Finding the Science of Reading in the Common Core State Standards
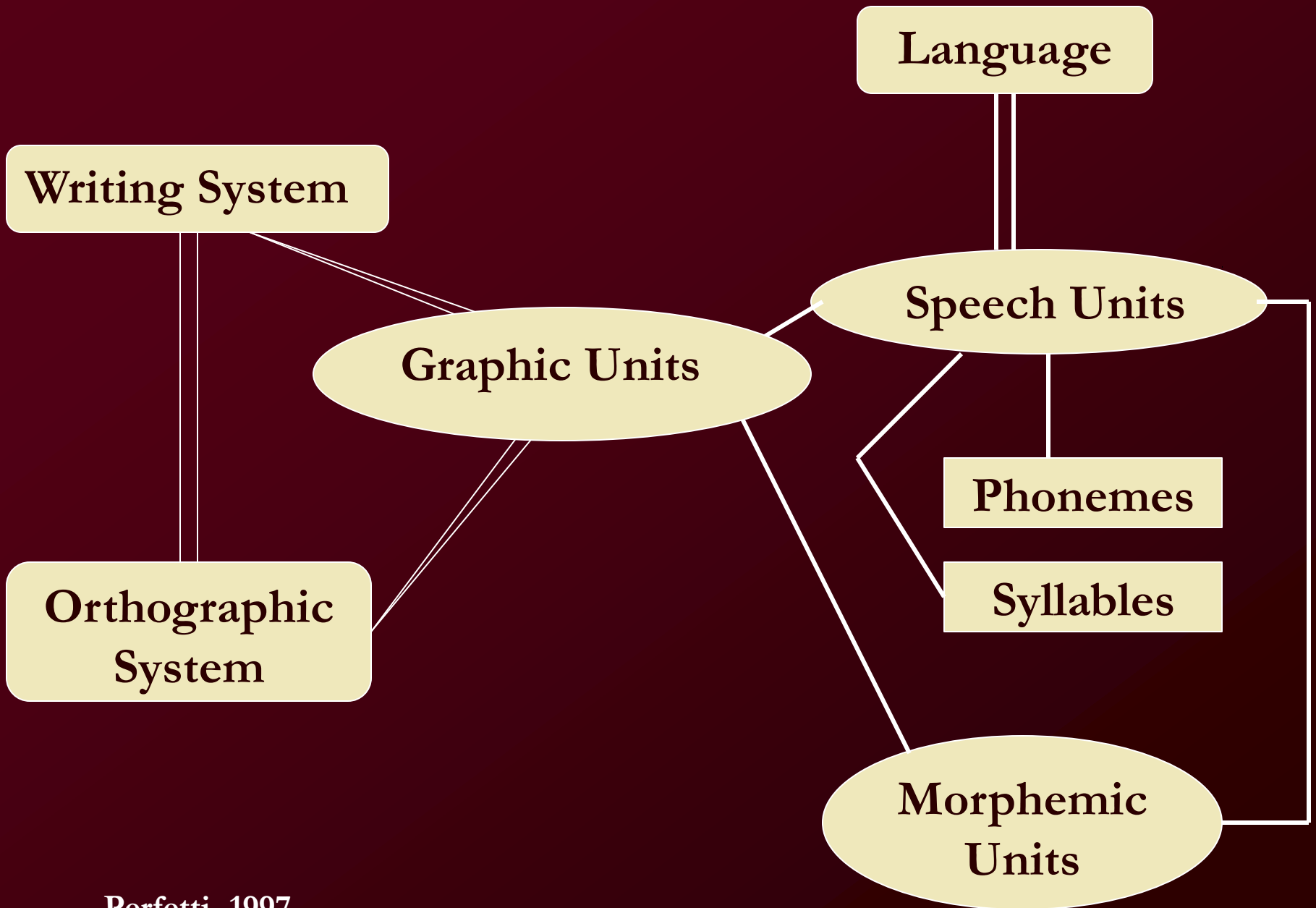
Barbara Foorman, Ph.D.

