Infer! Infer!
Filling what's not in the book, the book!
Infer! Infer!
It's taking a much closer look!

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Making Inferences in
Oral and Written Discourse
The Inference Song

Sometimes when you're reading a story.  
The words are not all there for you.  
So being a good book detective,  
Will help you to find any clues.

Some authors leave clues in their pictures.  
Some authors leave clues in their text.  
They give you just part of the story and want you to feel in the rest.

So when you are reading a story.  
Be careful to read what is there.  
But then figure out what is missing.  
Now you are inferring with flair!

Chorus

Infer! Infer!  
Filling what's not in the book, the book!  
Infer! Infer!  
It's taking a much closer look!
Competent Readers Can…

Read Across & Beyond the Lines

Read Between the Lines
(understanding inferred meaning)

Read Along the Lines
(decoding and understanding literal meanings)
The inference equation:
Text/picture + prior knowledge = inference

Knowledge
- Dinosaurs are dead
- Smoking can kill

= dinosaurs died because they smoked

An inference is the information gained from the picture and or text combined with our prior knowledge.
Batman has interpreted the sign literally – that someone is in trouble and needs help.

Knowledge

Batman & Robin help people who are in trouble

We infer that the “Help Wanted” is an employment advertisement.
Prior Knowledge

Original 3 pigs build their houses of straw, sticks, bricks. The pig who built his house of bricks survived.

The pig with the bricks sees that the pigs with straw and sticks are warming themselves by the fire.

We infer that in this situation the pigs with the straw and sticks are more likely to survive.
## NAEP Reading Requirements

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Basic</strong> (208)</td>
<td>Fourth-grade students performing at the <em>Basic</em> level should be able to locate relevant information, <strong>make simple inferences</strong>, and use their understanding of the text to identify details that <strong>support a given interpretation or conclusion</strong>. Students should be able to interpret the meaning of a word as it is used in the text.</td>
</tr>
<tr>
<td><strong>Proficient</strong> (238)</td>
<td>Fourth-grade students performing at the <em>Proficient</em> level should be able to <strong>integrate and interpret texts and apply their understanding of the text to draw conclusions and make evaluations.</strong></td>
</tr>
<tr>
<td><strong>Advanced</strong> (268)</td>
<td>Fourth-grade students performing at the Advanced level should be able to <strong>make complex inferences and construct and support their inferential understanding of the text.</strong> Students should be able to apply their understanding of a text to make and support a judgment.</td>
</tr>
</tbody>
</table>
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
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 & 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
WHAT GOOD READERS DO WHEN THEY INFER

- Draw conclusions from facts presented in texts
- Connect what is happening in the text to their own knowledge of the world
- Understand characters' relationship to one another
- Identify characters' personalities, and motivations
- Provide explanations for events presented in the text
- Recognize the connection between nouns & pronouns
- Figure out the meaning of unknown words from context cues
The man stood before the mirror and combed his hair. He checked his face carefully for any places he might have missed shaving and then put on the conservative tie he had decided to wear. At breakfast, he studied the newspaper and, over, coffee, discussed the possibility of buying a new washing machine with his wife. Then he made several phone calls. As he was leaving the house, he thought about the fact that his children would probably want to go to that private camp again this summer. When the car didn’t start, he got out, slammed the door, and walked down to the bus stop in a very angry mood. Now he would be late.

Where is the man going? What section of the paper is he reading? What do you think he is going to do about washing machine and summer camp? What are some things he’s concerned about?
Inferring without a title

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.

Need theory of mind for inferencing

Ability to attribute mental states (beliefs, intents, pretending, knowledge) to oneself and others and to understand that others have beliefs, desires, and intentions that are different from one’s own

Ability to predict what others are thinking and what they will do from what we know about them and the world

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)

Beliefs

Linda wants to find her cat. Her cat might be hiding in the garage or it might be hiding in the garage. Where do you think the cat is? In the bushes, or in the garage? (own-belief question)

