

*A New Conceptualization of
Reading Development and Fluent
Comprehension: Implications for
Teaching*

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The Mystery of Reading

*It took humans approximately
2,000 years to develop the
concepts underlying an alphabet.
We now expect children to learn
to read in approximately 2,000
days!*

How does this happen?



How Reading Develops

Developmental Progression in Wolf (2007)

1. Emerging Pre-Reader
2. Novice Reader
3. Decoding Reader
4. Fluent Comprehending Reader
5. Expert Reader

JEANNE CHALL'S 6 STAGES

1. Pre-reading
2. Initial reading
3. Confirmation & Fluency
4. Reading for Learning the New
5. Multiple Viewpoints
6. Construction & Reconstruction

Chall's Stages

- Successive stages are characterized by the ability to read language that is more complex, less frequently encountered, more technical, and more abstract.
- The reader's response become more inferential, critical, and constructive
- Each stage requires the reader to have more prior knowledge about the world and the content
- All stages depend on full engagement with the text --- including the affective component of reading

Chall's Stages

Construction and reconstruction

- Construct understanding based on analysis and synthesis

Multiple viewpoints

- Analyze texts critically
- Understand multiple points of view

Reading for learning the new

- Expand vocabularies
- Build background and world knowledge
- Develop strategic habits

Confirmation & Fluency

- Decoding skills
- Fluency
- Additional strategies

Initial Reading

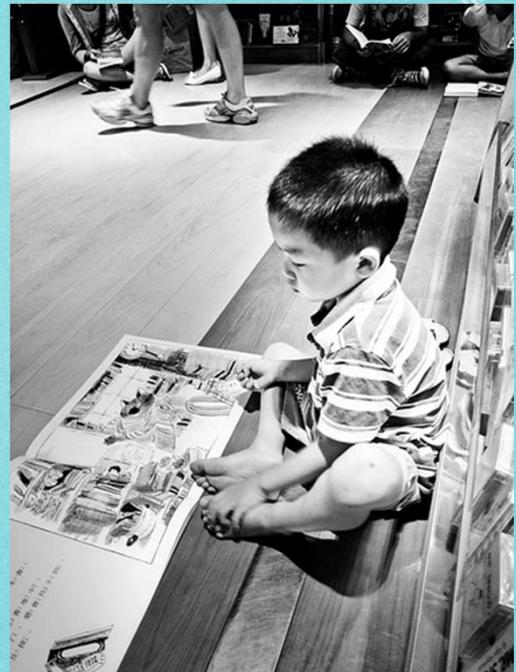
- Letters represent sounds
- Sound-spelling relationships

Pre-Reading

- Oral Language Development

1. Emerging Pre-Reader

- From birth to age 5
- Sits on “beloved laps”
- Emerges from years of perceptions, increased conceptual and social development, and exposure to oral and written language



The Role of “Beloved Laps”

- Research shows the amount of time a child spends listening to loved ones read is a good predictor of later reading attainment
- Why?
- Starts to learn that the lines on the page make letters; letters make words; words make stories
- Infants can associate reading with a sense of being loved



Serious Wordplay

Children start to understand the pictures in the first 2 years:

- Visual system is fully functional by 6 months
- Attentional system develops incrementally over time
- Conceptual system growing quickly
- The most important precursor for reading is early language development
- “Naming Epiphany”, when everything has its own name, occurs around 18 months----delays often seen in children who will go on to have a diagnosis of dyslexia

How does this linguistic “genius” happen?

- The brain learns to connect multiple systems in real time:
Vision, cognition, language
- Children between age 2-5 are sometimes referred to as
“linguistic geniuses” (Chukovsky). They learn how many
new words a day?
 - Answer: 2-4

The Power of the “Language of Books”

The entry to stories and children’s books allow young children to “pass over”:

- To enter another person’s consciousness, age, culture
- Essential for emotions/social learning

Stories are a safe place to

“try on” emotions



Victoria Purcell-Gates Study

Two groups of 5-year olds before they could read

Group A: had been “well read” to

Group B: had not

Children’s task:

Tell a story about a personal event

Pretend you’re reading a storybook to a doll

Results

Group A used more literary language, sophisticated syntax,
longer phrases, and relative clauses

Word Poverty

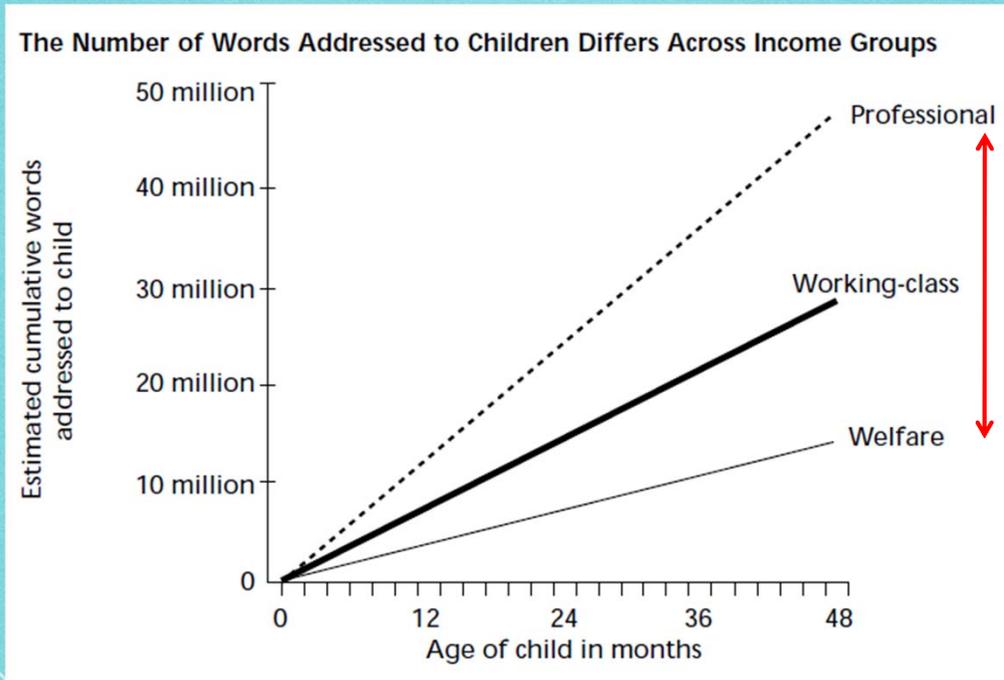
- Risley and Hart (2003)
- 86%-98% of the child's vocabulary consisted of words in the parents' vocabulary