Florida Center *for* Reading Research

Florida State University

Perfetti, 1997

- Arabic
- Danish
- English
- Finnish
- French
- German
- Hebrew

- Korean
- Italian
- Portuguese
- Spanish
- Serbo-Croatian
- Welsh

Which is the least transparent?
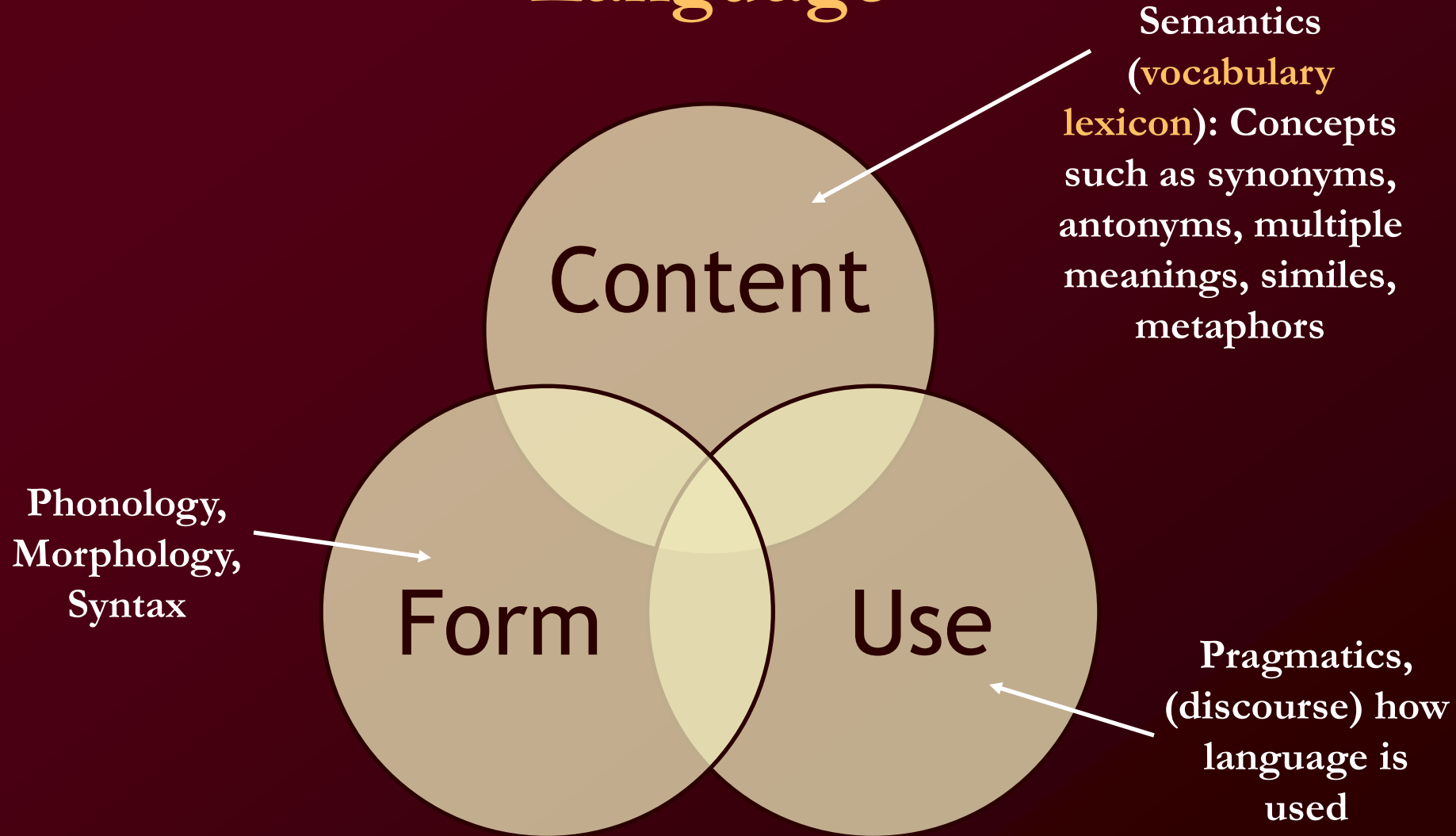
Poll on Transparency of Alphabetic Orthographies

Shallow

- **Finnish, Welsh**
- **Korean, Italian, German, Serbo-Croatian**
- **Spanish, Portuguese**
- **French, Danish**
- **English**
- **Hebrew, Arabic**

Deep

Perfetti, 2011

Language

Content

Form

Use

Semantics (**vocabulary lexicon**): Concepts such as synonyms, antonyms, multiple meanings, similes, metaphors

Phonology, Morphology, Syntax

Pragmatics, (discourse) how language is used

Cumulative Vocabulary words vs. Age of child in months

13 higher-SES children (professional)

23 middle/lower-SES children (working class)

