

A Scientific Success Story: Specific Reading Disabilities, or Developmental Dyslexia

Dr. Joseph K. Torgesen
Florida State University and
Florida Center for Reading Research



Florida Council for Exceptional Children, October, 2006



Alexis...

To identify students like Alexis, we developed definitions by exclusion:

Alexis, and many other students, have reading difficulties not caused by:

- Low intelligence, or general ability
- Lack of support, or learning opportunities, at home
- Poor instruction
- Other disabilities like vision or hearing

Made the assumption, that these disabilities were intrinsic to the child, but didn't know what they actually were

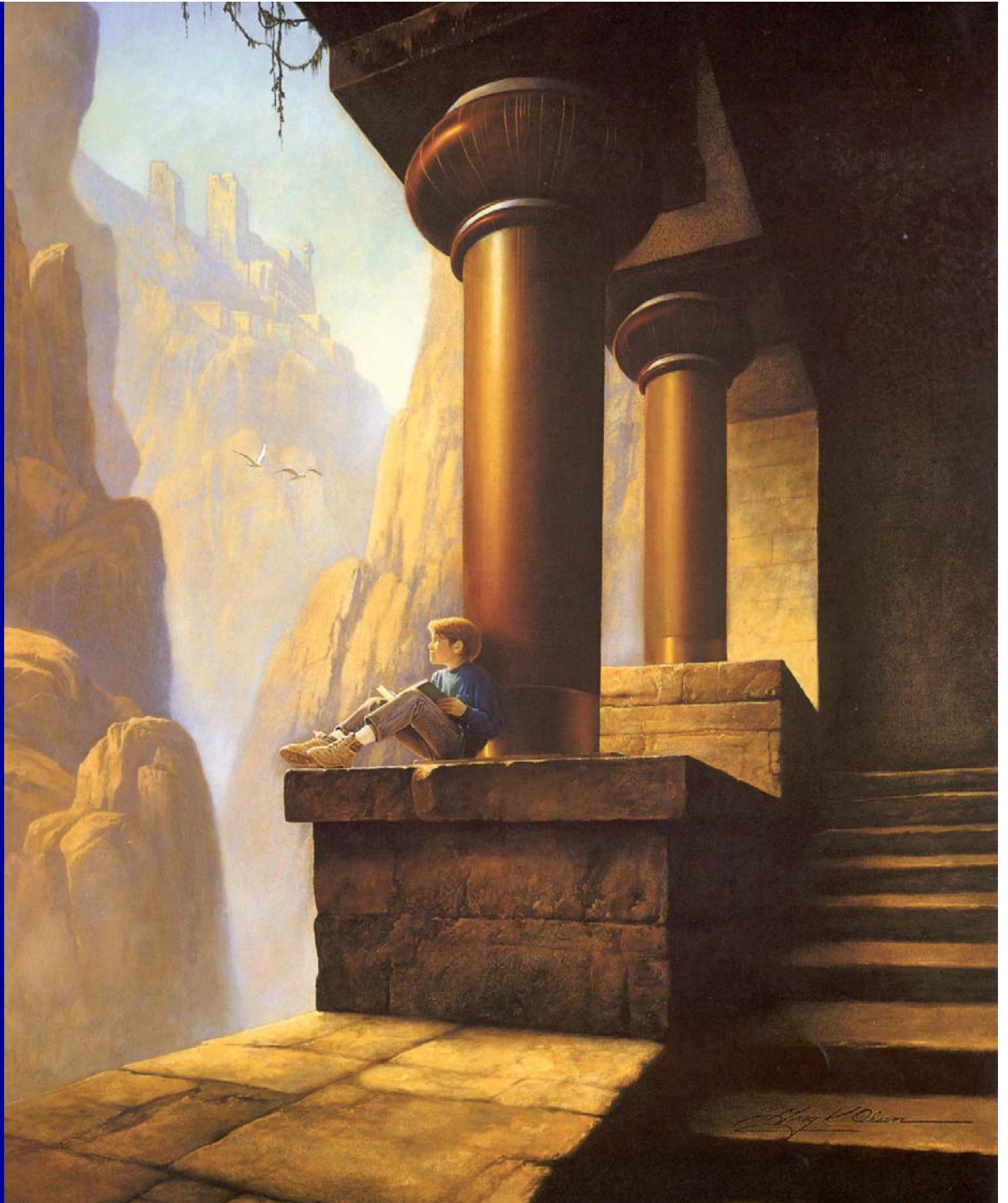
A short detour: How do we define a proficient reader – what is our ultimate instructional goal in reading?

We want students to be able to read grade level text with a strong level of understanding

Reading Comprehension is our ultimate goal – we want children to be able to understand and learn from what they read. This, for example, is what the FCAT measures.



What skills,
knowledge, and
attitudes are
required for good
reading
comprehension?



What we know about the factors that affect reading comprehension

Proficient comprehension of text is influenced by:

Accurate and fluent word reading skills

Oral language skills (vocabulary, linguistic comprehension)

Extent of conceptual and factual knowledge

Knowledge and skill in use of cognitive strategies to improve comprehension or repair it when it breaks down.