Families' Language and Use Differ Across Income Groups

| Measures & Scores | Families | | | | | |
|---|-----------------|-------|------------------|-------|-----------|-------|
| | 13 Professional | | 23 Working-class | | 6 Welfare | |
| | Parent | Child | Parent | Child | Parent | Child |
| Protest score ¹ | 41 | | 31 | | 14 | |
| Recorded vocabulary size | 2,176 | 1,116 | 1,498 | 749 | 974 | 525 |
| Average ² utterances per hour | 487 | 310 | 301 | 223 | 176 | 168 |
| Average ² different words per hour | 382 | 297 | 251 | 216 | 167 | 149 |

P
P
V
T

At age 4



32 million words

Differences in Print Environments

- Smith, Constantino, Krashen (1997)
- Surveyed three LA communities
- Average number of books in homes:
 - Underprivileged families: 0
 - Low-middle income families: 3
 - Affluent families: 200

National Early Literacy Panel

- Released January 2009
- 6-year study
- Studied children from birth-age 5
- Controlled for multiple variables – including SES
- Identified 6 domains of early literacy that predicted later reading skills

6 Early Predictors of Later Reading

1. Alphabet Knowledge
2. Phonological Awareness
3. Rapid Automatic Naming (RAN) of letters or digits (Wolf & Denckla, 2004)
4. RAN of objects or colors
5. Ability to write individual letter or one's own name
6. Phonological memory

2. Novice Reader

- “Why is it that the hardest thing children are ever asked to do is the *first* thing they’re asked to do?” --- Meryll Pisch
- Learns the alphabetic principle:
 - Letters connect to sounds
- Learns grapheme-phoneme correspondence
- Large gains in phonological, orthographic, and semantic processes



Orthographic Development

- Learns the visual conventions of language
 - Common letter patterns
 - Irregular usage (sight words)
- Visual patterns of letters and frequent combinations become automatized representations



Semantic Development

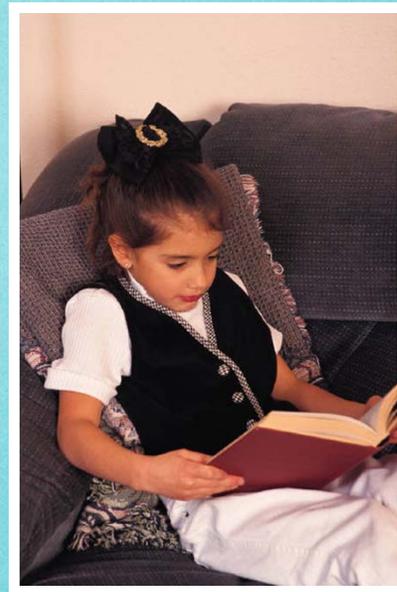
- Connie Juel: “The most common misconception in early reading is to assume that after the child decodes the word, she knows it.”
- Knowing the meaning enhances reading
 - Can’t assume decoding = comprehension
 - Vocabulary knowledge increases the speed of decoding
- Reading propels word knowledge
 - Children learn 88,700 words during school years
 - 9,000 of these need to be learned by end of 3rd grade
- Multiple meanings (POLYSEMY) enhance comprehension

3. Decoding Reader

- Semantic, syntactic, and morphological development
- On the verge of becoming fluent
- Letter pattern and vowel pair chunks become automatic
- Matthew effects (Stanovich, 1986)
- Too little explicit vocab instruction occurs in classrooms
- Children who know “what’s in a word” read much better than those that do not

What is a good decoding reader?

- ▶ **decodes text with ease and good prosody**
- ▶ **little cognitive effort to sound out longer words**
- ▶ **decodes fluently enough to allocate time to comprehend AND think new and creative thoughts.**



What does it mean to be a fluent reader?

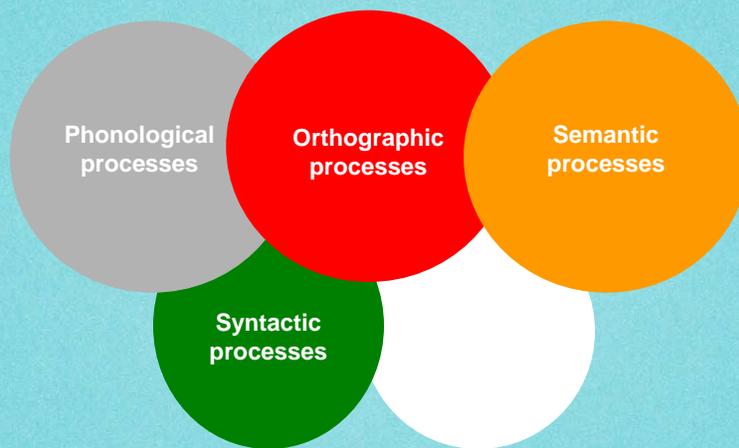
- “In fact, the automaticity with which skillful readers recognize words is the key to the whole system...The reader’s attention can be focused on the meaning and message of a text only to the extent that it’s free from fussing with the words and letters.” (Marilyn Adams)