6 welfare children
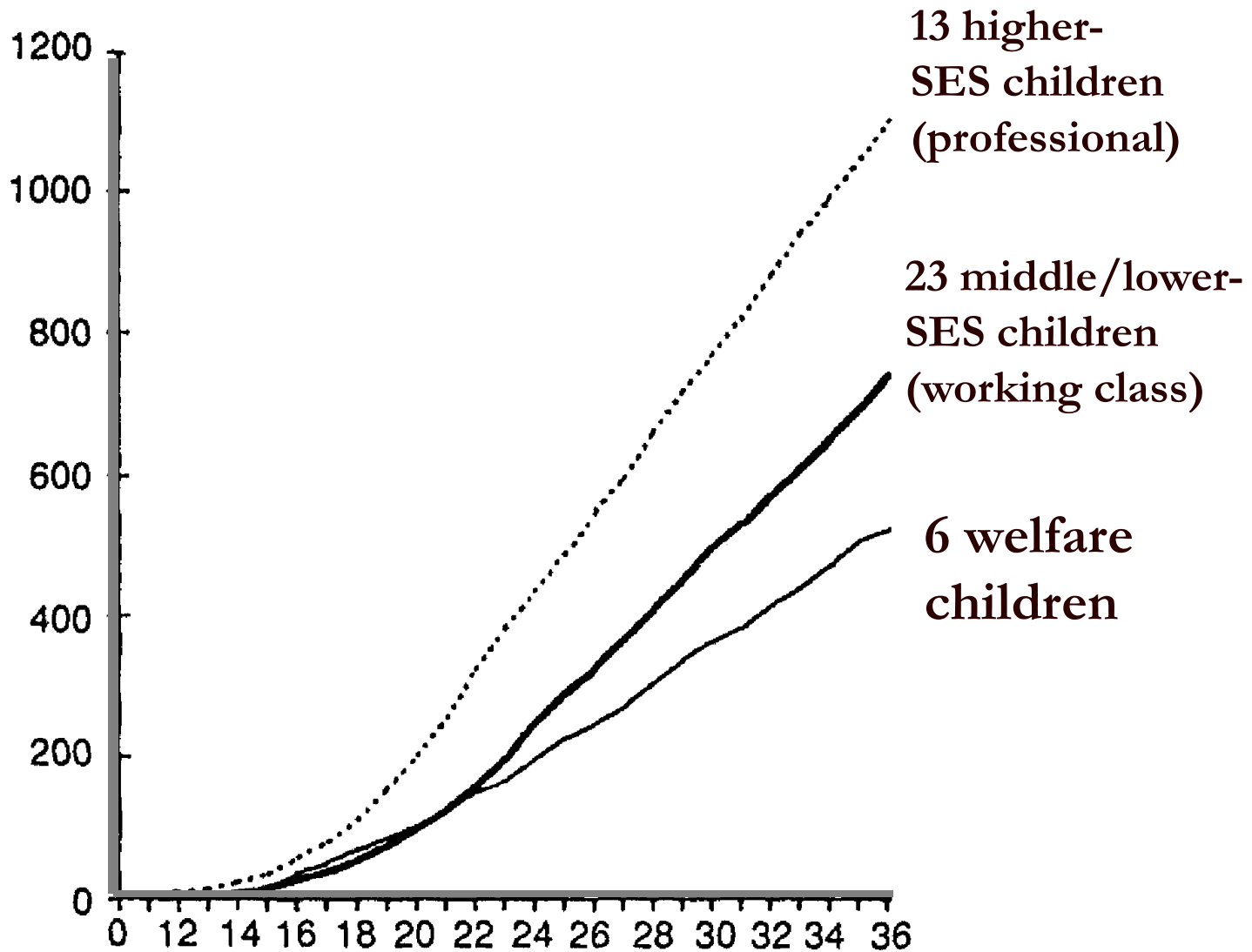
Hart & Risley, 1995

Language Experience

Estimated cumulative words addressed to child

50 million

40 million

30 million

20 million

10 million

0

Age of child in months

0   12   24   36   48

Professional

Working-class

Welfare
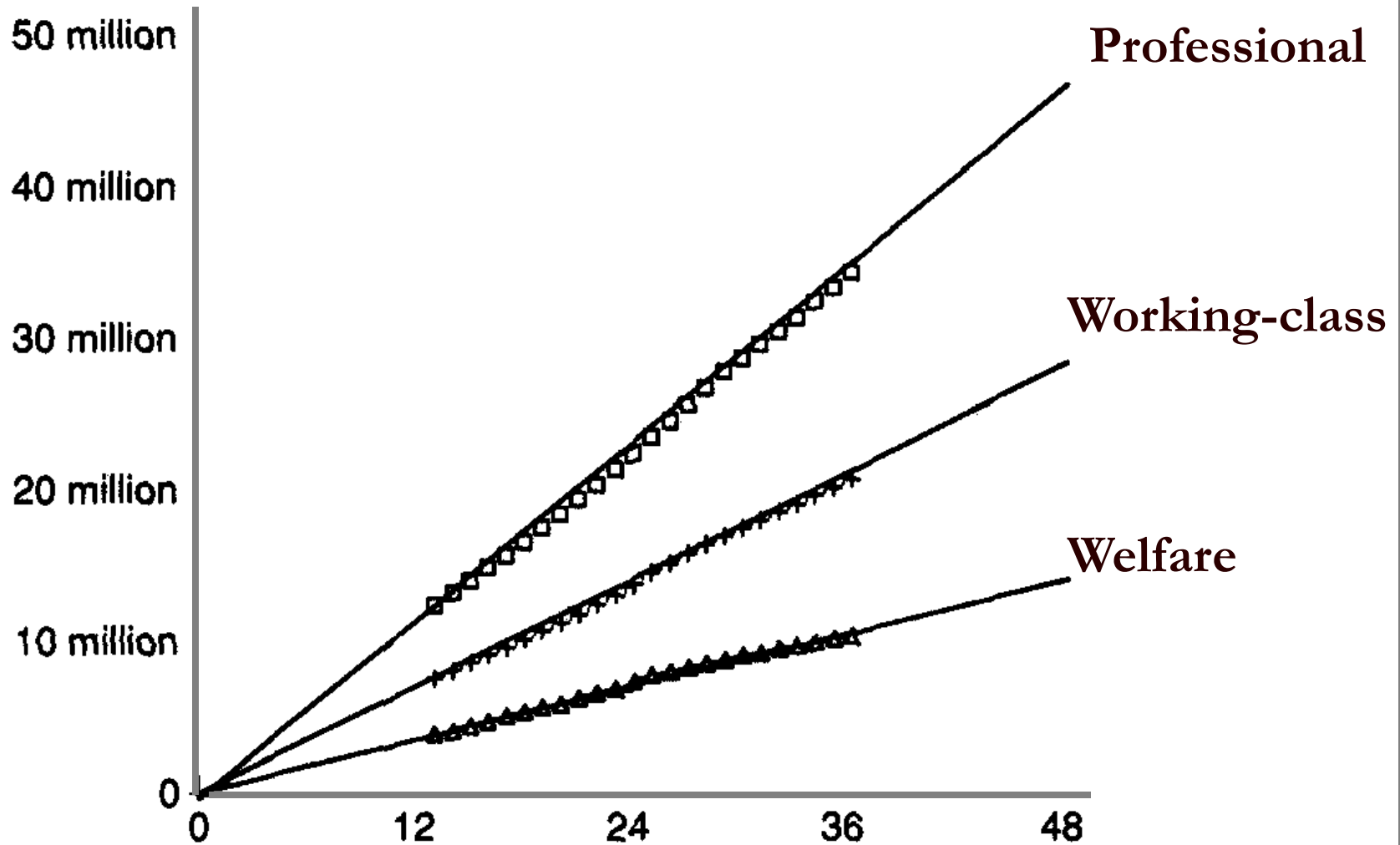
Hart & Risley, 1995

Quality Teacher Talk (Snow et al., 2007)

- Rare words
- Ability to listen to children and to extend their comments
- Tendency to engage children in cognitively challenging talk
- Promotes emergent literacy & vocabulary & literacy success in secondary grades

Learning to read & write entails…

- Normally developed language skills

- Knowledge of phonological structures

- Knowledge of how written units connect with spoken units (alphabetic principle)

- Phonological recoding and fluency

- Print exposure & writing instruction

Beginning Reading Instruction Requires

- Teach academic language skills

- Teach PA, LN & LS, and practice blending to read simple words; write simple words

- Provide sequential, **explicit** instruction in letter-sound & sound-spelling patterns; teach high frequency regular & irregular words. Practice in isolation & text

- Teach analysis of words with syllable patterns and multiple syllables. Practice.