If child chooses bushes: “Well, that a good idea, but Linda thinks her cat is in the garage. So where will Linda look for her cat?”
## 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>Coherence or intersentence or text-connecting</td>
<td>Peter begged his mother to let him go to the party.</td>
<td>Maintains textual integrity. Reader must realize that pronouns “his” and “him” refer to Peter to understand the sentence.</td>
</tr>
<tr>
<td>Elaborative or gap-filling or knowledge-based</td>
<td>Kathy dropped the vase. She ran for the dustpan and brush to sweep up the pieces.</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>
</tbody>
</table>
## 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 inferences</td>
<td>As above</td>
<td>Creates a coherent representation at the local level of sentences and paragraphs</td>
</tr>
<tr>
<td>2. Case structure role assignments</td>
<td>Dan stood his bike against the tree.</td>
<td>As above</td>
</tr>
<tr>
<td>3. Antecedent causal inferences</td>
<td>He rushed off, leaving his bike unchained.</td>
<td>Reader realizes that the tree is assigned a location role.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>The reader would infer that Dan was in a hurry and left his bicycle vulnerable to theft.</td>
</tr>
<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 over-arching ideas by drawing on local pieces of information.</td>
</tr>
</tbody>
</table>
# 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>On-line</td>
<td>Superordinate goals of characters or causal antecedents that explain why something is mentioned in the text.</td>
<td>These inferences are necessary to understanding and are drawn automatically during reading.</td>
</tr>
<tr>
<td>Off-line</td>
<td>Forecasting future episodes in a text.</td>
<td>Inferences drawn strategically after reading, usually during a retrieval task. Not essential to understanding.</td>
</tr>
</tbody>
</table>
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?

• First off, he survived a lightning strike; Zeus is the god of lightning. I'll admit, that's a big chunk of fresh evidence! People also think that because Zeus ruled the sky and Jason can fly, that it means Jason has to belong to him. But I don't remember any of Zeus‘ children having the power of flight. Some believe that since Jason appears to be a main character that he has to be a son of one of the Big Three.

• 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

- Anaphoric references: pronoun/noun-phrase that refers to previous text entity
- Bridging/relational: semantically or conceptually relating sentence to previous content
- Explanation-based/causal: explain what is read by a causal chain or network of previous events and states
- The warden scratched Mr. Sir. She was furious with him.
- Making the connection between the eating onions and not being bitten by lizards
- Stanley befriending Zero, carrying him up the mountain and saving his life breaks the curse of Madam Zaroni and brings the family good luck.

Classes of Inferences

- Predictive: forecast what events will unfold
- Goal: infer intentions of agent
- Elaborative: properties and associations that cannot be explained by causal relationships
- Stanley will find Zero in the desert. The yellow-spotted lizards won’t bite them.
- 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

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

% Errors on Literal and Inferential Questions

<table>
<thead>
<tr>
<th></th>
<th>Unseen</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Literal</td>
<td>Inferential</td>
<td>Literal</td>
<td>Inferential</td>
</tr>
<tr>
<td>Less skilled</td>
<td>29.2</td>
<td>45.8</td>
<td>3.6</td>
<td>35.4</td>
</tr>
<tr>
<td>Skilled</td>
<td>10.9</td>
<td>15.6</td>
<td>1.0</td>
<td>9.9</td>
</tr>
</tbody>
</table>

Can a verbal inference task differentiate between:

- Children with language impairment (CwLI) and match peers with typical language development (TLD)
- 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 pictures 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 does the family feel now? (prompt allowed)
• How do we know it was the burglar who broke the window?
• Why do you think the burglar took only the watch?
• Why would someone steal something? (prompt allowed)
• What will the family do now because of the burglary? (prompt allowed)
• Should all theft be treated in the same way? (prompt allowed)

Coding of inference comprehension

- **Failure of literal comprehension**, e.g., the child is asked, "Why do you think the burglar took only the watch?" and responds, "cos he creeped in."
- **Wrong inference**: answer is irrelevant in the context of the story, e.g., when asked "How does the family feel now?" the child responds, "feel better if go to hospital."
- **Immature inference**: the child ties to link the question to his own experience/picture. The answer is relevant to the picture but based on limited or immature world knowledge, e.g., when asked, "Why would someone steal something?" the child responds, "because they ain't got a watch."
- **Odd inference**: these are typically unique or unexpected given the story premise or contained excessive and/or irrelevant detail, e.g. when asked, "Why was the dog barking?" the child responds, "He was telling the truth."
- **Because**: minimal "because he did" answer
- **Scope**: child gives a response that is along the right lines, but is either too specific or too vague to be counted as correct, e.g., when asked, "why was the dog barking?" the child responds, "because someone said 'ow'."
- **Lack of expressive ability**: the child produces an answer that is syntactically incomplete or unintelligible
- **No response**
Results

