues (social/text) = Inference generation

Feedback and revision

Murza, 2015
Take a look
Categories of Inference Generation in Reading

- Magliano & Graesser (1991)
- 11 categories of inferences
  - Local interpretation of text elements
  - Global understanding of the passage

- Several of these inference categories in reading appear most related to social inference and most important overall
Inference Categories Specific to Social Inference

<table>
<thead>
<tr>
<th>Inference Category</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Theme</td>
<td>Inferences about the main idea or moral of the story</td>
</tr>
<tr>
<td>Author’s intent</td>
<td>Inferences concerning the motivation of the author in writing the text</td>
</tr>
<tr>
<td>State</td>
<td>Inferences about the condition of the world based on the timeframe of the text</td>
</tr>
<tr>
<td>Superordinate goal</td>
<td>Inferences concerning why a character might do something</td>
</tr>
<tr>
<td>Emotion</td>
<td>Inferences about the character’s emotional responses to story events</td>
</tr>
</tbody>
</table>
ACT & Check Strategy

- **ACT & Check**
  - Ask yourself a question
  - Consider the text
  - Think about what you know and take a good guess
  - Check your guess

Murza, 2015
Keys to Inference Generation Intervention in Reading

- Keys
  - Modeling inference generation
  - Instruction in text structure
  - Questioning by the teacher and the student
  - Activation of prior knowledge
  - Work in prediction skills
  - Strategy instruction

Hughes, Ruhl, Schumaker, & Deshler, 2002; Lancaster, Schumaker, Lancaster, & Deshler, 2009; Schumaker et al., 1982 Kispal, 2000
## Delivery of the Intervention

### Eight-Stage Instructional Sequence

<table>
<thead>
<tr>
<th>Stage</th>
<th>Activity</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>Pretest and Make Commitments</td>
<td>Gather baseline data to increase individual’s awareness of the necessity of strategy instruction and increase his/her motivation to learn the strategy.</td>
</tr>
<tr>
<td>Stage 2</td>
<td>Describe</td>
<td>Explicit instruction in each component of the strategy including overt and covert processes.</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Model</td>
<td>Instructor uses a “think-aloud” procedure to walk students through each overt and covert process of each step of the strategy.</td>
</tr>
<tr>
<td>Stage 4</td>
<td>Verbal Practice</td>
<td>Students demonstrate an ability to automatically name each strategy step and explain key information.</td>
</tr>
</tbody>
</table>

Ellis, Deshler, Lenz, Schumaker, & Clark (1991)
Delivery of the Intervention, cont.

<table>
<thead>
<tr>
<th>Stage 5</th>
<th>Controlled Practice and Feedback</th>
<th>Students are provided with multiple opportunities to practice using the strategy with less demanding material to build their confidence and help them become independent in their use of the strategy.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 6</td>
<td>Advanced Practice and Feedback</td>
<td>Students are provided with multiple opportunities to practice using the strategy with materials similar to those he/she encounters on a daily basis.</td>
</tr>
<tr>
<td>Stage 7</td>
<td>Posttest and Make Commitments</td>
<td>Gather data to demonstrate mastery of the strategy and make commitments to generalization of the strategy across settings, situations, and time.</td>
</tr>
<tr>
<td>Stage 8</td>
<td>Generalization</td>
<td>Students demonstrate the generalization of the use of the strategy across settings.</td>
</tr>
</tbody>
</table>

Ellis, Deshler, Lenz, Schumaker, & Clark (1991)
## Inference Category Question Key

<table>
<thead>
<tr>
<th>Inference Category</th>
<th>Question(s)</th>
</tr>
</thead>
</table>
| Theme or Thesis             | Theme  
• What does the story reveal (if anything)?  
• What kinds of changes did the main character go through? (what happens to the main character?)  
• What did the main character learn?  
• What is the nature of the conflict?  
| Thesis                      | • What is the main idea of this passage? |
| Author’s Intent             | • What is the author trying to tell me? Or how is the author trying to influence me? Or...what impression is the author trying to make upon me? |
| Character Condition         | • How have the character’s emotions changed?  
• What is this character up to now?  
• Did this event significantly change this character’s life, how so?  
• Does this information tell me anything new about the character? |
| Big Goal                    | • Why did the character just do that?  
• What does the character want to happen now? |
| Intended Reader Emotion     | • What is the author trying to make me feel by writing that? |
# Inference Graphic Organizer

<table>
<thead>
<tr>
<th>Known (the author tells me)</th>
<th>Unknown (the author doesn’t tell me)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
“I want to go home,” I said, my voice perilously near trembling, and without a word he started up the engine, let in the clutch and turned the car round the way that we had come.

Character Condition: How have the character’s emotions changed? Did some event significantly change the character’s life? How so?