- Daily text reading with & without feedback with attention to accuracy, fluency, comprehension

The Case for Fully Guided Instruction

Research has provided overwhelming evidence that, for everyone but experts, partial guidance during instruction is significantly less effective than full guidance.

(Clark, Kirschner, & Sweller, 2012, *American Educator*)

Reading for Understanding

The Reading Pillar

Skilled Reading

Speed and ease of reading with comprehension

Conceptual Knowledge/vocabulary

Strategic processing of text

Fluency

Comprehension

Word Recognition

Print Awareness & Letter Knowledge

Motivation to Read

Oral Language including

Phonological Awareness

Emergent Reading

Decoding using alphabetic principle

Decoding using other cues

Sight Recognition

(NRC, 1998)

LANGUAGE COMPREHENSION

BACKGROUND KNOWLEDGE
(facts, concepts, etc.)

VOCABULARY
(breadth, precision, links, etc.)

LANGUAGE STRUCTURES
(syntax, semantics, etc.)

VERBAL REASONING
(inference, metaphor, etc.)

LITERACY KNOWLEDGE
(print concepts, genres, etc.)
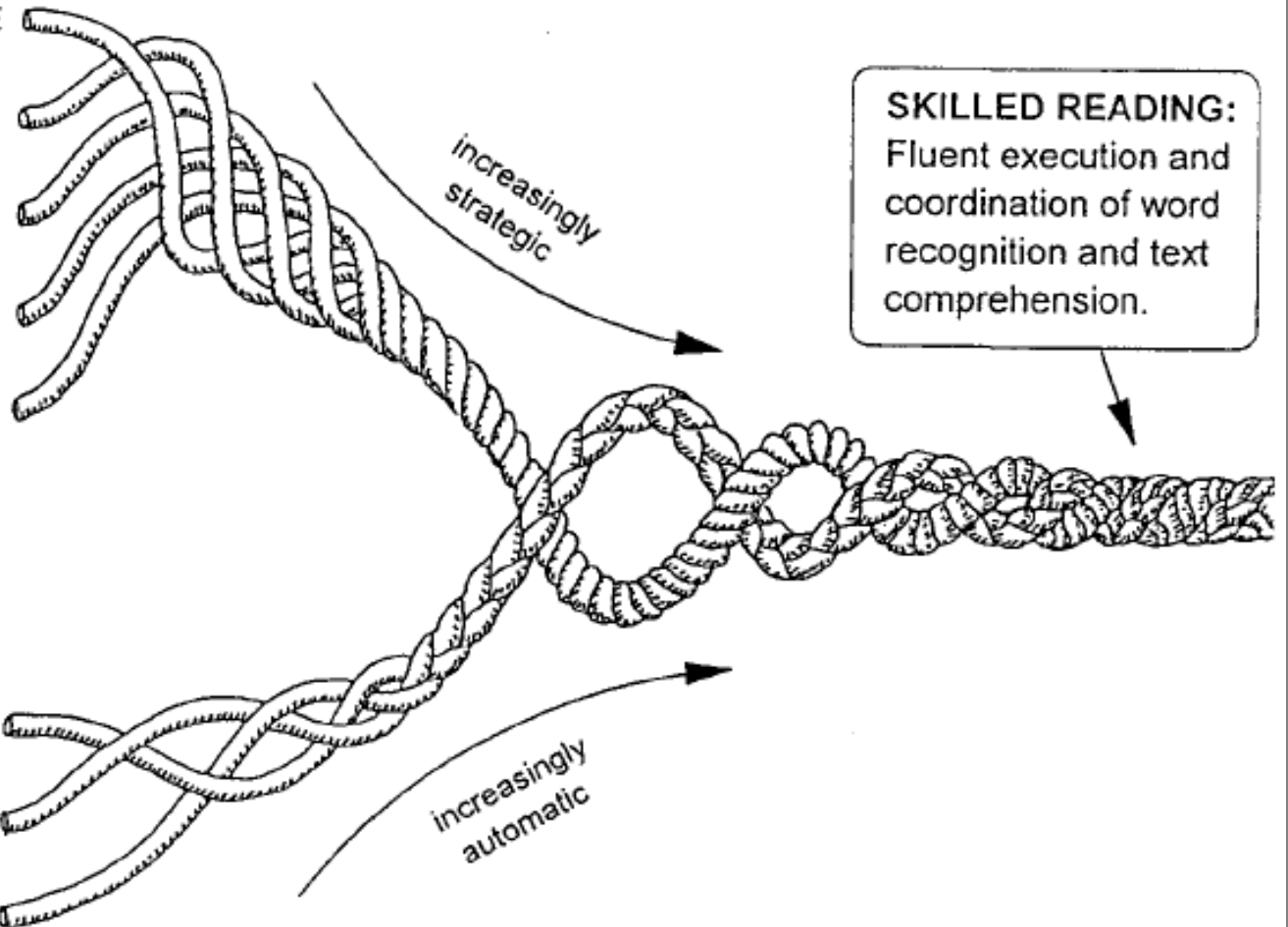
WORD RECOGNITION

PHONOLOGICAL AWARENESS
(syllables, phonemes, etc.)

DECODING (alphabetic principle,
spelling-sound correspondences)

SIGHT RECOGNITION
(of familiar words)

increasingly strategic

increasingly automatic

SKILLED READING:
Fluent execution and coordination of word recognition and text comprehension.

Scarborough (2002)

What is Reading Comprehension?

