Infer! Infer!
Filling what's not in the book!

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The Inference Song
https://www.youtube.com/watch?v=m_ZNP5aj5fs

Email for final more complete file

Competent Readers Can...

Read Across & Beyond the Lines
Read Between the Lines
(understanding inferred meaning)
Read Along the Lines
(decoding and understanding literal meanings)

Obanya, P. (2003). Towards a Reading

Comprehension Requires That
Readers build a mental model or representation of the situation or world (real or imaginary) described in the text.


Knowledge, experiences, propositions from long-term memory

Text Macrostructure
Text organization
Gist or theme

Text Microstructure
Words
Sentences
Cohesive structures

Textbase Model

Situation/Scenario Mapping Model
Comprehensive referential meaning of the real or imaginary situation described in the text.

Mental Modeling for Texts

NAEP Grade 4 Questions for Hungry Spider and Turtle

• When turtle remains quiet about his mistreatment by Spider, the author wants you to:
  – believe turtle is afraid
  – have sympathy for turtle
  – feel dislike for turtle
  – think turtle deserved no dinner
• Spider’s behavior during the first part of the story is most like that of:
  – mothers protecting their children
  – thieves robbing banks
  – runners losing races
  – people not sharing their wealth

Reasons for Inferencing Difficulties

• Lack of general knowledge
• Have difficulty accessing relevant background knowledge and integrating it with what is in the text
• Less skilled at synthesizing information from different parts of text and making relevant inferences
• May not realize that inferences are necessary

Why do students with LI tolerate ambiguity in texts?

They are less aware:

- That a text should make sense to them
- That they should be monitoring their understanding for potential inconsistencies
- About strategies to adopt when beginning with a text
- About strategies to adopt when an inconsistency occurs
- About the information that is relevant to the drawing of inferences

### Classification of Inferences: How they make text coherent

<table>
<thead>
<tr>
<th>Name</th>
<th>Example</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elaborative</td>
<td>Kathy dropped the vase. She ran for the dustpan and brush to sweep up</td>
<td>Enriches mental representation of text. Drawing on life experiences and general knowledge, reader has to realize that the vase broke to supply the connection between the sentences.</td>
</tr>
<tr>
<td>gap-filling</td>
<td>the pieces.</td>
<td></td>
</tr>
<tr>
<td>knowledge-based</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Classification of Inferences:

**How they make text coherent**

<table>
<thead>
<tr>
<th>Name</th>
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<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coherence</td>
<td>Peter begged his mother to let him go to the party.</td>
<td>Maintains textual integrity. Reader must realize that pronouns &quot;his&quot; and &quot;him&quot; refer to Peter to understand the sentence.</td>
</tr>
<tr>
<td>or intersentence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or text-connecting</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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### Classification of Inferences: How they make text coherent

<table>
<thead>
<tr>
<th>Name</th>
<th>Example</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Local</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Coherence</td>
<td>Peter begged his mother to let him go to the party.</td>
<td>Creates a coherent representation at the local level of sentences and paragraphs. Reader must realize that pronouns &quot;his&quot; and &quot;him&quot; refer to Peter to understand the sentence.</td>
</tr>
<tr>
<td>inferences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Antecedent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>causal inferences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>He rushed off, leaving his</td>
<td></td>
<td></td>
</tr>
<tr>
<td>bike unchained.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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### Classification of Inferences: How they make text coherent

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<thead>
<tr>
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<th>Example</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global</td>
<td>Inferences about the theme, main point, or moral of a text.</td>
<td>To create a coherent representation of the whole text, the reader would infer overarching ideas by drawing on local pieces of information.</td>
</tr>
<tr>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

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### Logical Inferences

**Deductive**

All mammals are **warm-blooded** and have fur. A tapir is a mammal. Is a tapir warm-blooded? Does it have fur?

**Inductive**

This animal is warm-blooded. It has fur. It feeds its young milk. I think it is a mammal.
Deductive Inferences

- Demigods are children who have one human parent and one parent who is a Greek or Roman god. Percy’s father is Neptune, the Greek god of the sea. His mother is a human who works in New York. Percy is a demigod.
- Percy is the son of Neptune, god of the sea. If he is the son of the god of the sea, then he should be very comfortable in the water, be able to hold his breath under water for a long time, or breathe under water. He won’t drown when the ship blows up.

Inductive Inferences

Who is Jason’s Father?

- Aeolus is the God presiding over and keeping the winds. Well it would explain Jason’s ability to fly and his connection to the Anemoi Thuellai (Venti in Roman). I think, though, that there is a better choice.
- Boreus is the North Wind. This one is the most plausible to me. Why, you ask? Well, first off in the myth “Jason and the Argonauts”, the title character (“our” Jason’s namesake) lost his shoe. Remind you of anything? Second off, there were some characters in that myth that could fly. Guess who their daddy is? My last bit of evidence: Being a child of the North Wind would definitely explain why he knew who the Anemoi Thuellai were.

