Big Data: How Target knows what you want before you do

• Andrew Pole: Obsessed with using data
• Target: How can we find our pregnant customers?
  – They are big spenders
  – Can sign up for Birth Registry
  – Mine these data for their purchases
  – Target coupons to these items
    • Irate father: Why my young daughter?
Two Important Influences in Reading

• Bottom Up Visual Processing
  – Vision and Visual Perception
    • Acuity
    • Tunnel Vision

• Top Down Knowledge Processing
  – Orthographic (Spelling) Constraints
  – Spelling/Sound Constraints
  – Lexical Constraints
Word Recognition or Lexical Access: An Important Issue in Reading with Implications for Learning to Read
Word Recognition or Lexical Access
Important Issue in Reading with
Implications for Learning to Read
Eye Movements

• Slow Pursuit Movements
  – Tracking a slow moving object

• High Frequency Nystagmus
  – noise

• Vergence Eye Movements

• Accommodation

• Saccadic Eye Movements
Vergence Eye Movements
Small changes in accommodation produce the optical movement.
The white discs reveal your saccadic eye movements.
In the next 3 slides, fixating at the center with one eye can make parts of the circle disappear. Saccadic eye movements keep the visual world alive.
Looking Glass No. 1', Peter Sedgley
### Saccadic Eye Movements

Ballistic Movements

Very Fast

<table>
<thead>
<tr>
<th>Task</th>
<th>Mean fixation duration (ms)</th>
<th>Mean saccade size (deg.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silent reading</td>
<td>225</td>
<td>2 (about 8 letters)</td>
</tr>
<tr>
<td>Oral reading</td>
<td>275</td>
<td>1.5 (about 6 letters)</td>
</tr>
<tr>
<td>Visual search</td>
<td>275</td>
<td>3</td>
</tr>
<tr>
<td>Scene perception</td>
<td>330</td>
<td>4</td>
</tr>
<tr>
<td>Music reading</td>
<td>375</td>
<td>3</td>
</tr>
<tr>
<td>Typing</td>
<td>400</td>
<td>1 (about 4 letters)</td>
</tr>
</tbody>
</table>

Table 1, Approximate Mean Fixation Duration and Saccade Length in Reading, Visual Search, Scene Perception, Music Reading, and Typing. (from Rayner, 1998).
Studying Eye Movements

during a saccade because the eyes are moving so

* normal text

XXXXXX X XXXX cade because the XXXX XXX XXXXXXX XX

* moving window

XXXXXX X XXXXXXXX XXXXXse the eyes are mX XXXX XX

*
Influences on Eye Movements

Fixation Duration and Size of Movement
Word Boundary Information
Length of the Fixated Word
Length of Next Word
### Developmental Characteristics of Eye Movements During Reading

<table>
<thead>
<tr>
<th>Article and characteristic</th>
<th>Grade level</th>
<th></th>
<th></th>
<th></th>
<th></th>
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<th></th>
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<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>Adult</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Fixation duration (ms)</td>
<td>355</td>
<td>306</td>
<td>286</td>
<td>266</td>
<td>255</td>
<td>249</td>
<td>233</td>
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<tr>
<td>Fixations per 100 words</td>
<td>191</td>
<td>151</td>
<td>131</td>
<td>121</td>
<td>117</td>
<td>106</td>
<td>94</td>
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<tr>
<td>Frequency of regressions</td>
<td>28</td>
<td>26</td>
<td>25</td>
<td>26</td>
<td>26</td>
<td>22</td>
<td>14</td>
<td></td>
</tr>
</tbody>
</table>
Two Important Influences in Reading

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  – Sentential Constraints
Sentential Constraints in Reading

- Tulving, Mandler, and Baumal (1964)
- Eight exposure durations with four sentential context lengths
- Word-recognition task
- Tachistoscopic presentation of a word followed the reading of the sentence context.
- Her closest relative was appointed as her legal ...
Figure 8. Observed (points) and predicted (lines) percentage correct identifications as a function of the stimulus duration of the test word and the number of context words (after Tulving et al., 1964; from Massaro).