Figure-Ground Shift: Fluency not as outcome of word identification accuracy, but as changing, developmental set of processes that include phonology, orthography, semantics, syntax, morphology (POSSuM)

Fluency in underlying component processes both allow time for comprehension and also directly contribute to comprehension and “Deep Reading” processes

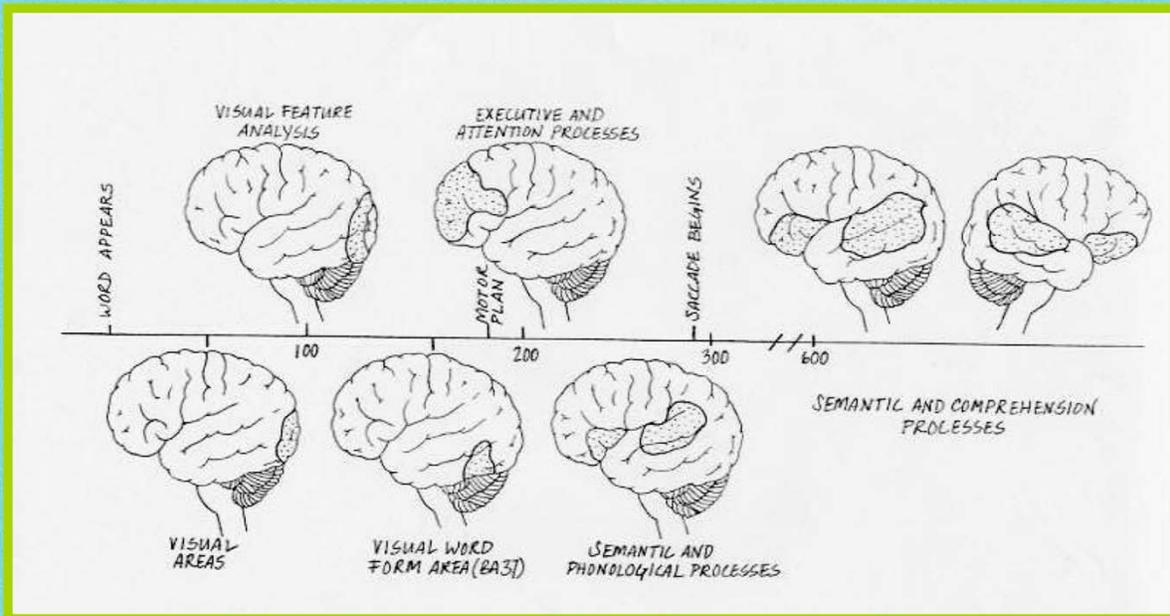
New Conceptualization

Dynamic Linguistic Connections Model: POSSUM



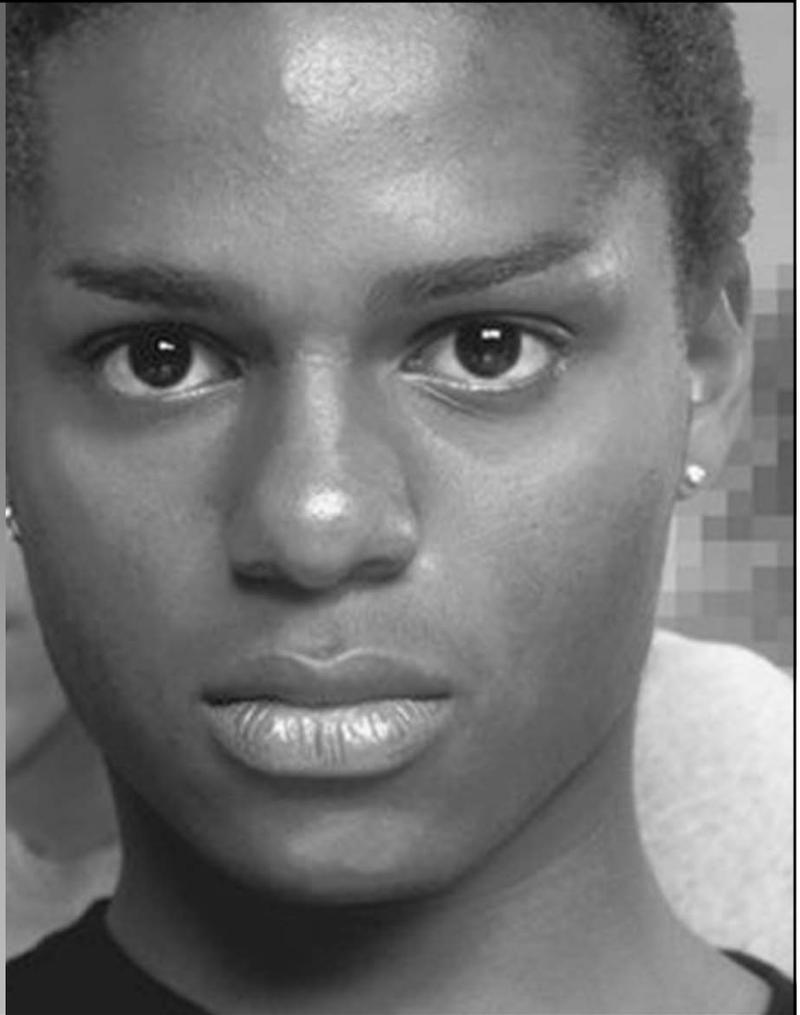
At a meta-level, fluency intervention must address the rapid activation and retrieval of the five interconnected systems if fluent comprehension is to be attained.