Classes of Inferences

Predictive: forecast what events will unfold

- Stanley will find Zero in the desert and they will run away from camp.
- The Warden is running the camp so she’ll have help finding a treasure.
- The Warden’s nail polish has rattlesnake venom in it. So when she scratches Mr. Sir, you must realize that the scratch will be more painful and harmful than an ordinary scratch.

Theory of Mind

Cognitive

- Interpersonal: Understand that others can have thoughts, beliefs, desires different than my own
- Interpersonal: Reflect on one’s own mental states
- Interpersonal: Use metacognitive learning strategies; Monitor comprehension; Plan one’s behavior

Affective

- Interpersonal: Recognize own emotions
- Interpersonal: Infer emotions of others
- Interpersonal: Empathize with others

Intrapersonal

- Reflect on one’s own mental states
- Use metacognitive learning strategies; Monitor comprehension; Plan one’s behavior
- Infer behavior based on thoughts

Gap-filling Inferences

• Theory of mind – prospective taking
• Bringing in past personal experiences
• Linking to other texts

Early Studies of LI and Inferencing

• On both verbal and visually presented stories, children with language impairments make fewer total inferences and more inference errors than typically developing children


Skills needed to make inferences:

• Comprehension of linguistic input
  – Vocabulary
  – Syntax
• General world knowledge
  – Including theory of mind (ToM)
• Working memory
  – Search for information in memory
  – Search in other places (look back at text)
  – Check that the inference explains the premises held in working memory


Research Questions

• Are inference questions based on distant information more difficult to answer than inference questions based on adjacent information?
• Do adolescents without language impairment answer distance inference questions with greater accuracy than adolescents with language impairment?
• Does working memory performance predict variation in distant inference accuracy beyond that explained by language and nonverbal IQ?

Inferencing in 4 Groups of 8th Grade Students

• Normal language group (NL)
  – Normal vocab/syntax, world knowledge, working memory
• Specific language impairment group (SLI)
  – Normal world knowledge
  – Deficits in vocab/syntax and working memory
• Nonspecific language impairment group (NLI)
  – Deficits in vocab/syntax, world knowledge, and working memory
• Low cognition group
  – Normal vocab/syntax
  – Deficits in world knowledge and working memory


Literal and Inferential Questions by students with Reading Comprehension Deficits

<table>
<thead>
<tr>
<th></th>
<th>Unseen</th>
<th>Seen</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Literal</td>
<td>Inferential</td>
</tr>
<tr>
<td>Less skilled</td>
<td>29.2</td>
<td>45.8</td>
</tr>
<tr>
<td>Skilled</td>
<td>10.9</td>
<td>15.6</td>
</tr>
</tbody>
</table>

Inferencing in 4 Groups of 8th Grade Students

- Working memory: All measures correlated highly with inference scores
- Adjacent inference questions:
  - No difference between NL and LC groups
  - NL group better than SLI and NLI groups
- Distance inference questions:
  - All groups of students had more difficulty with distant inference questions than adjacent inference questions


Working Memory, ASD, and Inferences (Adolescents 11-18 years)

- Fatima is going to work as a waitress this weekend. Her sister is sick and she is going to replace her.
- When Fatima was a child she sat all her dolls and pretended to be a waitress bringing glasses of water. Also, when asked what she wanted to be when she grew up, she always replied, “a waitress.” On top of it, she is going to earn some money in a proper job.
- Fatima was feeling excited
- Fatima was feeling disappointed

Working Memory, ASD, and Inferences (Adolescents 11-18 years)

- Isabel’s boss has told her that she has to go to England for 4 months. She can’t sleep since she received the news. She doesn’t know how she will live there. She won’t have her family nearby and, most important, she won’t be able to talk to anyone because she doesn’t speak English.
- Neutral sentences before inference:
  - Twenty years ago, people rarely studied English at school and students could choose to study other languages, such as French or German. But nowadays, to get a job, you must speak English.
  - Isabel was feeling unhappy
  - Isabel was feeling happy

Children with LI inferring emotions in situations

- Kindergarten children with language impairment (LI) and typically developing children (TD) were 100% accurate in pointing to pictures of happy, sad, mad, surprised
- TD and LI children were 100% correct in labeling happy, sad, mad; 4 of the 12 children with LI did not label surprised correctly
- Children with LI made significantly more errors inferring emotional reactions
  - Children with LI made more errors of a different valence


Children with LI inferring emotions online

- Preschool children with typical language (TL) and language impairment (LI) watched videos designed to activate knowledge of an emotion
  - It was Twinky’s birthday. He/she opened a present. It was a big teddy bear.
  - Twinky went to Grandma’s. Grandma took Twinky to the candy store. He/she got some candy.
- Children were then shown a facial expression. In half the scenarios, the facial expression matched the emotion in the video (happy) and in half it did not


