

65<sup>TH</sup> CONFERENCE ON EXCEPTIONAL CHILDREN



**GRADUATION:  
The Measure of Tomorrow**

**Solving the  
Inference Mystery**

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PUBLIC SCHOOLS OF NORTH CAROLINA  
State Board of Education | Department of Public Instruction

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**Solving the Mystery**

- What do we know about reading comprehension and inference?
- So, what exactly is inference?
- What contributes to skilled inference making?
- What's a teacher to do?

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**Agree-Disagree**

*A necessary condition for creating a mental model of text is the ability to make inferences.*



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**Time to find the clues....**



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**What do you know about reading comprehension and inference?**



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***Comprehension is a complex task that involves a range of language and cognitive processes and skills that students must master in order to make sense of written text.***

Fletcher, Lyon, Fuchs, & Barnes, 2007; Oakhill & Cain, 2007; Swanson, Howard, & S'aez, 2006

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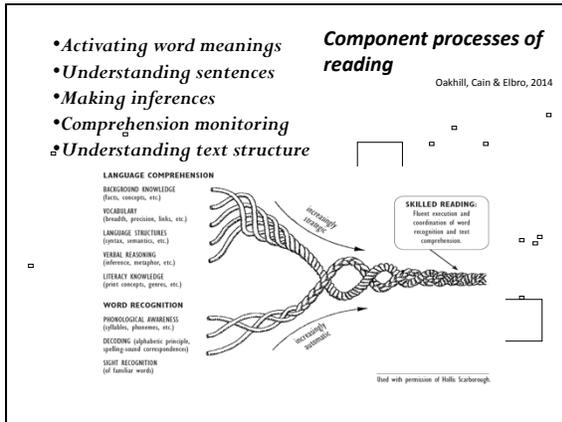
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**“Comprehension is an INTEGRATIVE process, in which information from different sentences is combined and Comprehension is a CONSTRUCTIVE process, in which explicit information in a sentence or sentences is supplemented by knowledge about the world from long-term memory.”**

Kate Cain - IDA, 2009

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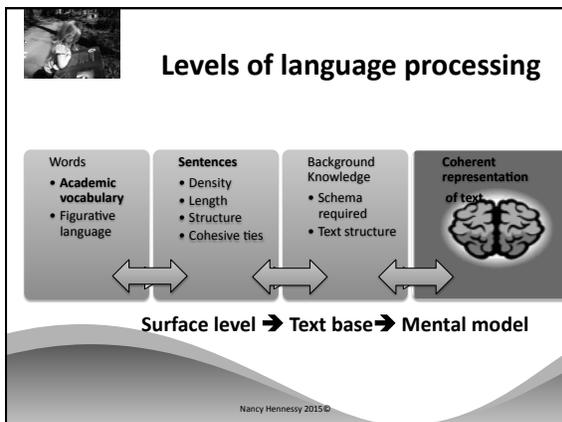
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### Dynamic interaction

Integration & construction occurs moment by moment as the reader proceeds through the text within the conditions set by the context.



**Mental model of text.....**

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**“This mental representation includes textual information and associated background knowledge interconnected via semantic relationships.”**  
Kendeou et al, 2014

**“These relationships are identified by the reader through passive and strategic inferential processes.”**  
van den Broek et al, 2015

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***.....critical cognitive competency for reading proficiency and necessary to create coherent models of understanding.***



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Jane V. Oakhill & Kate Cain (2012). The Precursors of Reading Ability in Young Readers: Evidence From a Four-Year Longitudinal Study. *Scientific Studies of Reading*, 16:2, 91-121.