• CwLI
  – Significant problems with inferential comprehension compared with their age matched peers
  – Made significantly more literal comprehension errors or simply 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 might be 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
Results

- **CwPLI**
  - Trend for the CwPLI to perform more poorly on developmentally more complex inference items
  - Did not make significantly more odd or wrong inferences than CwSLI on any of the questions
  - Had significantly lower scores than their CA and SC matched groups.

Inferring emotions in situations

1. Action

2. Action

3. Response

Twinky was bouncing a ball. A bully took the ball. Twinky was…

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

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

Skills needed to make inferences

• Comprehension of linguistic input
  – Vocabulary
  – Syntax

• General world knowledge
  – Including theory of mind (ToM)

• Working memory

Verbal Working Memory

• Say true or false to each statement. Then say the last word in each sentence

  – The sun rises in the evening.
  – Trees loose their leaves in spring.
  – A football is round.
  – We sleep at night.
  – Insects have eight legs.
  – A feather is heavier than a rock.
Inferencing in 4 Groups of 8\textsuperscript{th} Grade Students

- The normal language group (NL) had normal skills in all three components required for inferencing.
- The group with specific language impairment (SLI) had normal general world knowledge, but deficits in comprehension of linguistic input and working memory.
- The group with nonspecific language impairment (NLI) had deficits in all three areas.
- The group with low cognition (LC) had normal skills in comprehension of linguistic input but deficits in general world knowledge. Their working memory was better than the working memory of the SLI and SLI.

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?

• Are there differences in the types of errors across groups?

• Does working memory performance predict variation in distant inference accuracy beyond that explained by language and nonverbal IQ?
Results

• Working memory: All measures correlated highly with inference scores
• Adjacent inference questions
  – No difference between TD and LC groups
  – TD 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
  – NL group performed significantly better than all other groups
  – LC group performed significantly better than those in the NLI group
  – LC and SLI groups did not significantly differ
  – No significant difference between the SLI and NLI groups

Using think-alouds to evaluate children’s inferencing abilities

- **Types of inferences**
  - **Predictive**: speculates about events or actions that may occur based on what has already occurred in the story
    - She played hard every day.
    - Predictive inference: She probably will lose weight.
  - **Associative**: statement that makes generalizations about characters, actions, or events in the story
    - He searched for the lake.
    - Associative inference: He had to look around the world.
  - **Explanatory**: provides causal connections between actions and events in the story
    - He was very happy.
    - Explanatory inference: He was very happy because he got a new bike.

• Average readers (ARs) had significantly more inferences and fewer errors that below-average readers (BARs) in their Think Alouds
• 46% of ARs inferences were explanatory
• 36% of BARs inferences were explanatory
• ARs answered more questions about the stories correctly than the BARs
  – Think alouds had a more positive effect on the comprehension of ARs than BARs
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