Results for Inferring Emotions Online

- TL children were significantly slower to label emotions in unmatched condition
- Children with LI did not differ in response times in the two conditions
- Suggests they were not making inferences while watching the videos
- Performance on the inferencing tasks predicted social skills on the Preschool Kindergarten Behavior Scales

Inference in LI Children 6-10 years old

- Children with LI (6-10 years) have more difficulty with emotional inferences than TD children
- Children with LI make more errors of valence than TD children, e.g.,
  - TD same valence errors, e.g., sad for angry
  - LI different valence errors, happy for sad or angry


Can a verbal inference task differentiate between:

- Children with language impairment (CwLI) and match peers with typical language development (TLD) (6-11 years)
- Children with specific language impairment (CwSLI) and children with pragmatic language impairment (CwPLI)


Sentence Comprehension (SC) Task

- 29 items that required the child to point to a picture (from a set of four choices) or written word on the test booklet (again from a set of four words read by the evaluator).
  - direct and indirect objects ("She gave the baby the book.")
  - passive comprehension ("The dog was splashed by the girl.")
  - embedded clauses (The crocodile that bit the lion was small.)
  - complex continuous past ("Which one have I already eaten?")


Inferential Comprehension (IC) task

- Picture of kitchen in aftermath of a burglary.
  - Householder and policewoman picture with clues
    - Torn piece of cloth
    - Footprint
    - Broken window
  - Examiner read short text about picture
  - Students asked 11 questions designed to tap inferencing


Inferential Comprehension (IC) Questions

- Why was the dog barking?
- Why is the policewoman there?
- What happened when the burglar got into the house?
- What clues will the police find about who broke in? (prompt allowed)
- Why did the burglar break into the back of the house?
- How do we know it was the burglar who broke the window?
- Why do you think the burglar took only the watch? (prompt allowed)
- What clues will the police find about who broke in? (prompt allowed)
- Why did the burglar take the watch?
- How does the family feel now? (prompt allowed)
- Why do you think the burglar took only the watch? (prompt allowed)
- Should all theft be treated in the same way? (prompt allowed)
- Why did the burglar take only the watch?
- Why do you think the burglar took only the watch? (prompt allowed)

Coding of inference comprehension

<table>
<thead>
<tr>
<th>Type of inference error</th>
<th>Question</th>
<th>Example response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Failure of literal comprehension</td>
<td>Why do you think the burglar took only the watch?</td>
<td>cos he crept in</td>
</tr>
<tr>
<td>Wrong inference: answer is irrelevant in the context of the story</td>
<td>How does the family feel now?</td>
<td>feel better if go to hospital</td>
</tr>
<tr>
<td>Immature inference: child links question to own experience; answer is relevant to the picture but based on limited or immature world knowledge</td>
<td>Why would someone steal something?</td>
<td>because they ain’t got a watch</td>
</tr>
</tbody>
</table>
**Coding of inference comprehension**

<table>
<thead>
<tr>
<th>Type of inference error</th>
<th>Question</th>
<th>Example response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odd inference: Unique or unexpected given the story premise or contained excessive/irrelevant detail</td>
<td>Why was the dog barking?</td>
<td>He was telling the truth</td>
</tr>
<tr>
<td>Because: minimal answer</td>
<td></td>
<td>Because he did</td>
</tr>
<tr>
<td>Scope: response is along the right lines, but either too specific or vague</td>
<td>Why was the dog barking?</td>
<td>Because someone said “ow”</td>
</tr>
<tr>
<td>Lack of expressive ability: answer is syntactically incomplete or unintelligible</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No response</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Comprehension of CwLI and CwSLI**

- All CwLI
  - Made significantly more literal comprehension errors or failed to respond to inference questions than their SC matched peers (didn't understand the question).
  - Suggests that CwLI cope less well with an IC task than expected by their ability to comprehend isolated sentences
- CwSLI
  - The CwSLI had significantly higher IC scores than CwPLI
  - No significant differences between the types of inferences that CwSLI and CwPLI made


**Comprehension of CwPLI**

- CwPLI
  - CwPLI to perform more poorly on developmentally more complex inference items
  - Did not make significantly more odd or wrong inferences than CwSLI
  - Had significantly lower inferential scores than their CA and SC matched groups.