- "the process of simultaneously extracting and constructing meaning through interaction and involvement with written language" (RAND, 2002, p. 11)

- "Reading is an active and complex process that involves
  - Understanding written text

  - Developing and interpreting meaning; and

  - Using meaning as appropriate to type of text, purpose, and situation" (NAEP Framework, 2009)

Text structure, vocabulary, genre discourse, motivating features, print style and font

Word recognition, vocabulary, background knowledge, strategy use, inference-making abilities, motivation

SOCIOCULTURAL

TEXT

READER

ACTIVITY

CONTEXT

Environment, cultural norms

Purpose, social relations, school/classroom/peers/ families
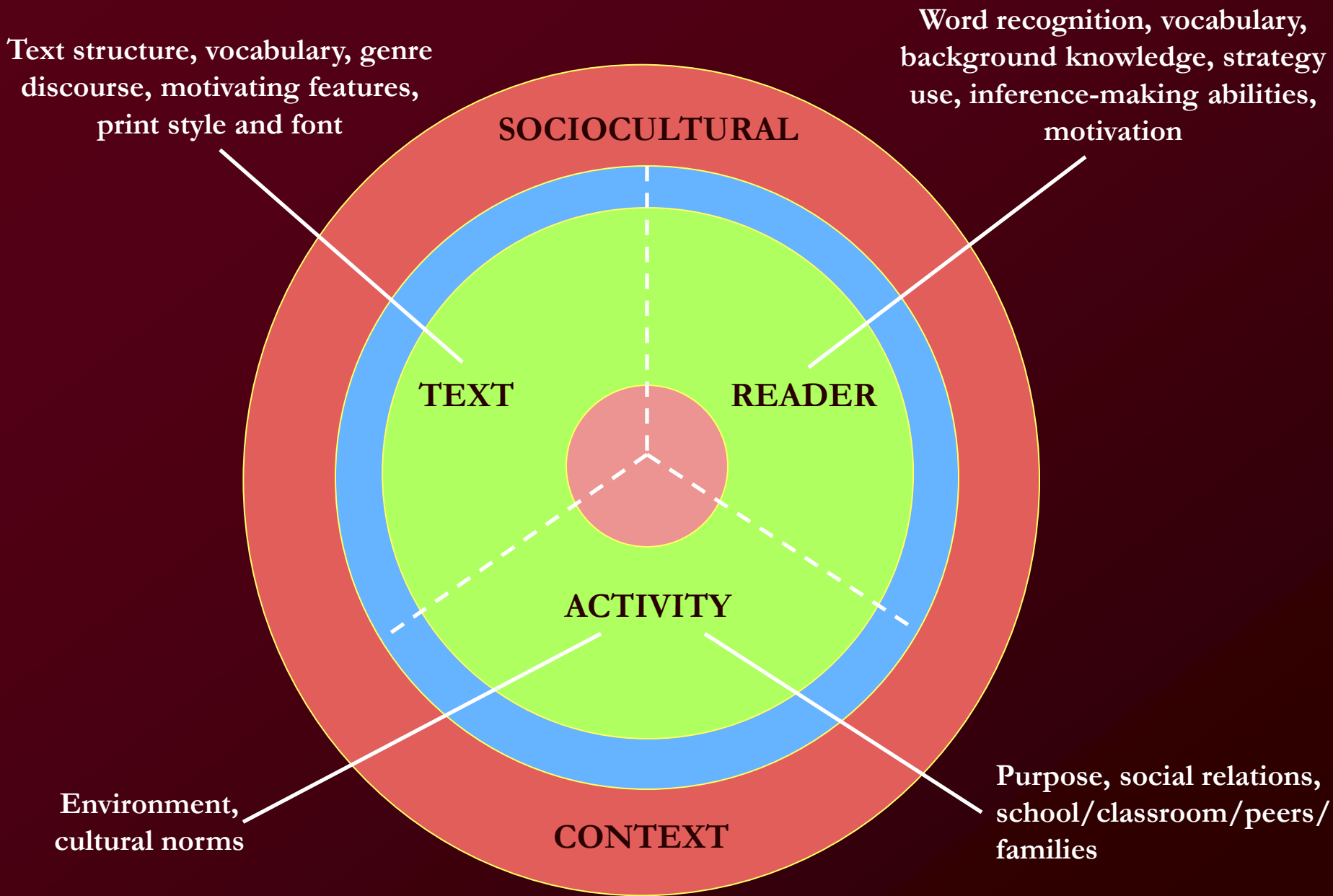
A heuristic for thinking about reading comprehension (Sweet & Snow, 2003).

Simple View of Reading

Decoding of text

✖

Comprehension of language

🟰

Reading to gain meaning

Multiplied by

Equals

Recognizing words in text & sounding them out phonemically

The ability to understand language

The ability to read and obtain meaning from what was read.

Gough and Tunmer (1986)

The Simple View

Reading Comprehension will develop to the same level as listening comprehension

Gough & Tumner, 1986

Levels of Text Processing

- Linguistic level: decoding graphic symbols

- Semantic level: word meanings, propositions integrated syntactically into coherent microstructure

- Textbase: meaning of the text—micro & macrostructure—as actually expressed by text

[Kintsch's Construction-integration model (Kintsch & Rawson, 2005);
Van den Broek's Landscape model (van den Broek et al., 2004);
Langston, Trabasso, & Magliano's (1998) model]

Components of Reading Comprehension

Comprehension Processes

General Knowledge

Situation Model

Inferences

Text Representation

Parser

Linguistic System
Phonology
Syntax
Morphology

Meaning and Form Selection

Word
Representation

Word   **Identification**

Lexicon
Meaning
Morphology
Syntax

Orthographic
Units

Phonological
Units

Orthography
Mapping to
phonology

(Perfetti, 1999)