Reasoning and inferential skills

Motivation to understand and interest in task and materials

The Many Strands that are Woven into Skilled Reading

(Scarborough, 2001)

LANGUAGE COMPREHENSION

BACKGROUND KNOWLEDGE

VOCABULARY KNOWLEDGE

LANGUAGE STRUCTURES

VERBAL REASONING

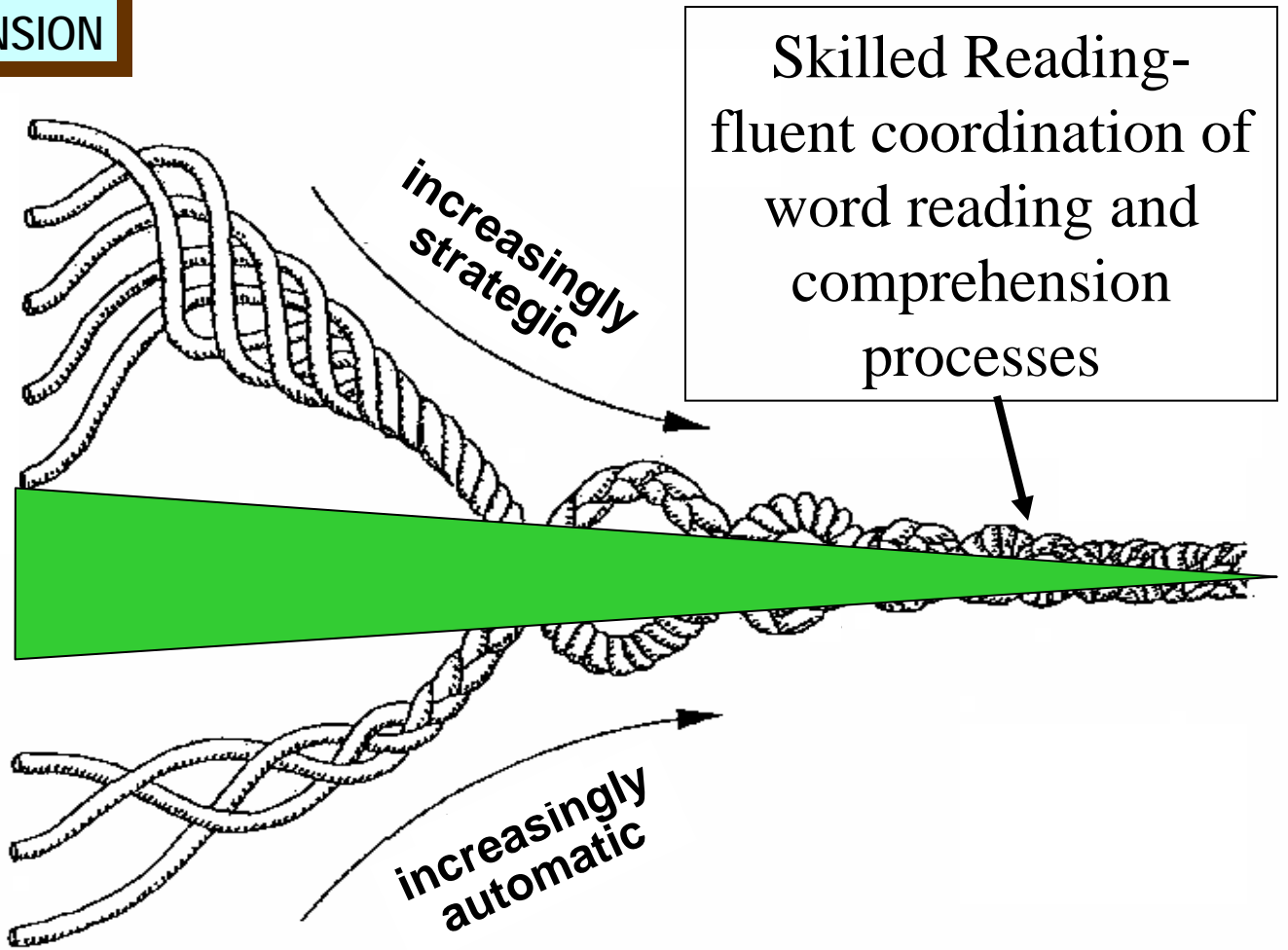
LITERACY KNOWLEDGE

WORD RECOGNITION

PHON. AWARENESS

DECODING (and SPELLING)

SIGHT RECOGNITION



Reading is a multifaceted skill, gradually acquired over years of instruction and practice.

Three potential stumbling blocks to becoming a good reader (NRC Report, 1998)

1. Difficulty learning to read words accurately and fluently
2. Insufficient vocabulary, general knowledge, and reasoning skills to support comprehension of written language
3. Absence or loss of initial motivation to read, or failure to develop a mature appreciation of the rewards of reading.

What is the most critical problem for students with specific disabilities in reading, or dyslexia?

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Extreme difficulties mastering the use of “phonics” skills as an aid to early, independent reading

- difficulties with the skills of blending and analyzing the sounds in words (phonemic awareness).
- difficulties learning letter-sound correspondences

Slow development of “sight vocabulary” arising from:

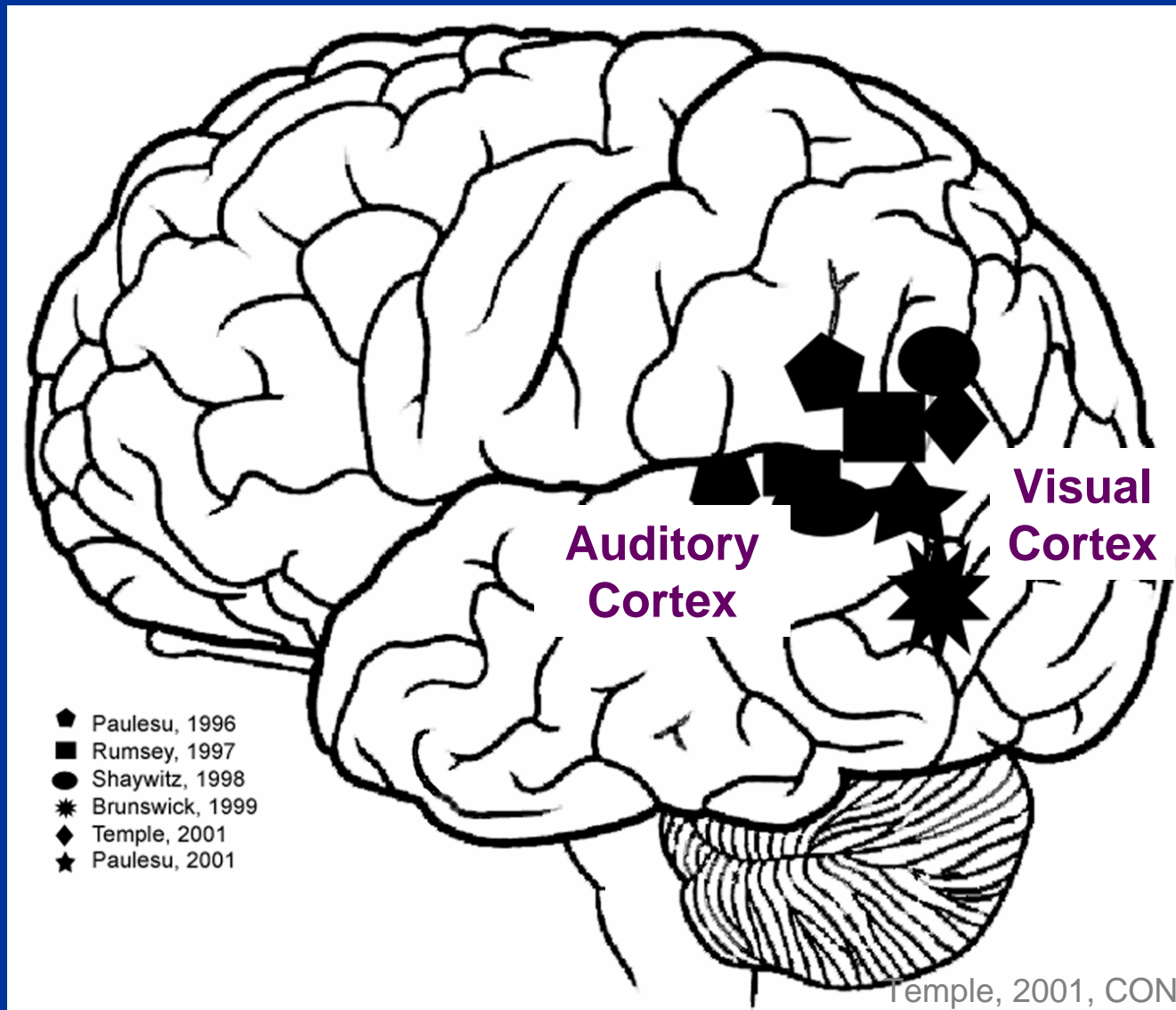
- limited exposure to text
- lack of strategies to reliably identify words in text

The nature of the underlying difficulty for most children who have specific reading disabilities or dyslexia