**Reading Comprehension in TD, ASD, ASD+LI**

- Adolescents
  - Nature stories that did not include social references or emotional content

- Students with ASD without LI answered more literal questions correctly than TLD students, but significantly fewer inferential questions
- Students with ASD + Language impairment answered the same number of literal questions correctly as TD students, but significantly fewer inferential questions correctly that students with ASD + LI

**ASD Answering Literacy & Inferential Questions: 7-12 year olds**

- TD children and children with ASD with normal vocabulary and syntax performed similarly
  - Both groups answered a few more literal questions correctly than inferential questions
- Children with LI
  - Answered same number of literal questions correctly as TD children and children with ASD without LI
  - Answered significantly fewer inferential question correctly than TD children and ASD children without LI
- Child with ASD + LI
  - Answered significantly fewer literal and inferential questions than children with LI

**Comprehension of physical causality, intentionality, and emotions by persons with ASD**

- Difficulty with all types of inferences, but
  - Best performance on physical causality
  - Errors may be related to difficult integrating world knowledge with context/situation
  - More errors on intentionality/mental states
  - Most errors on emotion states
Central Coherence vs Context Blindness

- Ability to derive overall meaning from a mass of details
- A person with strong central coherence, looking at an endless expanse of trees, would see “the forest.”
- A person with weak central coherence would see only a whole lot of individual trees.

Inferences by 4-7 year olds (TD & ASD) in narrative comprehension

- It’s Susie’s birthday party tomorrow. Susie and her Mum go to the supermarket to buy food for the party. Susie really hopes Mum buy her a chocolate cake. They get a cake, some candy, and some chips. Then they pay the cashier. Susie leaves the store smiling and feeling happy. And they take the food home.

<table>
<thead>
<tr>
<th>Question type</th>
<th>Inference type</th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factual</td>
<td>Inductive</td>
<td>Where do they first go in the story?</td>
<td>To the supermarket</td>
</tr>
<tr>
<td>Script</td>
<td>Inductive</td>
<td>Why did they give money to the cashier?</td>
<td>To buy the food</td>
</tr>
<tr>
<td>Propositional</td>
<td>Deductive</td>
<td>Why was Susie happy when they left the store?</td>
<td>Her Mum bought a chocolate cake.</td>
</tr>
</tbody>
</table>


What happens when you can’t retrieve the script

The procedure is quite simple. First you arrange items into different groups. Of course one pile may be sufficient depending on how much there is to do. If you have to go somewhere else due to lack of facilities that is the next step; otherwise, you are pretty well set. It is important not to overdo things. That is, it is better to do too few things at once than too many. In the short run this may not seem important but complications can easily arise. A mistake can be expensive as well. At first the whole procedure will seem complicated. Soon, however, it will become just another facet of life. It is difficult to foresee any end to the necessity for this task in the immediate future, but then, one never can tell. After the procedure is completed one arranges the materials into their appropriate places. Eventually, they will be used once more and the whole cycle will then have to be repeated. However, this is part of life.


Category Induction in ASD

<table>
<thead>
<tr>
<th></th>
<th>TD</th>
<th>Optimal</th>
<th>HFA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perfect 6/6</td>
<td>17.3</td>
<td>16.7</td>
<td>15.4</td>
</tr>
<tr>
<td>Almost perfect 5/6</td>
<td>52.2</td>
<td>27.8</td>
<td>23.1</td>
</tr>
<tr>
<td>Consistent 4/6</td>
<td>26.1</td>
<td>38.9</td>
<td>38.4</td>
</tr>
<tr>
<td>Moderate 3/6</td>
<td>4.3</td>
<td>16.7</td>
<td>15.4</td>
</tr>
<tr>
<td>Nonextender</td>
<td>0</td>
<td>0</td>
<td>7.7</td>
</tr>
</tbody>
</table>


Depth of Vocabulary and Inference Processing

- Types of vocabulary measures:
  - Breadth of vocabulary: number of words known
  - Depth of vocabulary: amount of knowledge about a word
- Particularly important to make inductive inferences:
  - Teacher, friends, play, learn, books, math --- school
  - Type, keyboard, internet, email, printer, mouse --- computer
- Depth of vocabulary affects inferences at global level even more than at local levels

Concept Questions

- Who was Martin Luther King?
- What is racism?
- What is Washington, DC?
- What does “equal rights” mean to you?


Martin Luther King, Jr. – 5th Grade

- Explicit questions
  - In some cities, what did blacks have to do on a city bus? (give up their seat)
  - Why was Rosa Parks arrested? (she didn’t want to give up her seat)
  - What did many people do to protest Rosa Park’s arrest? (don’t know)
  - Name one way in which Martin Luther King was honored for his work. (a medal)


Martin Luther King – 5th Grade

- Implicit Questions
  - What was Martin Luther King’s main goal? (change the law)
  - Why had people made laws separating blacks and whites? (don’t know) (causal inference – prior knowledge)
  - What happened when people refused to ride the buses? (lost money ?? They had to change the law) (causal inference – across the text)
  - Why was Washington, D.C. an important place to protest unjust laws? (the president lives there) (causal inference – prior knowledge)

Types of Answers to QRI Questions

- Failure to link ideas across a passage – making relational inferences
- Failure to make causal inferences
- Failure to parse syntax
- Excessive elaboration or overreliance on prior knowledge
- Failure to know a key vocabulary word
- No response – did not answer