Visual Input
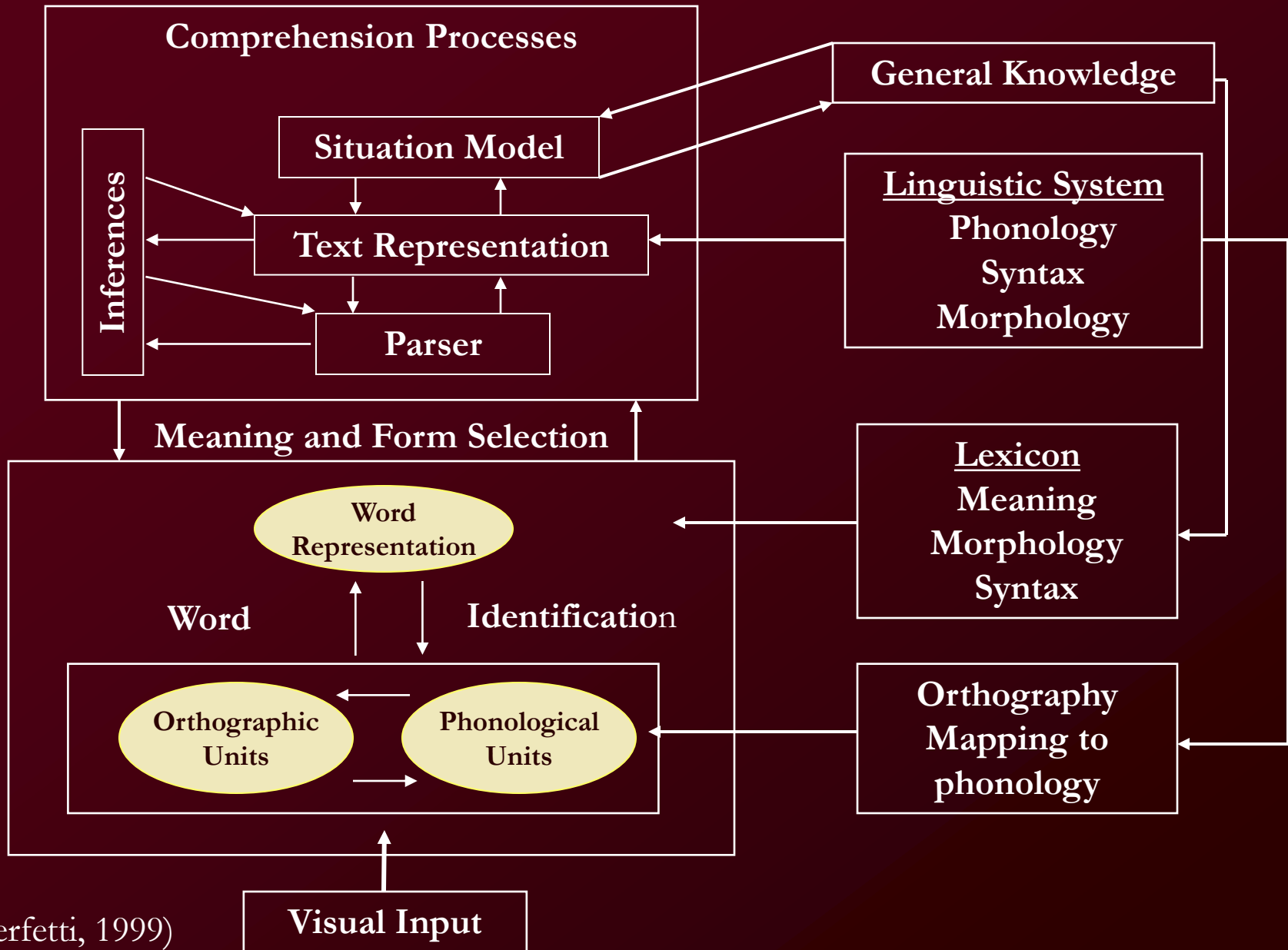
Measuring Text Difficulty

- Teacher judgment

- Readability: Typically measure word difficulty (frequency, length) and sentence length. E.g., Lexiles; ATOS; Flesch-Kincaid. DRP; REAP; SourceRater.

- Latent semantic analysis (Landauer's LSA now Pearson's Reading Maturity Metric)

- Natural language processing (e.g., McNamara's Coh-Metrix, 2001)

CCSS Qualitative Ratings

- Levels of Meaning (literary text) or Purpose (informational text):
    - Single vs. multiple levels of meaning (e.g., satire)
    - Explicit vs. implicit

- Structure
    - Low complexity: simple, well-marked, conventional
    - High complexity: complex, implicit, unconventional

- Language Conventionality and Clarity: literal, clear, contemporary, & conversational language vs. figurative, ironic, ambiguous, purposefully misleading, archaic/unfamiliar, academic & domain-specific language

- Knowledge Demands: Texts with few assumptions about reader's life experiences & depth of cultural/literary and content/discipline knowledge are less complex than those with more assumptions.

Coh-Metrix: Dimensions

- Narrativity: how story-like

- Syntactic simplicity: how short & familiar clauses & sentences are

- Word Concreteness: imageable vs. abstract

- Referential cohesion: overlap of N, V, adj., and major ideas

- Deep cohesion: presence of causal, temporal, & logical connectives in the text

University of Memphis

Referential Cohesion Examples

- <u>Argument overlap</u>: father-father(s); she-she

- <u>Noun overlap</u>: mother-mother; not mother-mothers

- <u>Stem overlap</u>: gives, gave, giving, giver

  When water is heated, it boils and eventually evaporates.
  When the heat is reduced, it turns back into a liquid form

Effects of Referential Cohesion

- Lack of argument overlap increases reading time

- Noun and argument overlap predict comprehension of informational text

- Semantic relatedness is shown to predict reading comprehension

- A high density of pronouns compared with the density of noun phrases creates referential cohesion problems

Causal Cohesion: Examples

- Causal verbs: refers to change of state, actions, or events
  - *break, freeze, move, enable, make*

- Causal particles and connectives
  - thus, therefore, the consequence of
  - *because, if, when, also, on the other hand*

Effects of Causal Cohesion

- Causally related events are read faster than other related events

- Causal cohesion is important in narrative comprehension

- Coherence suffers when the ratio of causal particles to causal verbs is small

  [Coherence = cohesion x reader ability]

What is Academic Language?