Weaknesses in the phonological area of language ability

inherent, or intrinsic, disability

Recent Functional Neuroimaging findings on Adults



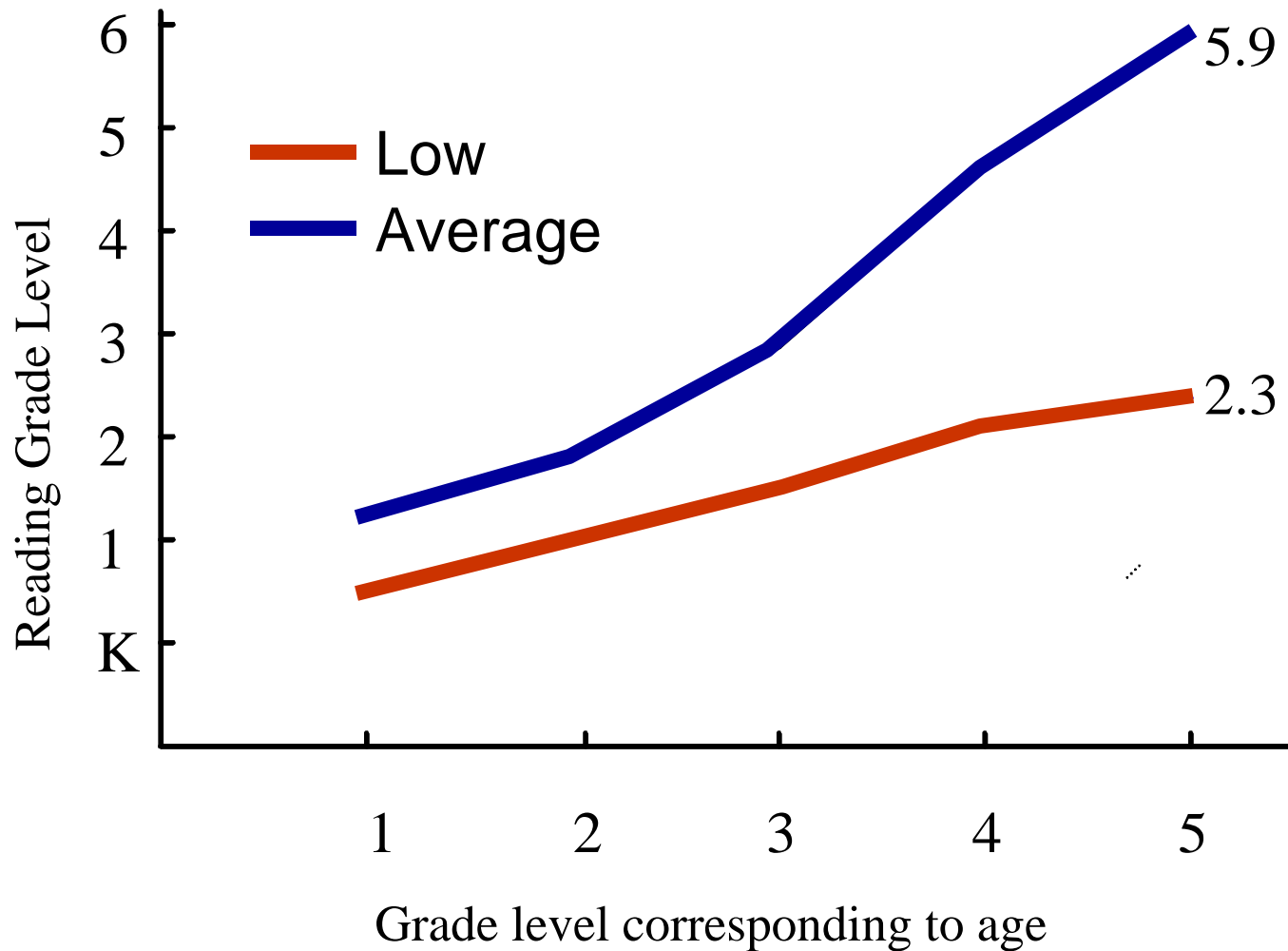
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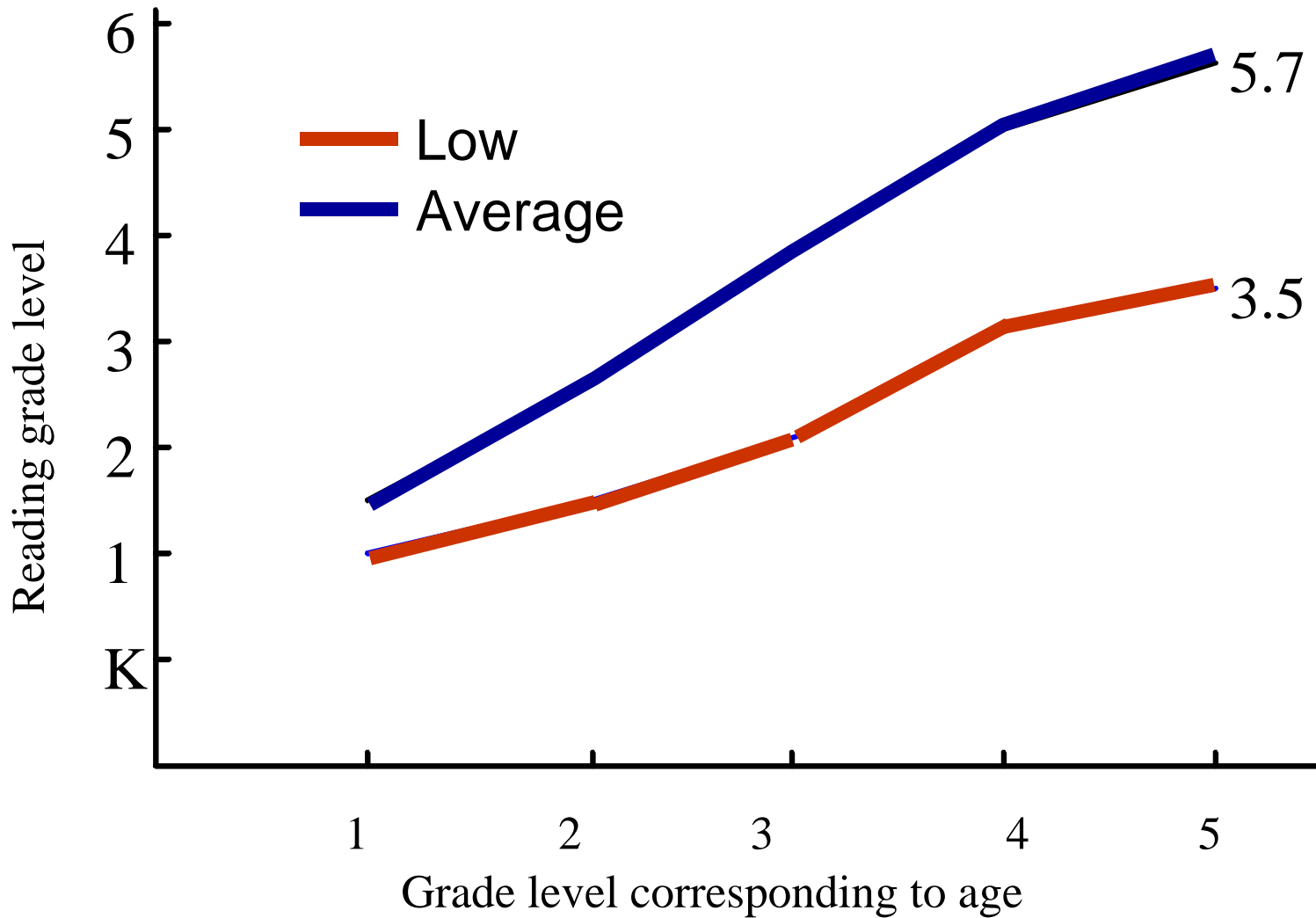
inherent, or intrinsic, disability

Expressed primarily by delays in the development of phonemic awareness and phonics skills