Common Core Standards Requiring Inferences

<table>
<thead>
<tr>
<th>Common Core Standard</th>
<th>Inference Type</th>
<th>Narrative Text Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determine what the text says explicitly</td>
<td>Text evidence</td>
<td>Using details from the text, what do the topics of Ms. Ryland’s books tell us about how she felt about animal?</td>
</tr>
<tr>
<td>Determine the theme of the text</td>
<td>Theme</td>
<td>What is the theme of the story so far? What details in the story support the theme you’ve chosen?</td>
</tr>
<tr>
<td>Describe/analyze how</td>
<td>Text analysis</td>
<td>Explain how events in Cynthia’s childhood led her to write about being lonely and needing love?</td>
</tr>
</tbody>
</table>


Common Core Standards Requiring Inferences

<table>
<thead>
<tr>
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<th>Inference Type</th>
<th>Narrative Text Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interpret words and phrases as they are used in text</td>
<td>Vocabulary in context</td>
<td>What does “undeniable punch” mean in the sentence, “her books have undeniable punch”?</td>
</tr>
<tr>
<td>Explain how an author develops a point of view</td>
<td>Point of view</td>
<td>How did Cynthia’s point of view of writers affect her view of herself as a writer?</td>
</tr>
</tbody>
</table>


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Think Aloud Statements
Indicating Comprehension

- Paraphrases or summarizes what the author has said
- Making new meaning: makes an inference, draws a conclusion, or engages in reasoning
- Questioning that indicates understanding: asks a question based on understanding the text, e.g., questioning the motivation of a character

Think Aloud Statements
Indicating Lack of Comprehension

- Questioning content: asks questions about character motivation or the applications of a concept that indicate lack of understanding. The student also asks about the meaning of words or concepts.
- Noting lack of understanding: clearly states that she or he is confused about something.

Factors common to those adept at inferring

- Being an active reader who wants to make sense of text
- Competent working memory
- Monitoring comprehension
- Rich vocabulary
- Wide background knowledge
- Sharing same cultural background as that assumed by text

What to do to Develop Inferring

- Activate prior knowledge/build knowledge
- Develop vocabulary/syntactic structures
- Develop theory of mind
- Teach questioning
- Teach summarizing

Metacognitive Processes

- Knowledge of Cognition:
  - Knowledge of the factors that influence one’s own performance
  - Knowing different types of strategies to use
  - Knowledge about why and when to use a given strategy.

- Regulation of Cognition:
  - Planning, monitoring, and regulating learning
  - Evaluating one’s own regulation; assessing results and strategies used

Raisel’s Riddle
What’s more precious than rubies, more lasting than gold?
What can never be traded, stolen, or sold?
What comes with great effort and takes time, but then,
Once yours, will serve you again and again.

Build Vocabulary Depth
• Identify important words in the passage
• Activate important facts about those words
• Reason about those facts, computing relationships among the words


Expanding Expression Tool

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>What group does it belong to?</td>
<td>Animal, bird</td>
</tr>
<tr>
<td>What does it do? What do you do with it?</td>
<td>Swims, doesn’t fly, eat fish</td>
</tr>
<tr>
<td>What color, size, shape is it?</td>
<td>Black and white, different sizes</td>
</tr>
<tr>
<td>What is it made of or come from?</td>
<td>??</td>
</tr>
<tr>
<td>What are its parts? What parts go with it?</td>
<td>Bill/beak, feathers, webbed feet</td>
</tr>
<tr>
<td>Where do you find it?</td>
<td>Many live in Antarctica; some live in South Africa, Australia, New Zealand; also zoos</td>
</tr>
<tr>
<td>Other knowledge about it</td>
<td>Seals eat penguins; I’ve read stories about Tacky the Penguin</td>
</tr>
</tbody>
</table>

Nondirective Vocabulary Context

Dan heard the door open and wondered who had arrived. He couldn’t make out the voices. Then he recognized the lumbering footsteps on the stairs and knew it was Aunt Grace.

General Vocabulary Context

Joe and Stan arrived at the party at 7 o’clock. By 9:30, the evening seemed to drag for Stan. But Joe really seemed to be having a good time at the party. “I wish I could be as gregarious as he is,” thought Stan.

Contexts that enable inferring of meaning
• Murderers are usually incarcerated for longer periods of time than robbers.
• Ben is fearless, but his brother is timorous.
• Dad gave credence to my story, but Mom’s reaction was one of total disbelief.
• When we invite the Paulsons for dinner, they never invite us to their home for a meal; however, when we have the Browns to dinner, they always reciprocate.
**Cloze treatment: Inferring vocabulary**

- Integrate background knowledge and text information to generate inferences
  - The car skidded out of control and crashed through the railing over the _____. (using semantic, syntactic, and world knowledge)
  - The car skidded out of control and crashed through the railing over the _____. The boat below was halfway under the bridge and missed being hit. (use information subsequent to the cloze blank)
  - It had rained and there was still no grass by the new house. The dogs were rolling in the mud and spreading dirt everywhere. The girl ran to catch her dog and slipped in the _____. (refer to information previous to the blank)