***one more clue about connections....***

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***“The early predictors of later word reading accuracy were phonological skills; the skills that predicted later reading comprehension were those that aid the construction of a coherent and integrated representation of the meaning of a text.”***

Oakhill & Cain, 2012

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***Three things I know about the connections between reading comprehension and inference..***



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**What exactly is inference?**

**How do you define it?**

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***.....identification of meaningful relations between the various parts of the text, and between those parts and the reader's background knowledge.***



Kendeou, Bohm-Gottler, White & van den Broek, 2008

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**Inference Equation**

*picture/text + previous knowledge = inference*



Westby, 2011

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**What types of inference are necessary?**



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**Necessary Inferences...**

*Local*



**Nancy was walking up the steps  
She tripped and fell.  
Her friend ran for help.**

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**Local Coherence Inferences**

- *linking ideas and concepts with bridging inferences.*
- *necessary and often automatic.*

***Information provided by words, syntax within and between different sentences combined.***



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### Necessary inferences...

**Global**  
causal  
explanatory  
predictive  
elaborative\*



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*The room was a mess! Pots and pans were piled in the sink. Drawers and cabinets were flung open. Chocolate chips dotted the floor and empty cartons were on a sticky counter, but the smell was delicious.*

*Why was the room a mess?*

2007 The Florida Center for Reading Research 4-5  
Student Center Activities: Comprehension

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### Global Coherence Inferences

- fill the gaps
- establishes connections and cohesi

*Explicit information in a sentence or sentences is supplemented by world knowledge stored in long-term memory.*



Oakhill, Cain & Elbro, 2014

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## Clues to Skilled Inference Making!



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## A few things we know about what poor comprehenders do...

- *less likely to engage in necessary processing.*
- *generate fewer correct inferences.*
- *generate same number of inferences but different quality.*
- *may not access background knowledge.*
- *create less coherent representations.*

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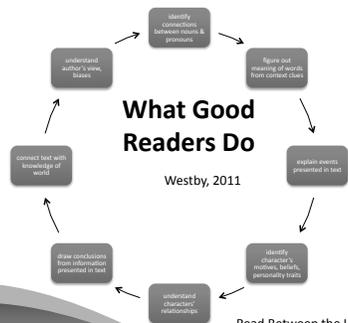
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## What Good Readers Do

Westby, 2011



Read Between the Lines  
[www.speechpathology.com](http://www.speechpathology.com)

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**Three potential clues to difficulties with integration & inference:**

*Working & long term memory*

*Access to vocabulary and background knowledge*

*Standards of coherence*



Oakhill, Cain & Elbro, 2014

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**Knowledge**

*Readers who possess high levels of knowledge, vocabulary, consistently exhibit better comprehension and retention than readers with low level of knowledge.*

**Long term memory**  
word meanings  
facts, experiences,  
beliefs,  
concepts...

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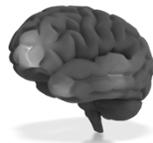
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**Poor comprehenders**

*-less developed structures*

*-slow at accessing accurate meaning of words and background knowledge.*

*What could facilitate accuracy & access to background knowledge?*

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### Knowledge is necessary...



*Strategies are mechanism for leveraging background knowledge -without it-they are not sufficient to make meaning.*

Nonie LeSeaux, 2014

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### So, what's a teacher to do?



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### What do we know about instruction?

- *explicit instruction*
- *strategies/activities that scaffold the students' understanding and expression of the relationship between ideas:*
  - ✓ *directly expressed in the text (surface level)*
  - ✓ *and their own ideas (text base and mental model).*



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**Let's work at the surface level-go local...**

Words  
• Academic vocabulary  
• Figurative language

Sentences  
• Density  
• Length  
• Structure  
• Cohesive ties

Background Knowledge  
• Schema required  
• Text structure

Coherent representation of text

Surface level → Text base → Mental model

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**Agree-Disagree**

*Young children's learning of vocabulary requires inference.*

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*...reading can also provide instances to acquire, refine, and consolidate vocabulary knowledge through inference from context.*

Cain, Oakhill & Lemmon, 2004

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### Searching for Clues and Connections

- Identify focus words or phrases.
- Frame a question or a task.
- Show the evidence.
- Make the connection.

Vocabulary...