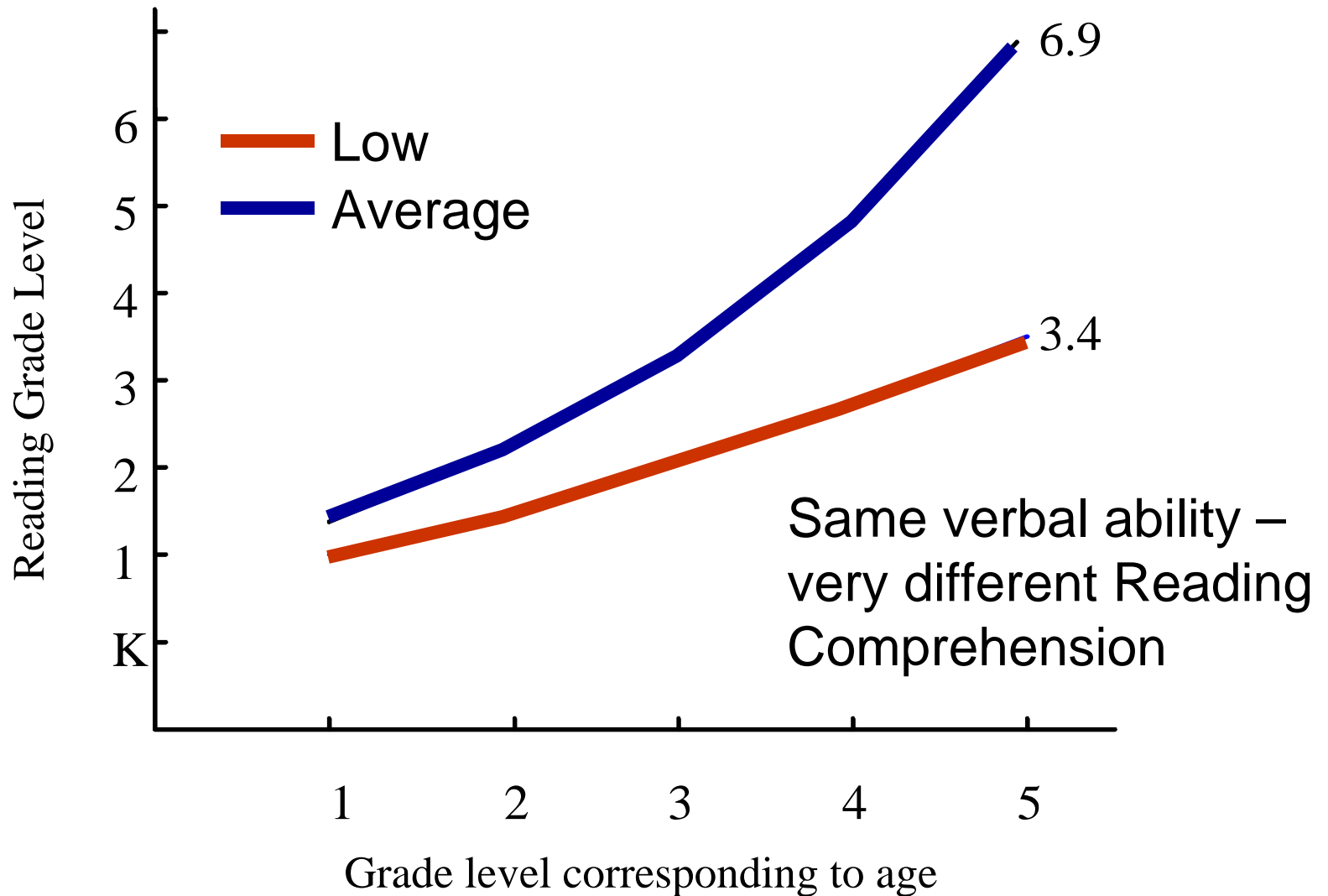
Growth in “phonics” ability of children who begin first grade in the bottom 20% in Phoneme Awareness and Letter Knowledge (Torgesen & Mathes, 2000)



Growth in word reading ability of children who begin first grade in the bottom 20% in Phoneme Awareness and Letter Knowledge (Torgesen & Mathes, 2000)



Growth in reading comprehension of children who begin first grade in the bottom 20% in Phoneme Awareness and Letter Knowledge (Torgesen & Mathes, 2000)



The Basic Discovery:

Specific reading disabilities, or developmental dyslexia, is caused by a weakness, or lack of talent, in the phonological domain of language

This weakness makes it difficult to acquire phonemic awareness and alphabetic reading skills—which interferes with the growth of accurate reading skills.

A recent definition of dyslexia that incorporates the new knowledge

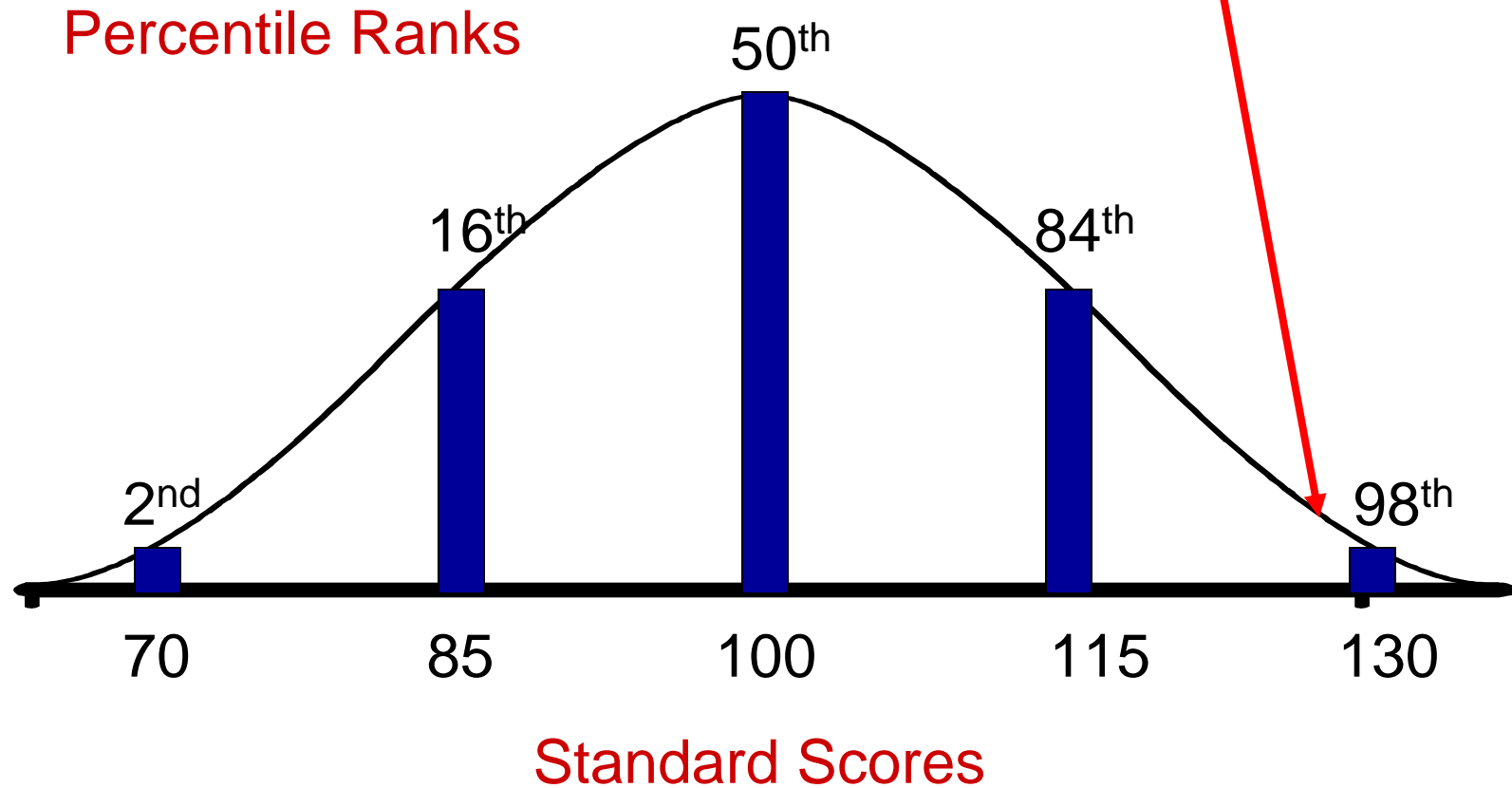
“Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction.” (Lyon & Shaywitz, 2003)