---

**Teaching Vocabulary**

<table>
<thead>
<tr>
<th>Word</th>
<th>Dictionary Definition</th>
<th>Friendly Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>devious</td>
<td>straying from the right course; not straightforward</td>
<td>If someone is devious, he is using tricky and secretive ways to do something dishonest</td>
</tr>
<tr>
<td>pungent</td>
<td>sharply affecting the organs of taste or smell, as if by a penetrating power; biting; acrid.</td>
<td>Something that is pungent has a smell or taste that is very sharp and strong, sometimes so strong it is unpleasant</td>
</tr>
</tbody>
</table>

---

**Sentences using dictionary definitions**

- He was **devious** on his bike.
- The dog was **pungent** the bone.
- The student made a **capricious** on her math test.
- Jim has a **smirk** on his face.

---

**Vocabulary instruction**

- Contextualize word for its role in the story
- Have children repeat word so they create a phonological representation
- Explain the meaning of the word
- Give examples in contexts other than the story.
- Children provide their own examples
- Children say word again to reinforce its phonological representation


---

**Evaluating Vocabulary Knowledge**

<table>
<thead>
<tr>
<th>Red Zone</th>
<th>Yellow Zone</th>
<th>Green Zone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red-light words</td>
<td>Yellow-light words</td>
<td>Green-light words</td>
</tr>
<tr>
<td>I don’t know the word</td>
<td>I understand the general meaning of the word but can’t use it</td>
<td>I can define the word</td>
</tr>
<tr>
<td>I need to stop and use clarifying strategies</td>
<td>I need to slow down and check my comprehension</td>
<td>I can read at the speed limit</td>
</tr>
</tbody>
</table>


---

**Learning Multiple Meaning Words**

- Many English words have multiple meanings
- Children with language impairments (LI) have fewer meanings for words
- Children with LI frequently have difficulty retrieving word meanings
- Ability to rapidly retrieve word meanings promotes comprehension

Multiple meaning words: "innocent"

- Not guilty of an offense
  - Blameless: Stanley was blameless of the robbery.
  - Guiltless: The court did not find Stanley guiltless.
  - In the clear: Stanley's social worker proved that he was in the clear.
- Not experienced
  - Naïve: Stanley was naïve about the functioning of the court.
  - Unsophisticated: Stanley's unsophisticated parents did not the implications of sending Stanley to Camp Green Lake.
  - Unaware: Zero was unaware that the sploosh would make him sick.

- Not dangerous or harmful
  - Harmless: A yellow-spotted lizard is not harmless.
  - Risk free: Being sent to Camp Green Lake was not risk free.
  - Playful: Sometimes the boys argued in a playful manner.

Multiple meaning words: "Match the sentence to its meaning"

- Stanley thought his comment was innocent, but it made Zero very angry.
- Stanley was a really good kid; he was too innocent to be with boys who were real bullies.
- Stanley's parents knew Stanley was innocent of stealing the shoes.

Is the word used as expected?

- When Zero confessed to stealing the shoes, he proved he was innocent.
- Stanley’s teaching Zero to read was an innocent activity.
- X-ray really knew how to survive in at Camp Green Lake. He was the boy's leader because he was so innocent.
- The social worker knew Stanley was innocent because he was in school when the shoes were taken.

Teach Vocabulary in Thematic groups

- The black widow spider
  - Widow, prey, poisonous, scamper, fluid
- The American colonies
  - Colony, independence, migrate, settlers, trade
- Whales
  - Adapt, agile, depths, docile, frolic, glide, tragic, treacherous, vicious

Teach Vocabulary in Thematic groups

**SERP Word Generation Program**

- Program to teach academic vocabulary language, discussion, argumentation, and thinking skills to students in 4th-8th grades
- Words are taught in multiple contexts over 5-10 lessons
- Available free: [http://wordgen.serpmedia.org](http://wordgen.serpmedia.org)

### Most Common Prefixes: Grades 3-4

<table>
<thead>
<tr>
<th>Prefix</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>un-</td>
<td>not</td>
</tr>
<tr>
<td>re-</td>
<td>back</td>
</tr>
<tr>
<td>in-, im-, ir, il-(not)</td>
<td>within, into, not</td>
</tr>
<tr>
<td>dis-</td>
<td>away</td>
</tr>
<tr>
<td>en-, em-</td>
<td>on, into</td>
</tr>
<tr>
<td>non-</td>
<td>not</td>
</tr>
<tr>
<td>over-</td>
<td>too</td>
</tr>
<tr>
<td>under-</td>
<td>below</td>
</tr>
</tbody>
</table>