## Think Aloud Checklist

<table>
<thead>
<tr>
<th>Comprehension Habits</th>
<th>2 = Helpful  1 = Attempt</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BKN</strong> Connects to background knowledge (self/world)</td>
<td>(Blank)</td>
</tr>
<tr>
<td>Connects to previous part of the text or to other texts</td>
<td>(Blank)</td>
</tr>
<tr>
<td>Notices a conflict with background knowledge</td>
<td>(Blank)</td>
</tr>
<tr>
<td><strong>Background Knowledge Notes:</strong></td>
<td>(Blank)</td>
</tr>
<tr>
<td><strong>SUM</strong> Summarizes to reduce &amp; remember information</td>
<td>(Blank)</td>
</tr>
<tr>
<td>Connects summaries to main idea/author’s purpose</td>
<td>(Blank)</td>
</tr>
<tr>
<td><strong>Summarizing Notes:</strong></td>
<td>(Blank)</td>
</tr>
<tr>
<td><strong>INF</strong> Makes logical inferences based on BK &amp; text evidence</td>
<td>(Blank)</td>
</tr>
<tr>
<td>Makes logical predictions based on BK &amp; text evidence</td>
<td>(Blank)</td>
</tr>
<tr>
<td>Confirms or disconfirms inferences &amp; predictions</td>
<td>(Blank)</td>
</tr>
<tr>
<td><strong>Inference and Prediction Notes:</strong></td>
<td>(Blank)</td>
</tr>
<tr>
<td><strong>QUE</strong> Generates good questions that provide direction/purpose</td>
<td>(Blank)</td>
</tr>
<tr>
<td>Hypothesizes, seeks, &amp; notices answers while reading</td>
<td>(Blank)</td>
</tr>
<tr>
<td><strong>Question Notes:</strong></td>
<td>(Blank)</td>
</tr>
<tr>
<td><strong>WOR</strong> Uses context clues to figure out words</td>
<td>(Blank)</td>
</tr>
<tr>
<td>Use knowledge of word parts to figure out words</td>
<td>(Blank)</td>
</tr>
<tr>
<td><strong>Word Meaning Notes:</strong></td>
<td>(Blank)</td>
</tr>
<tr>
<td><strong>MON</strong> Statements or questions indicating confusion</td>
<td>(Blank)</td>
</tr>
<tr>
<td>Uses fix-up strategies (look back, read ahead)</td>
<td>(Blank)</td>
</tr>
<tr>
<td>Uses text structure</td>
<td>(Blank)</td>
</tr>
<tr>
<td>Challenges text; critiques style/format/clarity</td>
<td>(Blank)</td>
</tr>
<tr>
<td><strong>Comprehension Monitoring Notes:</strong></td>
<td>(Blank)</td>
</tr>
</tbody>
</table>

### References
http://www.jeffzwiers.com/resources.html
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
• Develop theory of mind
• Teach questioning
• Teach summarizing
Think Aloud

• Students read silently as teacher reads aloud. Teacher thinks through trouble spots:
  – Make predictions: “From the title I think this will be about...”
  – Describe the pictures you form in your head about the information. “I have a picture of this scene in my head and this is what it looks like....”
  – Develop analogies: Show how to link prior knowledge to new information in text. “This reminds me of....”
  – Make inferences from pictures and words: I think Stanley feels frustrated because...
  – 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.
  – After you complete reading and think aloud, encourage students to add their own thoughts to yours.
MONITORING COMPREHENSION
.......THROUGH TALK

• Observe when students:

  Restate or summarise what the author has said.

  Make connections with prior knowledge. Students comment on how the text connects with their prior knowledge.

  Ask questions that show they have understood the text, e.g., questioning why characters behave in a certain way.

  Identify personally: Students relates the text to personal experiences; indicates like or dislike for a topic.
Vocabulary and Working Memory

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

General 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)

<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 <strong>devious</strong>, 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 <strong>pungent</strong> has a smell or taste that is very sharp and strong, sometimes so strong it is unpleasant.</td>
</tr>
<tr>
<td>capricious</td>
<td>subject to, led by, or indicative of caprice or whim; erratic</td>
<td>Someone who is <strong>capricious</strong> often changes their mind unexpectedly and for no good reason.</td>
</tr>
<tr>
<td>Smirk</td>
<td>to smile in an affected, smug, or offensively familiar</td>
<td>If you <strong>smirk</strong> you smile in an unpleasant way, often because you believe that you have gained an advantage over someone else or know something they do not know.</td>
</tr>
</tbody>
</table>

*A dozen people were watching her, smirking at her discomfort.*
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.
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

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.
Match the sentence to its meaning

- not guilty of an offense
- not experienced
- not dangerous or harmful

- 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.
Wordle cloud (www.wordle.nt)

What does the word cloud suggest this article is about?
What seem to be the most important words?
How do these words go together?
Why do you think the Wordle designer chose this shape of word cloud?
Wordsift cloud (www.wordsift.com)
Using morphology to infer word meanings

- 5th and 8th grade students given tasks to assess their use of morphology to infer meaning of low-frequency, probably unfamiliar words.