Important facts about talent in the
phonological language domain:

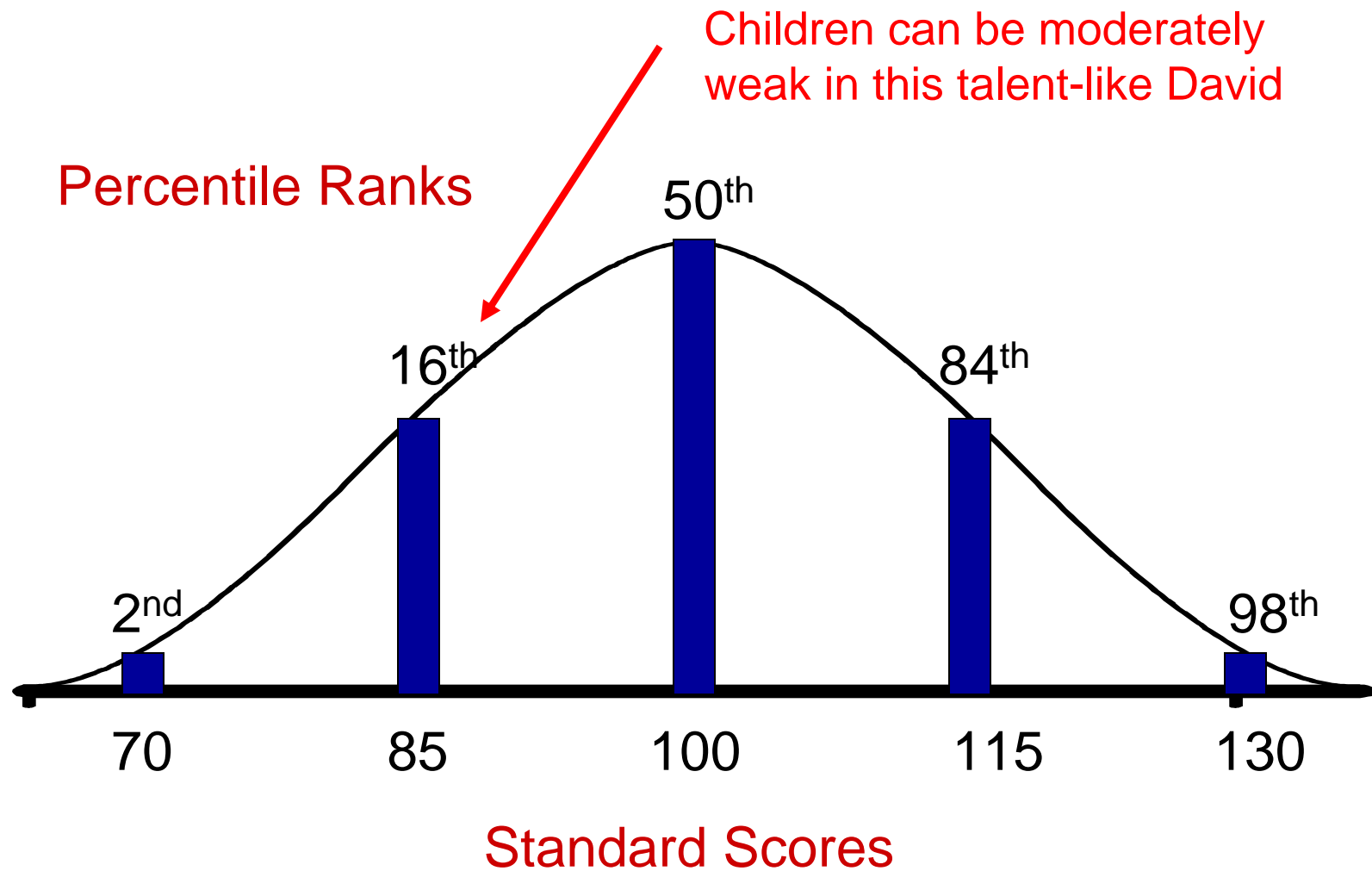
It is like most other talents in that it is
distributed normally in the population