### Teaching Suffixes

#### -er definitions and examples

<table>
<thead>
<tr>
<th>&quot;more&quot; (comparative adjective)</th>
<th>&quot;one who&quot; (noun)</th>
<th>&quot;that which&quot; (noun)</th>
</tr>
</thead>
<tbody>
<tr>
<td>stronger</td>
<td>teacher</td>
<td>toaster</td>
</tr>
<tr>
<td>thicker</td>
<td>traveler</td>
<td>washer</td>
</tr>
<tr>
<td>softer</td>
<td>pitcher</td>
<td>hanger</td>
</tr>
</tbody>
</table>


### Morphology Grades 5-6

- Greek and Latin word roots
  - Most common Greek roots: *tela* (far, distant); *therm* (heat); *photo* (light)
  - Move to Latin roots with aim to gain understanding of a few frequently occurring roots: *tract* (drag, pull); *spectator* (look); *port* (carry); *dict* (say), *rupture* (to break); *scrib* (to write)
- Greek and Latin prefixes
  - E.g., *inter-*(between); *intra-* (within); *post-* (after); *pro-* (in front of, forward); *co-* (com-com); *sub-* (under); *pre-* (before); *anti-* (against)


### Syntax for expressing inferences/interpretations

<table>
<thead>
<tr>
<th>Who</th>
<th>When</th>
<th>Emotion</th>
<th>Why</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percy</td>
<td>When Annabeth warned Percy that Aunty Em is Medusa</td>
<td>Terrified</td>
<td>he knew Medusa could turn him into stone</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Somebody</th>
<th>Wanted/Because</th>
<th>But</th>
<th>So</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percy</td>
<td>to stop Medusa because she could stop him from finding the lightning thief</td>
<td>if he looked at her when he swung his sword</td>
<td>he looked at her reflection in a mirror and swung his sword behind him</td>
</tr>
</tbody>
</table>

**Question-Answer-Relationships**

- Where is the answer?
  - Right there!
- Words are right there in the text
- Where is the answer?
  - 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 your 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?

**Landscape of Action**

- What characters do
- How they do it
  - Mrs. Pig called for a babysitter.
  - Mrs. Pig opened the door.
  - The babysitter is a wolf.
  - The babysitter it holding an umbrella.

**Landscape of Consciousness**

- What characters feel and think.
- Why they feel and think as they do?
- Making judgments about the characters

**Emotional Thermometers**

- Petrified
- Hysterical
- Terrified
- Scared/elevated
- Startled
- Unnerved
- Disturbed
- Dismayed

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

**Predicting Dialogue & Thoughts**

- She’ll be pleased with how I’m handling the boys and reward me.
- I don’t care what the boys do as long as they find the treasure.
- Mrs. Pig doesn’t know it’s a wolf. The wolf is tricking Mrs. Pig. The wolf wants to eat the piglets. The baby pigs are scared, so they’re running.

**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.


**Photo of Stanley in a hole he has been digging**

**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

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


Inner-Outer Prediction Chart

<table>
<thead>
<tr>
<th>Character</th>
<th>Outer Prediction (Events, Actions, Relationships)</th>
<th>Why? (Evidence)</th>
<th>Inner Predictions (Personality, Maturity, Learning, Emotions)</th>
<th>Why? (Evidence)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zero</td>
<td>He'll keep running and won't die.</td>
<td></td>
<td>He'll be scared, but he'll be glad to be out of camp</td>
<td>He doesn't know where he's going, but there won't be people calling him stupid</td>
</tr>
<tr>
<td>The warden</td>
<td>She'll just let Zero go</td>
<td>She's knows he'll have to come back</td>
<td>She doesn't</td>
<td></td>
</tr>
<tr>
<td>Stanley</td>
<td>He'll go after Zero</td>
<td>His Zero's friend; Zero's dog holes for Stanley and Stanley taught Zero to read</td>
<td>He's worried that Zero will be dead</td>
<td>It's been 2 days and Zero didn't have any water with him</td>
</tr>
</tbody>
</table>


Perspectives

<table>
<thead>
<tr>
<th>Stanley</th>
<th>Events</th>
<th>Mr. Sir</th>
</tr>
</thead>
<tbody>
<tr>
<td>Disappointed they’re not going after Zero, then worried</td>
<td>Zero runs off.  Warden/Mr. Sir don’t go after Zero; destroy Zero’s records</td>
<td>Indifferent to Zero; just don’t want anyone to know he went missing</td>
</tr>
<tr>
<td>Wants to save Zero; frustrated &amp; scared, but determined when truck falls in hole</td>
<td>Stanley runs the truck in a hole; then runs off into the desert</td>
<td>Initially furious; then worried if someone discovers he’s missing</td>
</tr>
<tr>
<td>Relieved that they haven’t been bitten and that they may be rescued</td>
<td>Stanley and Zero in hole with lizards, but lizards haven’t bitten; lawyer arrives</td>
<td>Apprehensive about what lawyer will ask and what she knows about him</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stanley</th>
<th>Events</th>
<th>Mr. Sir</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thirsty, thinks Mr. Sir is offering him a drink</td>
<td>Arriving at Camp Green Lake</td>
<td>Intends to taunt Stanley by drinking in front of him</td>
</tr>
<tr>
<td>Worried cause boys threw seeds in his hole. Lies to protect friends</td>
<td>Stanley says he stole Mr. Sir’s sunflower seeds</td>
<td>Doesn’t believe Stanley. Decides to have warden deal with him.</td>
</tr>
<tr>
<td>Frightened – what might the warden do to him</td>
<td>Warden scratches Mr. Sir</td>
<td>Surprised, angry; didn’t expect this</td>
</tr>
</tbody>
</table>