- **The language of disciplines, texts, & of discourse**

- **Requires competence in:**

  - <u>Phonology</u>: GPC rules; stress/intonation in English + words borrowed from other languages

  - <u>Academic vocabulary</u>: Tier 2 & 3 and scientific method words (describe, analyze, hypothesize); word structure (prefixes; inflectional morphemes; derivational suffixes)

  - <u>Grammar/syntax</u>: verb tenses; noun system; complex clause

  - <u>Discourse</u>: cohesive devices (connectives, anaphora); intro/ending phrases; inter-sentential signals (consequently)

  - <u>Cognition</u>: inferential, metalinguistic, & metacognitive language

The Academic Language of Disciplines

	English	Mathematics	History	Science
text type	literary	informational or technical, symbolic, diagrams	expository, argumentative, persuasive	Informational or technical, diagrams
text structure	plot, setting, characterization, point of view, verse, rhyme	sequence, cause and effect, problem and solution, supporting ideas and evidence, graphical features	sequence, cause and effect, problem and solution, author's perspective supporting ideas and evidence, contrasting viewpoints, graphical features	sequence, cause and effect, problem and solution, supporting ideas and evidence, graphical features
author's craft	diction, dialogue, symbolism, imagery, irony, figurative language	rhetorical structure, examples, logical arguments	figurative language, rhetorical structure, examples, emotional appeal	rhetorical structure, examples, logical arguments

Academic Language: Assessing Morphology

- Her [query, quest*, question] for knowledge about how to cure sick people led her to become a doctor.

- Tell me a word that has *circulate* in it that fits in this sentence: " the heart's network of blood vessels is called the _____ system."

Academic Language: Syntactic Elements

- Connectives (temporal, causal, logical, additive, adversative)

- Anaphora (pronoun reference)

- Subject-verb agreement

Academic Language: Assessing Syntax

- Pizza is one of my favorite foods, (although*, as, when) we only get to eat it on special occasions.

- Dolphins are light in weight and very strong and athletic. (Lastly, Consequently*, Furthermore,) they can leap very high out of the water.

- She noticed a bird lying on the sidewalk (and, when*, instead) she turned the corner.

- Mrs. Smith was very disappointed when she told the students how poorly (he, she, they*) scored on the test.

- There (has, have*, had) to be some snacks left in the pantry for our party tonight.

Macrostructure of Text on Functioning of Human Heart

Circulatory System

1. Location
(171 words)

2. Structure
(158 words)

3. Valves
(105 words)

4. Branching blood vessels
(225 words)

5. Circulation of blood
(483 words)

5.1 Systemic loop

5.2 Pulmonary loop

5.3 Heartbeat

(Kintsch & Rawson, 2005)
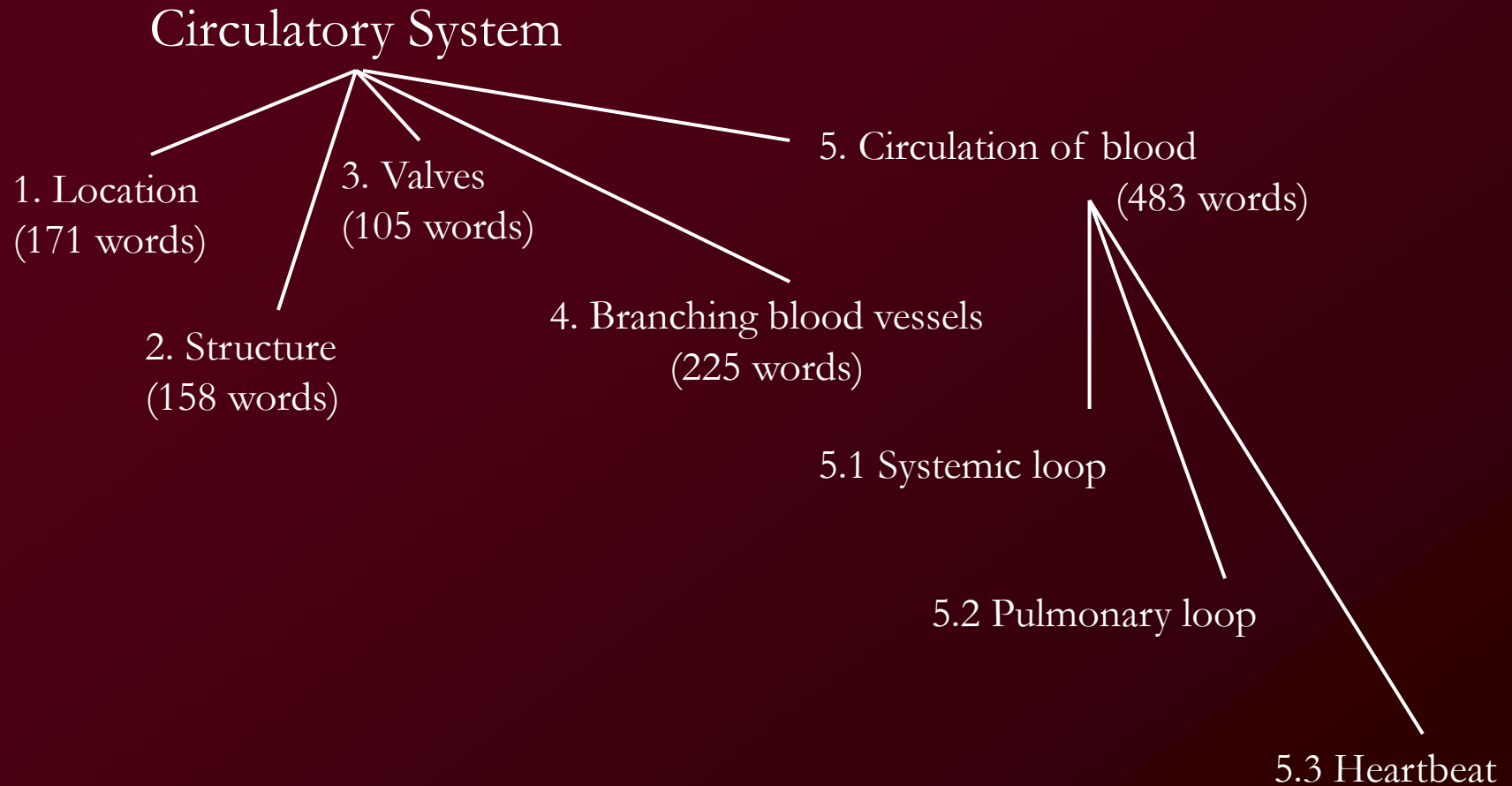
Assessing Written Discourse (i.e., reading comprehension)