“Phonological talent” is normally distributed in the population

Children can be strong in this talent-like my grandson Andrew



“Phonological ability” is normally distributed in the population

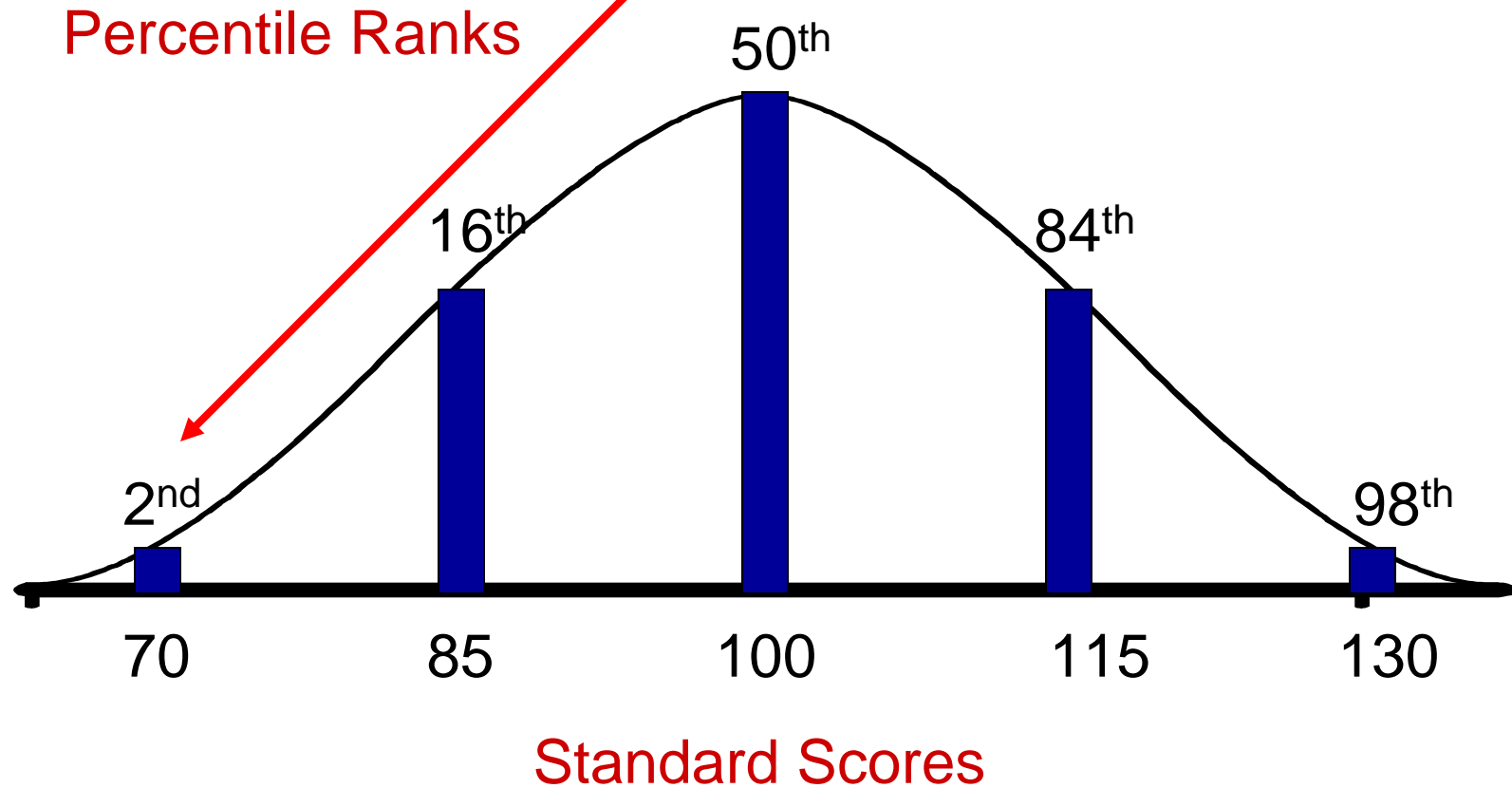




David

Each of these kinds of weakness is normally distributed in the population

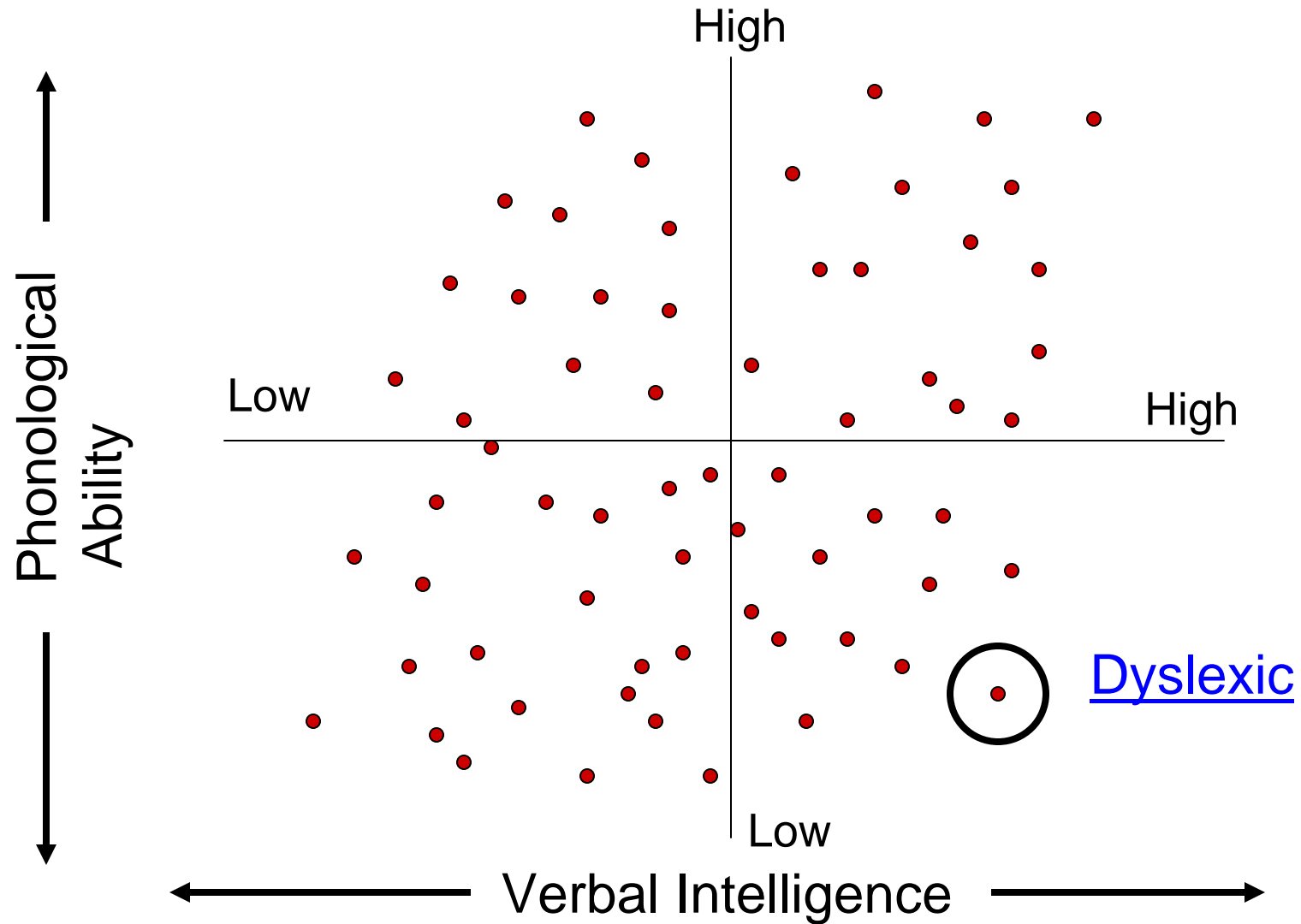
Serious difficulties-probably require special interventions and a lot of extra support-like Alexis