Teach by Thinking Out Loud

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- *Although Mary was sad and depressed, her fellow graduates were all jubilant.*
- *On hot steamy humid summer days, I often feel languid.*
- *My friends were ready and eager to join the protest march but I was feeling very reluctant.*

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### Let's work at the surface level-go local...

Words

- Academic vocabulary
- Figurative language

Sentences

- Density
- Length
- Structure
- Cohesive ties

Background Knowledge

- Schema required
- Text structure

Coherent representation of text

Surface level → Text base → Mental model

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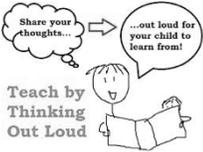
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### Searching for Clues and Connections

- Identify word and phrases.
- Frame a question or a task.
- Show the evidence.
- Make the connection.

*Cohesive ties...*



Teach by Thinking Out Loud

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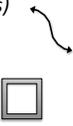
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**Semantic and syntactic devices** guide readers and show how parts of a composition **relate to one another**, assist the reader in **bridging & integrating information within and between sentences.....**

- Pronoun referents (underline)
- Substitution, synonyms (*arrows*)
- Conjunctions (*box*)



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### What do you know about the Greensboro Four?

1. *The Woolworth's in Greensboro North Carolina was one of the company's largest and best known stores.*
2. *It was a popular place for lunch.*
3. *In the winter of 1960, four young African-American men, students at a local college in Greensboro, North Carolina, walked in and sat at the lunch counter on stools intended to be used by white customers only.*

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### What do you know about the Greensboro Four?

1. The Woolworth's in Greensboro North Carolina was one of the company's largest and best known stores.
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4. This peaceful protest was intentional and shortly, sit-ins began to occur in other North Carolina cities and segregationist states.
5. A seemingly simple action proved to be a pivotal event in the student-led phase of the civil rights movement.

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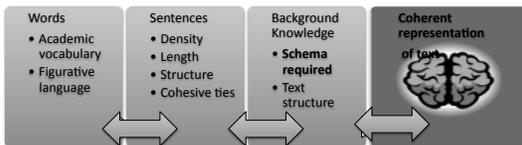
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### Let's work at text base and mental model level-let's go global



Surface level → Text base → Mental model

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### Use questioning coupled with graphic organizers...

My question	It says	I know	So I think...
Why did these young men do this?			
			The Greensboro Four

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My question	It says	I know	So I think...
Why did these young men do this?	They sat down on stools that had been...	That there were Jim Crow Laws in the south	They were protesting....

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### Knowledge is necessary but not sufficient.

*Failure to activate relevant, existing background knowledge may be a cause of poor reading comprehension.*

*Conversely, teaching students how to use background knowledge in the context of gap-filling inferences could improve reading comprehension in general.*

Elbro & Buch-Iversen, 2013

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Elbro, C. & Buch-Iversen, I. (2013). Activation of Background Knowledge for Inference Making: Effects on Reading Comprehension. *Scientific Studies of Reading*, 17:6, 435-452.



**Have the knowledge  
Do not have the knowledge  
Have the knowledge but do not use it.....**

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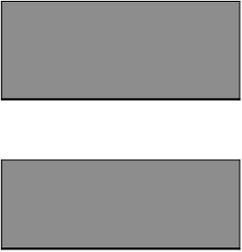
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Text



Reader



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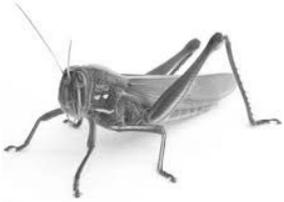
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**Let's try this one!**



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Most people have once heard grasshoppers sing in the summer. The grasshoppers' song is very high pitched. Therefore you need a good sense of hearing in order to hear the song. Actually, it is not correct to say that grasshoppers sing because they do not use their voice to sing. The grasshopper makes the song, or the sound, by rubbing its legs against a sharp edge on the wings. It is not easy to spot a grasshopper as its body is almost invisible when it is surrounded by plants. It blends in with the surroundings. If you want to find a grasshopper, you ought to follow the sound. Remember to listen to the grasshopper while you are young, because you might not hear the grasshopper when you get older.