The Fluent Reading Brain





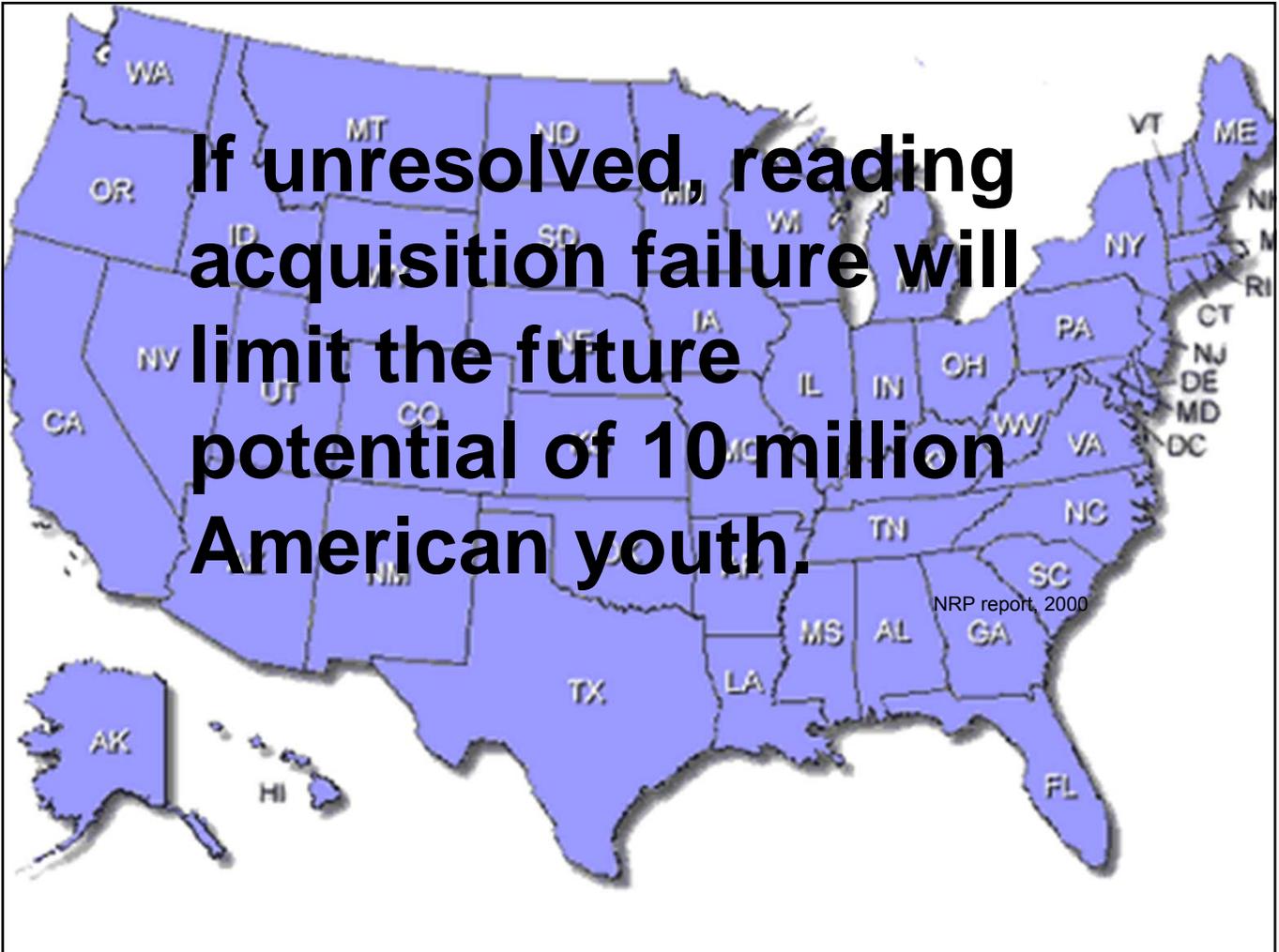
61% AA
54% H
26% EA



reading of struggling reader:

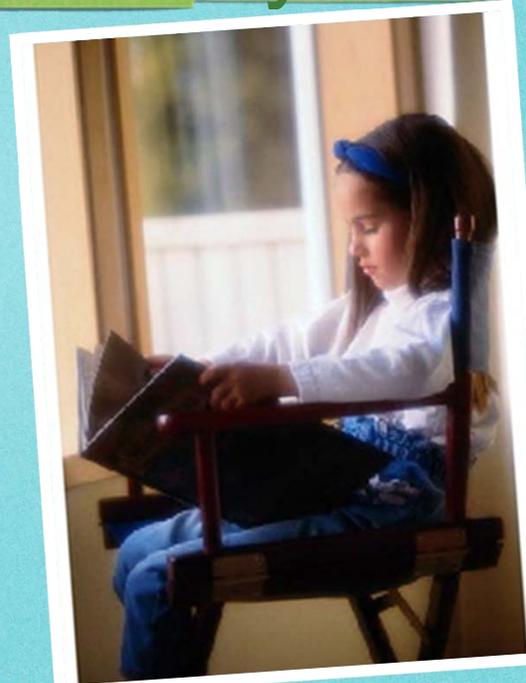
He had never seen dogs fight as these w__ish c__ f__t, and his first ex_____ t__th in an unf_____able l_____n. It is true, it was a vi_____ex_____, else he would not have lived to pr_____it by it. Curly was the v_____. They were camped near the log store, where she, in her friend __ way, made ad _____ to a husky dog the size of a full-_____ wolf, th__ not half so large as _he. _ere was no w_____ing, only a leap in like a flash, a met_____ clip of teeth, a leap out equal __ swift, and Curly's face was ripped open from eye to jaw.