  The doctor informed the family that the patient’s health was beginning to **wane/degenerate**.
  a. improve
  b. stabilize
  c. worsen*

  The mother commented on her son’s **vulgar/unrefined** behavior at the dinner table.
  a. polite
  b. rude*
  c. animated

Using morphology to infer word meanings

- Results
  - Students were more accurate with morphologically accessible words
  - Students who made greater use of morphological knowledge to infer word meanings
    - Had higher scores on the vocabulary subtest of the Woodcock Johnson III
    - Had higher comprehension scores on the Gates-MacGinitie Passage Comprehension subtest

Common Prefixes
Grades 3-4

un-
re-
in-, im-, ir, il-(not)
dis-
en-, em-
non-
in-, im- (in or into)
over-(too much)
mis-
sub-

pre-
inter-
fore-
de-
trans-
super-
semi-
anti-
mid-
under-
Teaching Suffixes
-er definitions and examples

<table>
<thead>
<tr>
<th>“more”</th>
<th>“one who”</th>
<th>“that which”</th>
</tr>
</thead>
<tbody>
<tr>
<td>(comparative adjective)</td>
<td>(noun)</td>
<td>(noun)</td>
</tr>
<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>

### ly definitions and examples

<table>
<thead>
<tr>
<th>“In a manner that is” (adverb)</th>
<th>“Like a (noun)” (adjective)</th>
<th>Time-related adverbs</th>
<th>Time-related adjectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>kindly (“in a manner that is kind”) speaks <em>kindly</em></td>
<td>sisterly (“like a sister”) a <em>sisterly</em> hug</td>
<td>suddenly suddenly faints</td>
<td>daily (once a day) vitamins</td>
</tr>
<tr>
<td>quietly firmly sweetly courageously</td>
<td>friendly kingly motherly beggerly</td>
<td>periodically instantly eternally constantly</td>
<td>weekly monthly annually</td>
</tr>
</tbody>
</table>

Morphology Grade 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); *spect* (look); *spect* (look); *port* (carry), *dict* (say), *rupt* (to break); *scrib* (to write)

• Greek and Latin prefixes
  – E.g., *inter-* (between); *intra-* (within); *post-* (after); *pro-* (in front of, forward); *co-.com-con-* (together); *sub-* (under); *pre-* (before); *anti-* (against)

Vernakes, C. *Roots on the vine*. 
### Expressing Inferences

<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</td>
<td>if he looked at her when he swung his sword he would be turned to stone</td>
<td>he looked at her reflection in a mirror and swung his sword behind him</td>
</tr>
<tr>
<td>Grover</td>
<td>to get permission to go in search of Pan, the god of the fields, because he has not been seen for many years</td>
<td>he had failed on his previous tasks</td>
<td>he had to prove himself by successfully protecting Percy</td>
</tr>
<tr>
<td>Annabeth</td>
<td>to leave Camp Halfblood because she had not seen much of the real world</td>
<td>she could not live in the world with her stepfamily because she brought them into danger</td>
<td>so going on the quest with Percy was a way to get out of camp</td>
</tr>
</tbody>
</table>
Required for TOM

• Ability to “read” affect cues
  – facial expressions
  – body postures/gestures
  – vocal tones
• Affective/emotional labels put on these behaviors
• Social cognition knowledge
  – understanding how situations cause emotions and emotions cause situations
  – expected behaviors in particular situations
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

- 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.