- Write a summary in 50 words or less of the expository passage on the circulatory system

- Compare your summary to that of simulated peers. Rate your summary and those of the simulated peers

- Go back and revise your summary

Writing Development (Wagner et al., 2011)

- CFA shows 5-factor model of writing development in 1st and 4th grades: 1) macro-organization; 2) productivity; 3) complexity; 4) spelling & punctuation; and 5) handwriting fluency

- **Handwriting fluency** correlated with written composition factors at both grades, but surprisingly strongly related to macro-organization and productivity in grade 4.

CCSS Instructional Organization: Grade 3

Modules	Reading Complex Texts RL/RI.3.10		Writing About Texts W.3.1–2, 4–6, 10		Research Project W.3.7–8, RL/RI.3.1–10	Narrative Writing W.3.3–6, 10
	5–9 Short Texts	1 Extended Text	Routine Writing	2 Analyses	1 Research Project	1–2 Narratives
A	Myths/fables: 3–5 Science: 1–2 Social studies or arts: 1–2	Literature	Develop & convey understanding	Focus on opinions	Integrate knowledge from sources when composing	Convey experiences
B	Literature: 3–5 Science: 1–2 Social studies or arts: 1–2	Informational	Develop & convey understanding	Focus on inform & explain	Integrate knowledge from sources when composing	Convey experiences
C	Literature: 3–5 Science: 1–2 Social studies or arts: 1–2	Literature	Develop & convey understanding	Focus on inform & explain	Integrate knowledge from sources when composing	Convey experiences
D	Literature: 3–5 Science: 1–2 Social studies or arts: 1–2	Informational	Develop & convey understanding	Focus on opinions	Integrate knowledge from sources when composing	Convey experiences

For Reading and Writing in Each Module*

| Cite evidence RL/RI.3.1 | Analyze content RL/RI.3.2–9, SL.3.2–3 | Study & apply grammar L.3.1–3, SL.3.6 **Language** Study & apply vocabulary L.3.4–6 | Conduct discussions SL.3.1 **Speaking & Listening** Report findings SL.3.4 |

*After selecting the standards targeted for instruction, texts and writing tasks with clear opportunities for teaching these selected standards should be chosen.

Reading: Foundational Skills

| Phonics & word recognition RF.3.3 | Fluency RF.3.4 |

CCSS Writing Standards Progression from Grade 8 to Grades 9–10

Grade 8, Standard 1 (W.8.1)	Grades 9–10, Standard 1 (W.9–10.1)
Write arguments to support claims with clear reasons and relevant evidence. a.Introduce claim(s), acknowledge and distinguish the claim(s) from alternate or opposing claims, and organize the reasons and evidence logically. b.Support claim(s) with logical reasoning and relevant evidence, using accurate, credible sources and demonstrating an understanding of the topic or text. c.Use words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence. d.Establish and maintain a formal style. b.Provide a concluding statement or section that follows from and supports the argument presented.	Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. a.Introduce precise claim(s), distinguish the claim(s) from alternate or opposing claims, and create an organization that establishes clear relationships among claim(s), counterclaims, reasons, and evidence. b.Develop claim(s) and counterclaims fairly, supplying evidence for each while pointing out the strengths and limitations of both in a manner that anticipates the audience's knowledge level and concerns. c.Use words, phrases, and clauses to link the major sections of the text, create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. a.Establish and maintain a formal style and objective tone while attending to the norms and conventions of the discipline in which they are writing. b.Provide a concluding statement or section that follows from and supports the argument presented.

CCSS Speaking and Listening Standards Progression from Grade 5 to Grade 6

Grade 5, Standard 1 (SL.5.1)	Grade 6, Standard 1 (SL.6.1)
Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 5 topics and texts, building on others' ideas and expressing their own clearly. a.Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion. b.Follow agreed-upon rules for discussions and carry out assigned roles. c.Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grade 6 topics, texts, and issues, building on others' ideas and expressing their own clearly. a.Come to discussions prepared, having read or studied required material; explicitly draw on that preparation by referring to evidence on the topic, text, or issue to probe and reflect on ideas under discussion. b.Follow rules for collegial discussions, set specific goals and deadlines, and define individual roles as needed. c.Pose and respond to specific questions with elaboration and detail by making comments that contribute to the topic, text, or issue under discussion. d.Review the key ideas expressed and demonstrate understanding of multiple perspectives through reflection and paraphrasing.

CCSS Assessment Plans

PARCC

Summative: Fixed-form delivery

Optional: Diagnostic & mid-year for 3-12; K-2 formative

Required: non-summative speaking & listening for 3-12; locally scored

Smarter Balanced

Summative: Adaptive delivery format

Optional: Computer-adaptive, interim assessments

In Summary

- Key Scientific constructs of ELA CCSS
  - Text complexity
  - Academic language
  - Perspective taking

- Key to Implementation

Professional Development!

Children Must be *Taught* to Read and Write!

www.FCRR.org

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FCRR
Florida Center for Reading Research

We are all born dyslexic--the difference among us is that some of us are easy to cure and others more difficult.

-Liberman, 1996