It was the wolf manner of fight__, to st__ and leap away; but there was more to it than this. Th__ or forty huskies ran _o the spot and not com_____d that s_____t circle. Buck did not com_____d that s_____t in_____, not the e__ way with which they were licking their chops. Curly rushed her ant_____, who struck again and leaped aside. He met her next rush with his chest, in a p_____ fash__ that tum__ed her off her feet. She never re_____ed them. This was __at the on_____ing huskies had w_____ for. (London, 1981, p. 55)



Effects of Poor Reading Fluency

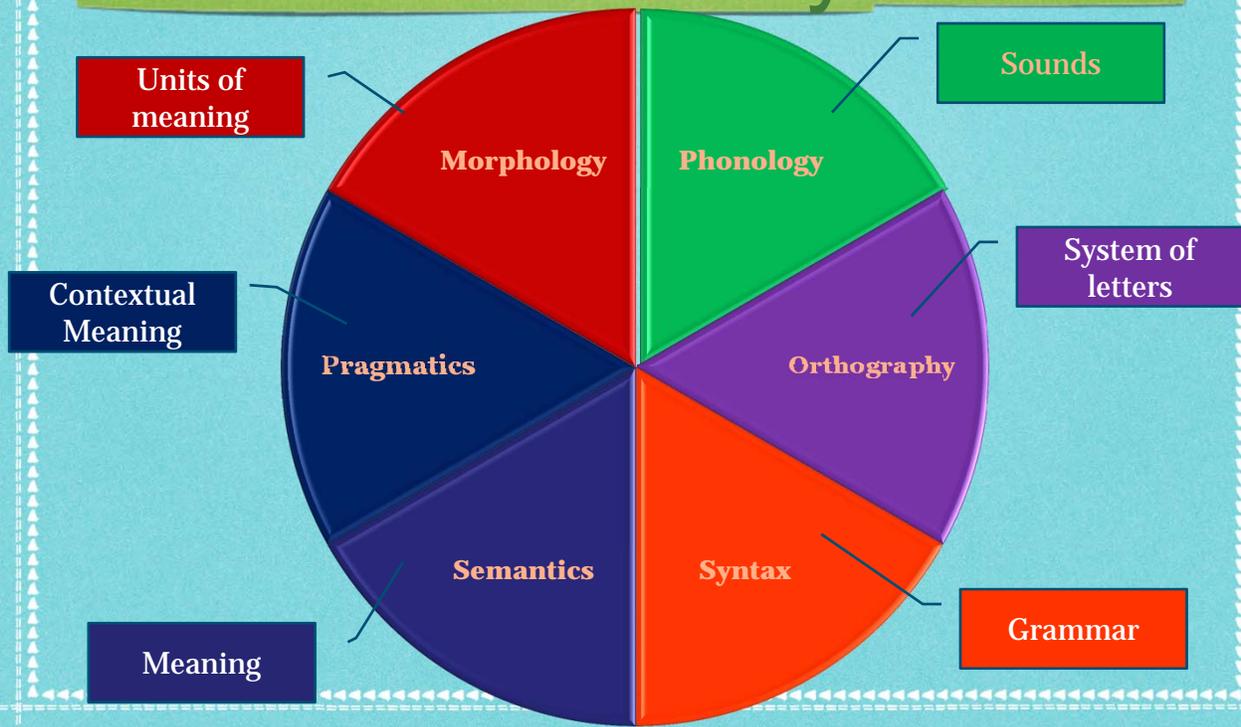
- ▶ Lowers student achievement
- ▶ Lowers student's ability to keep up with classroom expectations
- ▶ Lowers self-esteem
- ▶ Lowers student's interest in independent reading
- ▶ Lowers student's interest in learning



Fluency Principles

- Is not a matter of speed
- It's about being able to utilize all the knowledge about a word fast enough—from phonemes to meanings to grammatical functions--- to have time to think and comprehend
- Fluency does not ensure comprehension, but is a bridge to allowing time for thinking
- Gives the executive system enough time to direct attention where it's needed
 - Infer, understand, predict

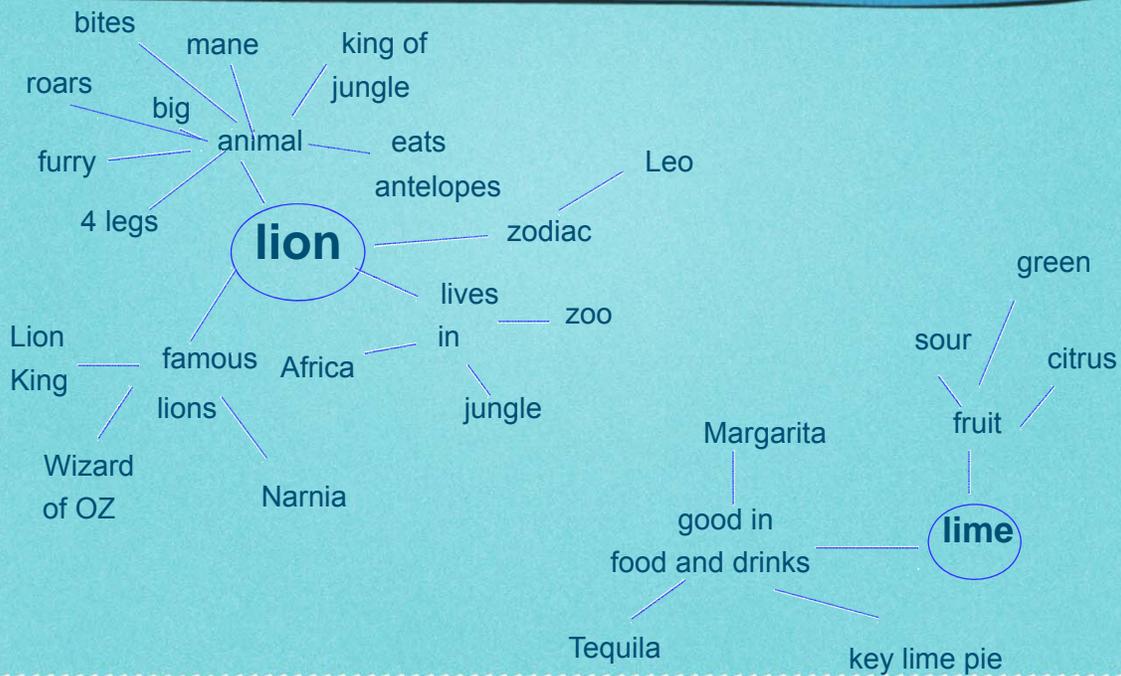
Components contributing to Fluency



English Orthography

- ▶ Reading words is faster for words in large orthographic neighborhoods. (Peerean & Content, 1995)
- ▶ Word patterns prime related words.
- ▶ Dyslexics do not exhibit orthographic priming. (Bentin & Feldman, 1990)