Perspectives

<table>
<thead>
<tr>
<th>Reason for Limited Character Inferences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focusing on what’s happening not why</td>
</tr>
<tr>
<td>Thinking that story characters are just like them</td>
</tr>
<tr>
<td>Focusing on only a small part of the story</td>
</tr>
<tr>
<td>Focusing on the main character’s perspective only</td>
</tr>
</tbody>
</table>

Coping with Inferencing Difficulties

• When students focus on what happened instead of why
  – Why did A act in this way?
  – How is A feeling now?


• When students misinterpret character’s feelings and thoughts because they are considering only their own perspective
  – Is that the way you would have felt?
  – Is what way is (character) different from you?
  – Since the character is different in this way, how do you think the character felt?
  – Let me reread some of the parts that may help us understand why the character might respond differently than you would.


• When students’ replies are inadequate because they are focusing on only one part of the story instead of the whole
  – What else might the character want?...be thinking? be feeling?
  – Think about the part where the character did X and Y at the beginning.
  – What does that tell you about what the character might be thinking now?


• When students consider only one character’s perspective
  – We mentioned A. What about B? How is B feeling?
  – What did A believe that B was thinking/feeling/wanting?
  – What did B believe that A was thinking/feeling/wanting
  – When A did that, how did A think B would react?
  – What was A believing about B when A did that?


Think-alouds to promote infering

Promote

• Intrapersonal ToM
  – Reflecting on what one knows/doesn’t know; understands/ doesn’t understand; what one can or can not understand
• Interpersonal ToM
  – Inferring what characters are thinking, feeling

Strategies to Build Inferential Comprehension

Think Aloud

Students read silently as teacher reads aloud
Teacher thinks through tricky spots

Make predictions from book title and cover

“From the title I think this will be about...”
"I have a picture of this scene in my head and this is what it looks like...."

"Outside the storm grew worse. Still shaking, Ben picked up the receiver and held it to his good ear. He hesitated then dialed the number. He slid the bookmark between the pages of the book."

The description on the wolf exhibit at the museum says the scene is at the margin of Gunflint Lake, MN. I remember at the beginning of this book that Ben is from there. Had the person who created this exhibit been at Gunflint Lake. Maybe it was the Daniel that Ben is looking for.

"I'd better reread." or "I'll read ahead and see if I can get some more"

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

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Reciprocal Teaching

- Prediction
- Questioning
- Clarification
- Summarization


Clarify

How can you figure out tricky or hard words and ideas?
I didn't get the (word, idea) so…
• Reread
• Read on
• Sound words out
• Ask if it makes sense
• Talk to a friend

Summarization

Using your own words, tell the main ideas from the text in order
This text is about…
This part is about…
First…
Next…
Then…
Finally

Promoting Predicting

• Model predictions using think-alouds and text cues
• Ask students to preview illustrations and headings and think about what they will learn from text
• Use what you know about text structure to predict
• Periodically summarize what has happened so far and add, “Now I think… because…”

Promoting Clarifying

• Model words and ideas to clarify
• Use the prompt “I don’t get the [word, idea, chapter] so I…”
• Require students to provide an example (if they have nothing to clarify, ask them to select a word/idea a younger student might have trouble with)
• Give students a copy of text and having students underline words to clarify in one color and sentences to clarify in another

Promoting Questioning

• Model how to formulate different types of questions
• Modeling higher level questions that require using textual cues and prior knowledge
• Asking students to reflect: How does this question help us understand the text
• Providing question starters, e.g., “Why do you think…?”

Question Types

• On the surface
  – Who, what, when, where
• Under the surface
  – How, why, what if, would
• On the sea floor: Life application
  – Opinions, how does this text relate to real life

Summarizing ≠ retelling
The three little pigs wanted to build their own houses, but a wolf kept blowing them down one at a time. So, each piggy escaped to his brother’s house for safety. In the end, all three pigs were safe in the last pig’s brick house.

Metacognition

We’ve got metacognition, running through our mind. We’ve got metacognition and it isn’t hard to find. Can’t you hear our thoughts a calling
Listen to our song.
We’ve got metacognition.
Learning all day long.

https://www.youtube.com/watch?v=FyZsSQu4