Big Goal: Why did “he” just do that?

<table>
<thead>
<tr>
<th>Known (the author tells me)</th>
<th>Unknown (the author doesn’t tell me)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“I want to go home,” I said, my voice perilously near trembling ...”</td>
<td>Seems like the narrator wants to get away from where they are in the car. I know when people’s voices tremble they are either scared, angry, or about to cry from sadness.</td>
</tr>
<tr>
<td>Without a word ...</td>
<td>Whoever “he” is obeyed her wishes. Maybe that’s because he wants to help her feel better.</td>
</tr>
</tbody>
</table>

Inference Lab

• With a partner or partners use the ACT & Check Strategy to generate inferences with the remainder of the passage in your handouts

• Use the lines to write your questions (refer to the Inference Category Question Key)

• Use the Inference Graphic Organizer to consider the text and what you know to generate an inference

Murza, 2015
A Couple Examples

Swiftly we covered the ground, far too swiftly, I thought, far too easily, andCharacter Condition: How have the character’s emotions changed?the callous countryside watched us with indifference. We came to the bend in

the road that I had wished to imprison as a memory, and the peasant girl was
gone, and the color was flat, and it was no more after all than any bend in any r
road passed by a hundred motorists. The glamour of it had gone with my
Author’s intent: what is the author trying to tell me?happy mood, and the thought of it my frozen face quivered into feeling, my
adult pride was lost, and those despicable tears rejoicing at their conquest
welled into my eyes and strayed upon my cheeks.
Character Condition: How have the character’s emotions changed?
<table>
<thead>
<tr>
<th>Known (the author tells me)</th>
<th>Unknown (the author doesn’t tell me)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Swiftly we covered the ground, far too swiftly, I thought...</td>
<td>Sounds like the narrator might be frightened now by the speed of the car</td>
</tr>
<tr>
<td>We came to the bend in the road that I had wished to imprison as a memory, and the peasant girl was gone, and the color was flat, and it was no more after all than any bend in any road passed by a hundred motorists.</td>
<td>This bend sounds significant to the narrator, and because she wants to “imprison it as a memory” I’m thinking that something awful happened here. Maybe recently since she was expecting to see the peasant girl. I’m guessing that the author wants me to put the pieces together. I can think of some bad things that can happen at a bend in the road, maybe they hit the peasant girl as they came around the bend too quickly</td>
</tr>
<tr>
<td>My adult pride was lost, and those despicable tears rejoicing at their conquest welled into my eyes and strayed upon my cheeks</td>
<td>The narrator seems to be very sad to be crying uncontrollably, but I’m also thinking that if she’s calling the tears despicable and if she thinks her pride is lost she is embarrassed to cry in front of the man</td>
</tr>
</tbody>
</table>
Inference Instruction at Each Level of Instruction

Level 1: Make the process of inference generation explicit. Provide opportunities for students to support their answers with evidence.

Level 2: Use think-aloud procedures to make the ACT & Check Strategy even more explicit. Work on the “A” piece of the strategy.

Level 3: Full ACT & Check Strategy Intervention guided by the empirically validated instructional methodology of Ellis et al. (1991)
Inferencing Goal/Objective

• An example:

“...will spontaneously orally predict/form inferences about story characters and events during read alouds in the classroom with 80% accuracy over a 2-week period...”

ELA-Literacy.RL.4.1: “Refer to details and examples in a text when explaining what the text says explicitly, and when drawing inferences from the text.”
How is all of this related to social inference?
Conceptualizing Inference Generation

- The cognitive process of connecting information from a variety of sources to come to a conclusion.

- Background knowledge + Contextual cues (social/text) = Inference generation

Feedback and revision

Murza, 2015
Research Rationale

• Many adults with ASD:
  ▫ Are unemployed or underemployed (Gerhardt & Lainer, 2011)
    • It is the *pragmatic language* difficulty of individuals with ASD, not an inability to perform job tasks adequately, that contributes to a loss in employment (Dew & Alan, 2007; Holmes, 2007; Hurlbut & Chalmers, 2004; Unger, 1999)
  ▫ Experience difficulty establishing and maintaining friendships and romantic relationships (Hendrick, 2008)
  ▫ Experience social isolation and/or an extreme fear of social situations (Kim, Szatmari, Bryson, Streiner, & Wilson, 2000; Woodbury-Smith, 2009)
Social Inference Considerations

- Facial expression interpretation
- Identifying the meaning behind paralinguistic aspects of communication
  - e.g., pausing, vocal inflection, loudness
- Interpreting nonverbal feedback of communication partners
Social Inference Considerations

• Sincerity, sarcasm, lies
Questions/Comments

kim.murza@unco.edu
970351-1084
References

References, cont.