Semantic Neighborhoods



Polysemy: the neglected semantic area

- Almost half of the common words in primary grades are polysemous in nature: e.g., jam, pat, bat, track
- Little explicit instruction on the fact that many words have not only multiple meanings, but also different syntactic functions: e.g., jam, pat, bat, track
- Important to develop “Semantic Flexibility” for fluency

English Morphology

- Morphological analysis: learners break complex words into constituent meaning elements called **morphemes** (bases, prefixes, and suffixes)
- Morphological ability can even serve to distinguish **different degrees of reading disabilities** (Joanisse, Manis, Keating, & Seidenberg, 2000)
- Sixty Percent of Novel Words can be “**worked out**” through examining the morphemes: e.g., **periventricular nodular heterotopia!** (Biemiller, 2005)

English Syntax

- ▶ Reading impaired children are significantly impaired in complex language production (Gottwald et al., 2010)
- ▶ Syntactic effects are subtle.
- ▶ Fluency for connected text demands knowledge at word level (“syntactic flexibility”), sentence level (with increasing sophistication of phrase and clause structure), and passage level

Maria told Patrick to shovel the driveway.



**Maria promised Patrick
to shovel the driveway.**



Passage Complexity

There was an “evil witch”, who lived in the middle of the forest. Because everyone feared her, they never looked her in her eyes. One day a young, lonely princess happened to walk near the place where the witch lived, and she knocked unsuspectingly at the strange door. With surprise written upon her face, the witch opened the door and stared at the lovely, friendly face of the young girl. The princess did not avert her face; rather, she smiled, and this filled the witch with feelings of joy, now long forgotten.

Expert Reader

- ½ second is all it takes an expert reader to read almost any word

| Time | Description |
|--------------|--|
| 0 - 100 ms | Turning expert attention to letters |
| 50 – 150 ms | Recognizing a letter, letter pattern, and word |
| 100 – 200 ms | Connecting letters to sounds and orthography to phonology |
| 200 – 500 ms | Accessing all that we know about a word: semantics, morphology, syntax |

Fluent, Feeling Brain

- A fluent, comprehending reader “feels” more than ever before, because there is time to allocate to emotions
- Growing activation in the limbic system
- Affective network determines what patterns and strategies are important to the individual
 - Helps us prioritize and give meaning to what we read

Changes in the reader's brain

Before:

- Large cortical space activated in young reader
- Both hemispheres operating for many functions
- Less efficient pathway
 - The upper route (Dorsal Route)
 - from visual areas to upper temporal and lower parietal regions and then to frontal regions

After Fluency:

- Has specialized cortical regions
- Bi-hemispheric processing switches to more efficient left hemisphere
 - The lower route (Ventral Route)

Why is the shift to specialized left hemispheric processing so important?

- Allows for more bilateral activation for meaning and comprehension processes
- Enables the reader to allocate the single most important gift of the fluent reading brain ---- TIME---to “DEEP READING” processes
- With time, the brain can now think and feel differently

DEEP READING

- Inferential processes
- Analogical reasoning
- Integration with background knowledge
- Incorporation of feelings
- Perspective-taking
- Insight and reflection
- Novel Thought

Expert Reading over the Life-Span

- How reading changes us depends on what we read and how we read it: this raises the question about the expert reading brain in a digital epoch
- Predict, infer, plan, leverage background knowledge
- The relationship between text and life is dynamic
 - “We bring our life experiences to the text, and the text changes our experience of life”

How can we predict fluency problems before they happen?

- Estimation of the brain's ability to recognize a visual symbol and name it accurately.



How quickly can the
brain
integrate visual and
language processes?

Naming Speed: RAN

o a s d p a o s p d
s d a p d o a p s o
a o s p s d p o d a
d a p o d s a s o p
o a d s d p o a p s