Thinking Triangle: Language for Making Inferences

Kick-off (initiating event)

Feeling Words (internal response)
happy
sad
mad
scared
surprised
disgusted

Planning words
plan
want
decide
desire
intend
need

Thinking Verbs
know
think
understand
realize
remember
believe
observe
deduce
surmise
deduce
suspect
infer

because
so
and/so
therefore

Mindwingconcepts.com
Emotions and Computer Programs

*Let's Face It!* is a joint project between the University of Victoria Brain and Cognition Lab and the Yale Child Study Centre. The program is a free multimedia, computer-based intervention that is designed to teach face processing skills to children with autism.

http://web.uvic.ca/~letsface/letsfaceit/index.php
<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>Lost</td>
<td>Sad</td>
<td>Tired</td>
<td>Upset</td>
<td></td>
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<tr>
<td></td>
<td>Sad</td>
<td>Tearful</td>
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<tr>
<td></td>
<td>Disappointed</td>
<td>Discouraged</td>
<td>Disconsoling</td>
<td>Despairing</td>
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<td></td>
<td></td>
<td>Gloomy</td>
<td>Heartache</td>
<td>Devastated</td>
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<tr>
<td></td>
<td></td>
<td>homesick</td>
<td>Hysterical</td>
<td>Disillusioned</td>
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<td></td>
<td></td>
<td>Troubled</td>
<td>Troubled</td>
<td>Dismayed</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>Weak</td>
<td>Troubled</td>
<td>Distraught</td>
<td></td>
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<td></td>
<td></td>
<td>Withdrawn</td>
<td>Troubled</td>
<td>Empty</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Troubled</td>
<td>Grieving</td>
<td></td>
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<td></td>
<td></td>
<td>Troubled</td>
<td>Resigned</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Troubled</td>
<td>Agonizing</td>
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<td></td>
<td></td>
<td></td>
<td>Troubled</td>
<td>Anguished</td>
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<td></td>
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<td></td>
<td>Troubled</td>
<td>Condemned</td>
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<td></td>
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<td></td>
<td>Troubled</td>
<td>Grave</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Troubled</td>
<td>Overwrought</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Troubled</td>
<td>Pining</td>
<td></td>
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<td></td>
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<td></td>
<td>Troubled</td>
<td>Subdued</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Troubled</td>
<td>Tormented</td>
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<td></td>
<td></td>
<td></td>
<td>Troubled</td>
<td>Turmoil</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Troubled</td>
<td>Maudlin</td>
<td></td>
</tr>
</tbody>
</table>

Mind Reading: The Interactive Guide for Emotions
Emotional Thermometers

Petrified
Hysterical
Terrified
Scared/frightened
Startled
Unnerved
Disturbed
Dismayed

Enraged
Incensed
Livid/furious
Angry
Aggravated
Provoked
Irritated
Annoyed
Bothered
Observations
Stanley in hole
Lizards with yellow spots on him
Lizards are crawling on him
Seems to be looking up at something
Mouth open – not a smile, not a frown
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

<table>
<thead>
<tr>
<th>Observations</th>
<th>Inferences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Many, many people carrying signs.</td>
<td>They’re protesting something they don’t like – that’s why people march sometimes</td>
</tr>
<tr>
<td>Signs say “jobs now”, “we demand”</td>
<td>Black people aren’t getting the same jobs as white people</td>
</tr>
<tr>
<td>Singing “we shall overcome”</td>
<td>People are going to change something</td>
</tr>
<tr>
<td>Street is completely full of people from side to side and as far as can see</td>
<td>Looks like Washington DC</td>
</tr>
<tr>
<td>Most people are Black, some are White.</td>
<td>Police might be afraid about what so many people would do</td>
</tr>
<tr>
<td>Two rows of men, mostly Black, walking slowly side-by-side, dressed in suits</td>
<td>Probably Black leaders who want to create a good impression</td>
</tr>
<tr>
<td>Big white building with columns; statue of Lincoln</td>
<td>White people want to show their support</td>
</tr>
<tr>
<td>Very tall, pointed building</td>
<td>Maybe they’re in Washington because they want the president to listen to them</td>
</tr>
<tr>
<td>Large, rectangular pool of water between buildings</td>
<td></td>
</tr>
<tr>
<td>Black man speaking at the front of the building</td>
<td></td>
</tr>
<tr>
<td>Several policemen around man who is speaking</td>
<td></td>
</tr>
</tbody>
</table>
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

Do You Know 
Inferencing Strategy

• **Situation:** Water fountain with sign, “Whites Only;” little girl takes off her black shoes and steps up to the fountain in her white socks.