**Why might you not hear the grasshopper when you get older?**

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**Monitoring Effectiveness**

- *What is my inference?*
- *What information did I use to make this inference?*
- *How good was my thinking?*
- *Do I need to change my thinking?*

Marzano, 2010

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**Inference instructional strategies and activities...**

- Word level work
- Text level work
- Activation of prior knowledge

- ✓ Using textual cues.
- ✓ Generating & asking questions.
- ✓ Using concept maps/ graphic organizers.
- ✓ Thinking aloud & explaining/ summarizing text.
- ✓ Using mental imagery.

Kispaal, 2010

Adapted LETRS Module 6

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**Solving the Mystery**

- What do we know about reading comprehension and inference?
- So, what exactly is inference?
- What contributes to skilled inference making?
- What's a teacher to do?

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files.eric.ed.gov/fulltext/ED501868.pdf

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**Hope you have been struck by enlightening!**

Thanks!  
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## References

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**Inference-NCEC Conference  
A Little Extra....  
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Framework for Comprehension Instruction		© Nancy Hennessy 2013 All Rights Reserved
Critical understandings of text	What do you want students to know and understand after reading the text? What are the lessons, big ideas?	
Purpose for reading text	How will you introduce the text initially and each day? What will you tell students the purpose of the lesson is (each day)?	
Text Reading: Key vocabulary	Which words will your students need to know, are worth knowing? Which ones will you intentionally target, which words will you incidentally on purpose teach, when, how? Which will you incidentally on purpose discuss/question? How will you foster the use of independent word learning strategies? Is there figurative language that requires explanation?	
Language structures (phrases, sentences)	Are there phrases, clauses, sentence structures that may be difficult for your students? Connectives? When and how will you teach students to work with these?	
Schema & text structure	What background knowledge/schema is critical to understanding the text. What strategies/activities will you use to surface, build, connect to text?  How is the text organized? How will you teach students to use the structure to understand purpose, organize and express understanding?	
Levels of understanding	What strategies and activities (questions) will you use to facilitate student construction of different levels of understanding during and after reading?	
Expression of understanding	What strategies and activities will you use to have students demonstrate understanding at different levels of understanding after reading?	

Before, During, After

## Inference instructional strategies and activities...

- Word level work
- Text level work
- Activation of prior knowledge

- ✓Using textual cues.
- ✓Generating & asking questions.
- ✓Using concept maps/ graphic organizers.
- ✓Thinking aloud & explaining/summarizing text.
- ✓Using mental imagery.

Kispaal, 2010

Adapted LETRS Module 6

## **Use direct questioning to prompt inference.**

- *Which words or sentence is evidence of ...?*
- *Which words or sentence from the selection shows ...?*
- *Which evidence from the selection supports the idea that the author believes that ...?*
- *Which collection of evidence can be offered as as a reason why ...?*
- *Which conclusion is supported by the phrase, "...” from paragraph \_\_?*



## **Use questioning coupled with graphic organizers...**

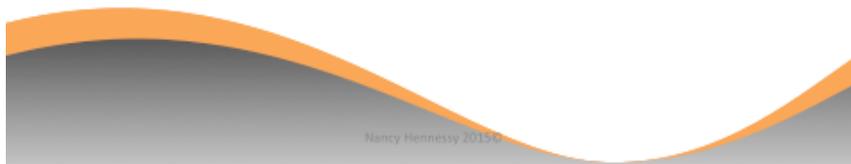
<b>My question</b>	<b>It says</b>	<b>I know</b>	<b>So I think...</b>
Why did these young men do this			



## **Monitoring Effectiveness**

- *What is my inference?*
- *What information did I use to make this inference?*
- *How good was my thinking?*
- *Do I need to change my thinking?*

*Marzano, 2010*



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