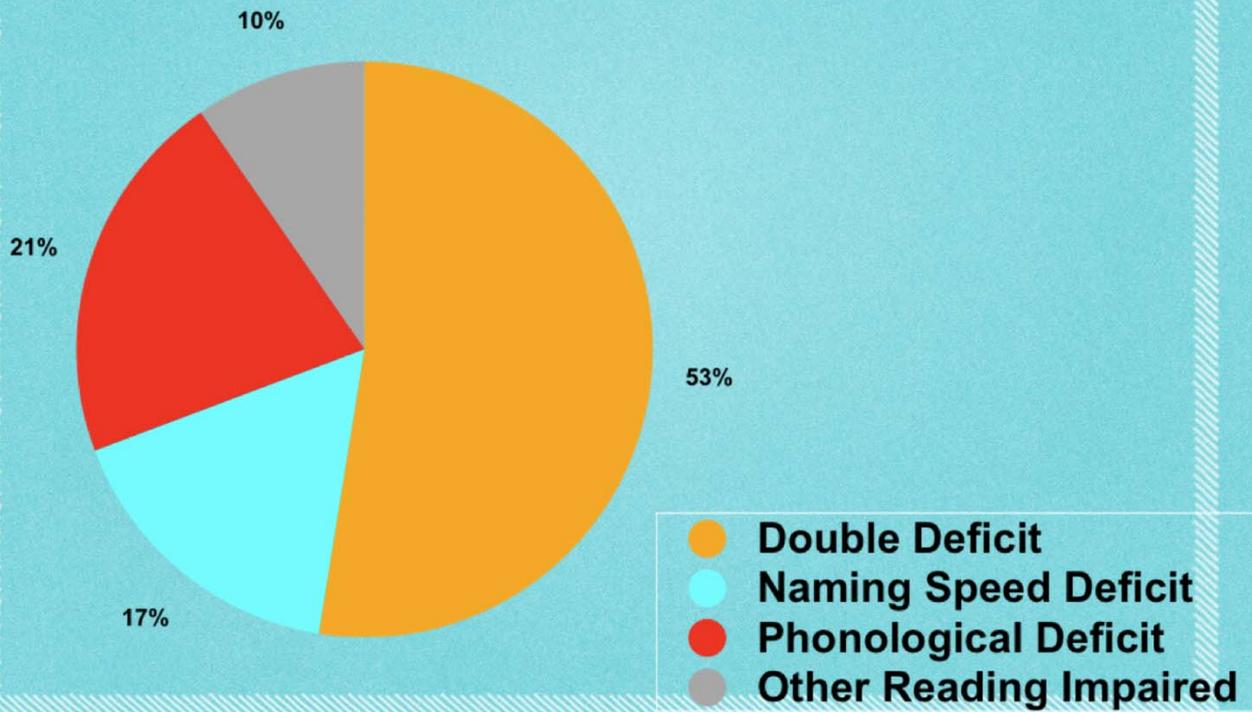
| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 6 | 9 | 4 | 7 | 6 | 2 | 9 | 7 | 4 |
| 9 | 4 | 2 | 7 | 4 | 2 | 6 | 7 | 9 | 6 |
| 6 | 2 | 9 | 7 | 9 | 4 | 7 | 2 | 4 | 6 |
| 4 | 6 | 7 | 2 | 4 | 9 | 6 | 9 | 2 | 7 |
| 9 | 2 | 4 | 7 | 6 | 7 | 2 | 6 | 4 | 9 |

RAN as a Predictor

- Kindergarten (Kirby 2001, Sunseth & Bowers, 2002)
- Letters & Numbers predict reading fluency (Kirby)
- RAN/RAS correlates with:
 - Spelling
 - Reading fluency
 - Comprehension
 - Reading accuracy of unfamiliar words
 - Math Fluency



Distribution



Principles of Intervention Based on New Conceptualization of Fluency

- ▶ Equal weight in instruction on accuracy and speed;
- ▶ Explicit instruction in all components of linguistic knowledge: that is, emphasis in instruction on phonology, orthography, semantics, syntax and morphology
- ▶ Explicit emphasis on comprehension strategies

Approaches to Improving Fluency

- **Traditional: Repeated or Guided Reading**
- **Newer Research: Multi-Componential Emphases**



Multi-Componential Emphases in Intervention

Phoneme Awareness

Orthographic Pattern and
Word Recognition and
Spelling

Vocabulary

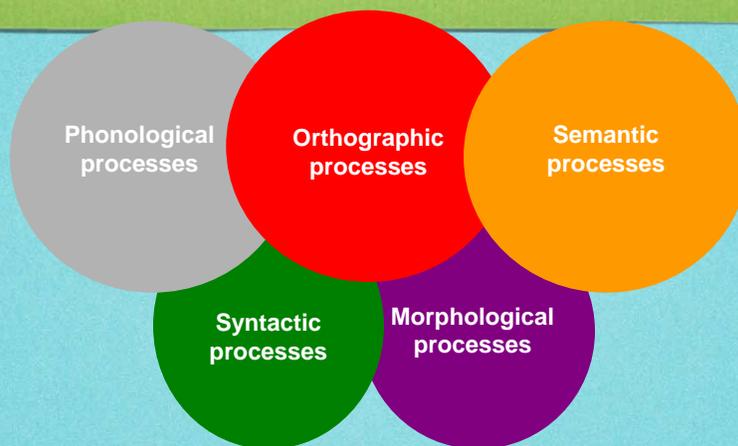
Morphology

Grammar and Usage

Listening and Reading
Comprehension Strategies



Dynamic Linguistic Connections Model: POSSUM



At a meta-level, fluency intervention must address the rapid activation and retrieval of the five interconnected systems if fluent comprehension is to be attained.

Examples of Multi-component Approaches

- ▶ PHAST (Empower) and RAVE-O
- ▶ Tier 2 or 3 Intervention model;
- ▶ Suitable for 1-4 graders reading at least a year behind their peers;
- ▶ Explicit emphases on major components of reading