• **My inference:** “Whites Only” doesn’t mean white clothes; it means only white people can drink from the fountain. White people will get mad when they see a Black girl drinking from the fountain.

• **How do I know?** The story happened a while ago. The person telling the story said she is telling a story about her grandmother. Before Martin Luther King, Black people couldn’t eat or drink where White people did.

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 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 you own
  – Can you think of someone else who has risked his or her own life to save other persons?
<table>
<thead>
<tr>
<th>Mr. Sugihara</th>
<th>Events</th>
<th>Jews</th>
</tr>
</thead>
<tbody>
<tr>
<td>willing to listen; asked Japanese government what to do</td>
<td>many people come to the embassy</td>
<td>terrified; desperate to escape Nazis</td>
</tr>
<tr>
<td>says can’t help; asks again; concerned for Jews</td>
<td>government denies visas</td>
<td>more people gather; increasing worry, terror</td>
</tr>
<tr>
<td>concerned about self; compassionate, worried about Jews’ safety</td>
<td>Sugihara decides to go against government</td>
<td>thrilled, relieved</td>
</tr>
<tr>
<td>exhausted; worried about family and Jews</td>
<td>Sugihara writes visas</td>
<td>grateful</td>
</tr>
<tr>
<td>concerned, then relieved when hears from survivors</td>
<td>Sugihara leaves address at Israeli embassy in Japan</td>
<td>treasured visas, felt great respect; wished to honor him</td>
</tr>
</tbody>
</table>
Reasons for Limited Character Inferences

- Focusing on what’s happening not why
- Thinking that story characters are just like them
- Focusing on only a small part of the story
- Focusing on the main character’s perspective only
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.
Coping with Inferencing Difficulties

• 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?
Reciprocal Teaching

Teacher and students read paragraph.

Teacher summarizes paragraph and asks questions.

Teacher clarifies misconceptions about difficult concepts.

Students will predict what will be in next paragraph.

Teacher and students read next paragraph.

Student and teacher roles reversed.

<table>
<thead>
<tr>
<th>Predict</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use cues from the text or illustrations to predict what will happen next • I think…because… • I’ll bet…because… • I suppose …because… • I think I will learn…because…</td>
<td>Ask questions as you read. Some are answered in the book and others are inferred • I wonder… • Who? What? When? Where? Why? How? • Why do you think?</td>
</tr>
<tr>
<td>Clarify</td>
<td>Summarize</td>
</tr>
<tr>
<td>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</td>
<td>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</td>
</tr>
</tbody>
</table>
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

• 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…?”

Perceptual-language distance

<table>
<thead>
<tr>
<th>I</th>
<th>II</th>
<th>III</th>
<th>IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Literal</td>
<td>Inferential</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Matching</td>
<td>Selective</td>
<td>Reordering</td>
<td>Reasoning</td>
</tr>
<tr>
<td>Perception</td>
<td>Analysis of</td>
<td>Perception</td>
<td>about</td>
</tr>
<tr>
<td></td>
<td>Perception</td>
<td></td>
<td>Perception</td>
</tr>
<tr>
<td>Who</td>
<td>What</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Who
- What

What is happening? Describe...

- How does...feel?
- What will ...?
- How are these the same (similarity abstract)

Why
- How/explain
- How do you know

Abstraction Levels

Level 1
- Requires matching perception (answer immediately available)

Level 2
- Requires selective analysis of perception

Example
- Show me the goose.
- Where is the holly bush?
- What is the duck doing here?
Abstraction Levels

Level 3
- Required reordering of perception (prediction or reworking thoughts)

Examples
- What did the bear think when he saw the fox with the goose and duck?

Level 4
- Requires reasoning about perception (reflect or interpret)

- Why did the fox say he was playing hide and seek?
Promoting Summarizing

• Have students contribute to a teacher-guided summary
• Teach strategies for summarizing
  – Delete material that is trivial.
  – Delete material that although important, is redundant.
  – Substitute a superordinate term for a list of items/actions, e.g., *pets* for *cats, dogs, goldfish, gerbils,* and *parrots,*
  – Select a topic sentence.
  – If there is no topic sentence, invent your own.