Predictions of the FLMP
Current Practice in Reading Instruction

- Grounded in Spoken Language
- Focus on Decoding
  - Print to Sound
- Essentially Ignores Structure of Orthography
Phonemic Awareness (PA) Is Essential For Beginning Readers

• PA instruction includes tasks like:

• 1. Phoneme isolation, which requires recognizing individual sounds in words—for example, “Tell me the first sound in paste.” (/p/)

• 2. Phoneme identity, which requires recognizing the common sound in different words—for example, “Tell me the sound that is the same in bike, boy, and bell.” (/b/)
Phonemic Awareness Is Essential For Beginning Readers

- PA instruction includes tasks like:
  - 3. Phoneme categorization, which requires recognizing the word with the odd sound in a sequence of three or four words—for example, “Which word does not belong? bus, bun, rug.” (rug)
  - 4. Phoneme blending, which requires listening to a sequence of separately spoken sounds and combining them to form a recognizable word—for example, “What word is /s/ /k/ /u/ /1/?” (school)
Phonemic Awareness Is Essential For Beginning Readers

• PA instruction includes tasks like:
  • 5. Phoneme segmentation, which requires breaking a word into its sounds by tapping out or counting the sounds or by pronouncing and positioning a marker for each sound—for example, “How many phonemes are there in ship?” (three: /ʃ/ /I/ /p/)
  • 6. Phoneme deletion, which requires recognizing what word remains when a specified phoneme is removed—for example, 
    – “What is smile without the /s/?” (mile)
Phonics Instruction

• Phonics instruction is a way of teaching reading that stresses the acquisition of letter-sound correspondences and their use in reading and spelling.

• Commercial Examples
  • Hooked on Phonics
    – https://orders.hookedonphonics.com/
  • LeapFrog
Phonics Instruction

• Larry Sanger
  – Founded Wikipedia
  – Taught sons to read by Your Baby Can Read
  – Created Reading Bear

• Illustration

• http://www.readingbear.org/GettingStarted.aspx
Phonics Instruction

• The primary focus of phonics instruction is to help beginning readers understand how letters are linked to sounds (phonemes) to form letter-sound correspondences and spelling patterns and to help them learn how to apply this knowledge in their reading.
Phonics Instruction

• Learn Letter Names
• Learn Letter Sounds
  – Scholastic 44
    • [http://www.scholastic.com/staysmart/system44.htm](http://www.scholastic.com/staysmart/system44.htm)
  – /b/
• Learn Blending Sounds
Cute Downside of Phonics Instruction
cat
Phonics Instruction

• Logic of Decoding
• Fourth Grade
  – Frequent Observation
    • Decoding OK but Poor Comprehension
  – One reason may be that the decoding process, although well-learned, still requires attention and effort that leaves fewer resources for processing the meaning of what is being read.
Fluency Should Be A Focus of Early Reading Instruction

• Fluency is the ability to read with speed, accuracy, and proper expression.
• Repeated oral reading is a technique in which students read and re-read a passage. The intent is to get students to be able to automate their word recognition processes.
• Guided oral reading involves instructional feedback to students as they read.
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• Guided oral reading involves instructional feedback to students as they read.
• Critique
  – Can be misleading
Vocabulary Knowledge in Language Development

• Importance of vocabulary knowledge for understanding the world
• Positively correlated with both listening and reading comprehension
Need for Direct Vocabulary Instruction

• Word Meaning is usually ambiguous in context
• Value of Time on Task
• Present Words in a variety of contexts
• Provide multiple opportunities to learn and to expand on meanings
Vocabulary Knowledge

• Perceptual and Cognitive Development
• Listening and Reading Comprehension
• Central to Everyday Life
JOHANNES KEPLER'S UPHILL BATTLE

...SO, YOU SEE, THE ORBIT OF A PLANET IS ELLiptical.

WHAT'S AN ORBIT?

WHAT'S A PLANET?

WHAT'S 'ELLiptical'?

Source: © 1980 by Sidney Harris, The American Scientist Magazine
Direct Vocabulary Instruction

- Word Meaning Ambiguity
- Time on Task
- Variety of Contexts
- Multiple Learning Opportunities
- Multiple Meanings
Vocabulary

• Vocabulary is the knowledge of word meanings.
• Direct, explicit instruction of vocabulary improves comprehension.
• Both explicit instruction and indirect or incidental acquisition are both important in acquisition of vocabulary.
Comprehension Strategies Should Be Taught Explicitly

• Strategies are specific procedures that guide individuals as they make meaning from text.
• Question answering is the traditional form of comprehension.
  – As they read, readers are aware of a set of questions that need to be answered.
•
Comprehension Strategies Should Be Taught Explicitly

• Question generation
  – the emphasis is on students producing the questions

• Question generation
  – Shows larger effects than other comprehension strategy instruction techniques.

•
Comprehension Strategies Should Be Taught Explicitly

• Constructing maps of story structure  
  – a proven way to improve the comprehension of narrative or story text.

• Comprehension monitoring  
  – a metacognitive strategy that involves the continual evaluation of a reader’s understanding of the text.
Optimizing Learning to Read

• Motivation and Engagement Are Essential For Student Learning

• Principled Professional Development Will Yield High Quality Instruction

• Access to Books Is Crucial For Students

• Assessment Must Be a Cornerstone of Any Instructional Program