Orthographic Pattern Emphases

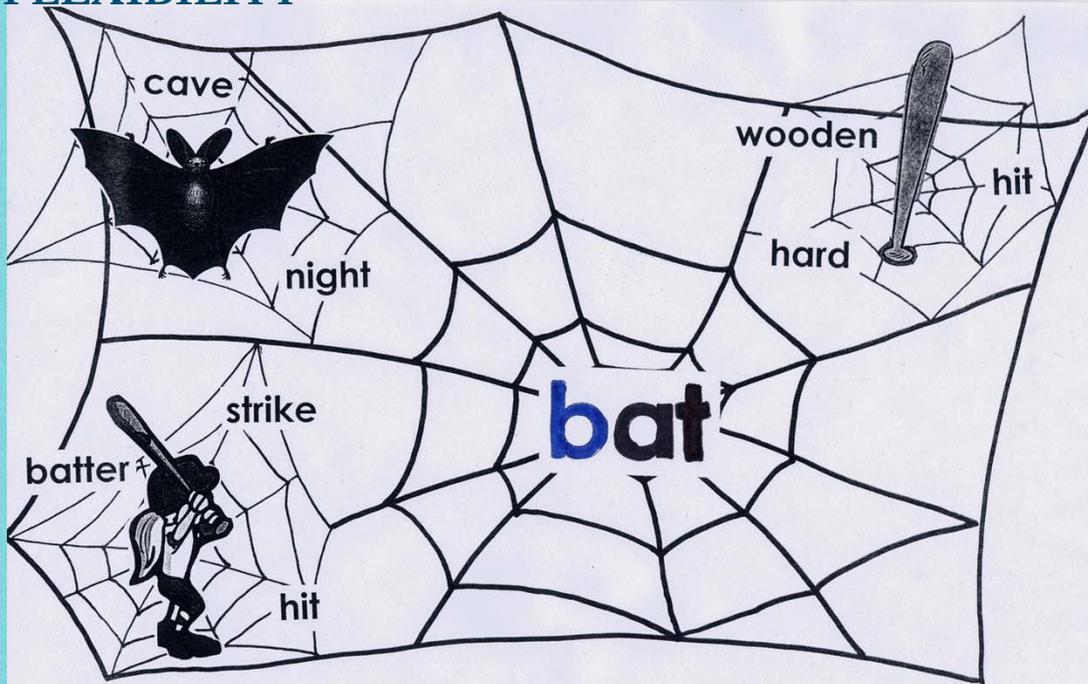


lock
mock
dock
rock

block

blocked blocking
blockade

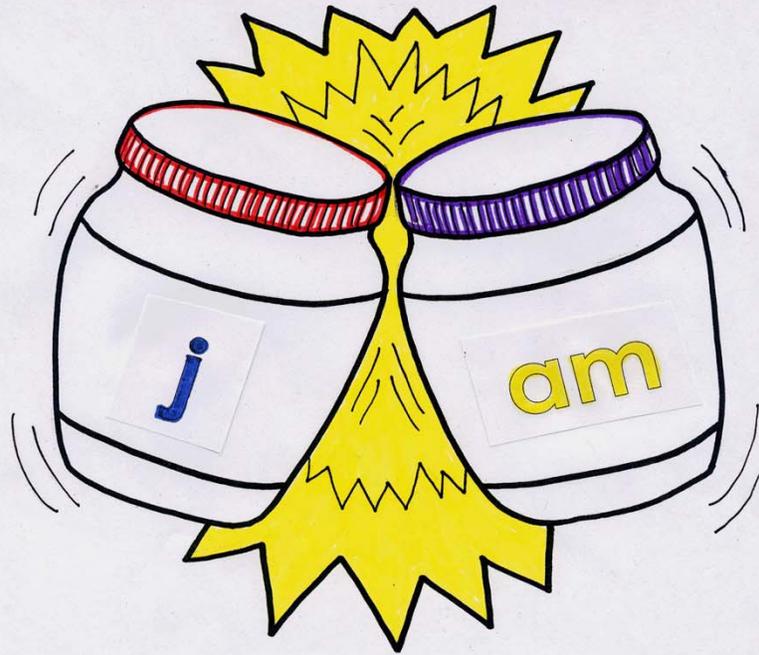
PHONIC FLEXIBILITY



MANY INTERESTING MEANINGS

Cognitive Strategies

Jam-Slam



Morphological Pattern Emphases

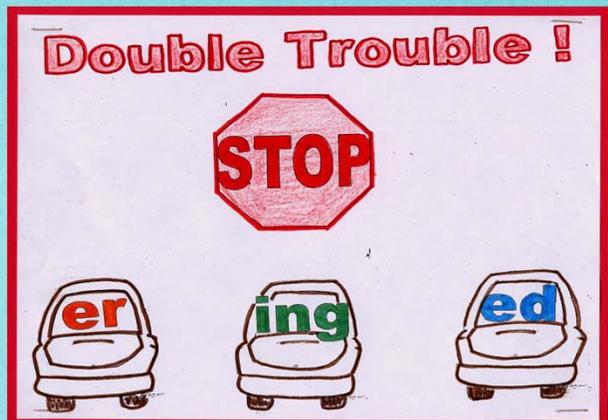
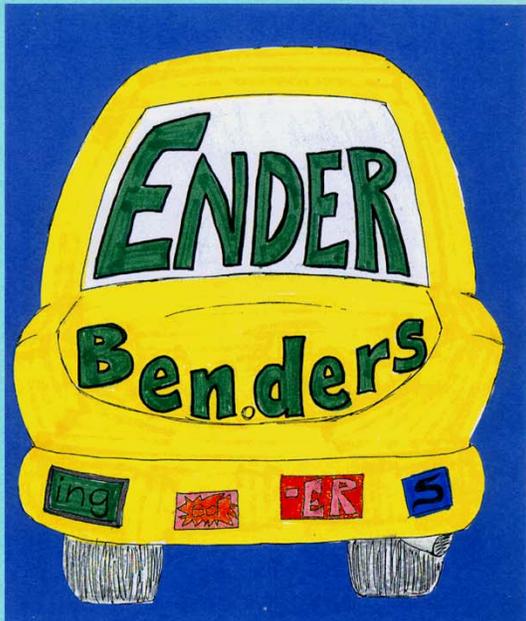
- Ender Bender 'ER'
- What does ER do to the word?
- How does it change the spelling?
- How does it change the meaning?

More

Person

New Meaning

LOGICAL STRATEGIES



GOALS OF MULTI-COMPONENT INTERVENTIONS

- ▶ Development of fluency in reading outcome behaviors (word identification, word attack, and comprehension)
- ▶ Development of automaticity in underlying component skills such as left-to-right scanning, letter recognition, and orthographic pattern recognition and onset and rime identification.
- ▶ Self-recognition of growing command over language.

PHAST V. UNI-DIMENSIONAL INTERVENTIONS

- **MULTI-COMPONENT TREATMENTS:**
Significant differences over other approaches in word attack, word identification, and word level fluency
- **RAVE-O :** Significant differences over all other approaches in vocabulary (semantic flexibility), fluent comprehension