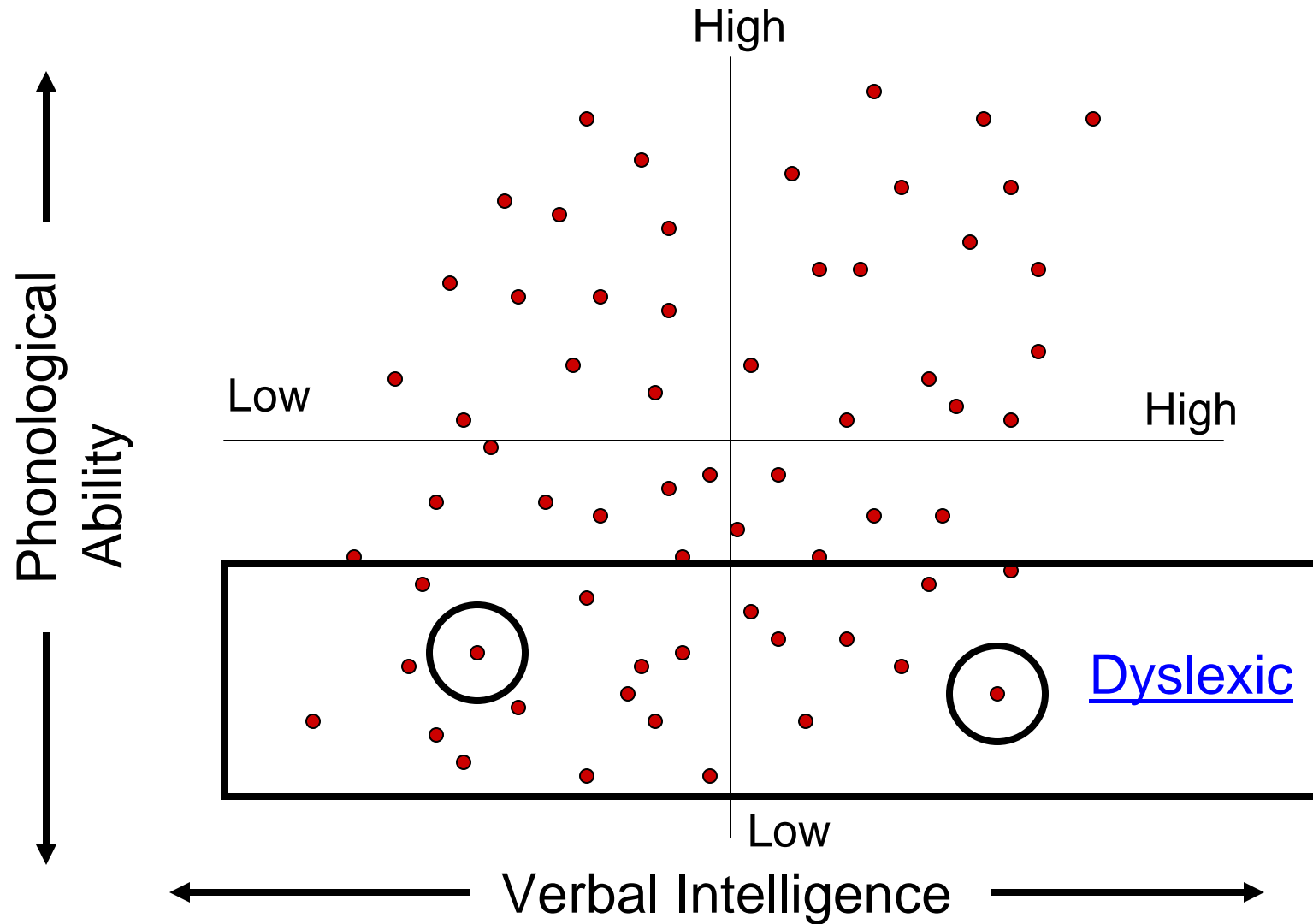
Another important fact about talent in the phonological language domain:

It is only weakly correlated with broad verbal ability or general intelligence

Phonological Language Ability is not highly Correlated with General Verbal Ability as measured by IQ tests



Phonological Language Ability is not highly Correlated with General Verbal Ability as measured by IQ tests



One more important fact about talent in the phonological language domain:

Children's ability in this area when they come to school is influenced both by biologically based talent, and by opportunities to learn from their pre-school environment

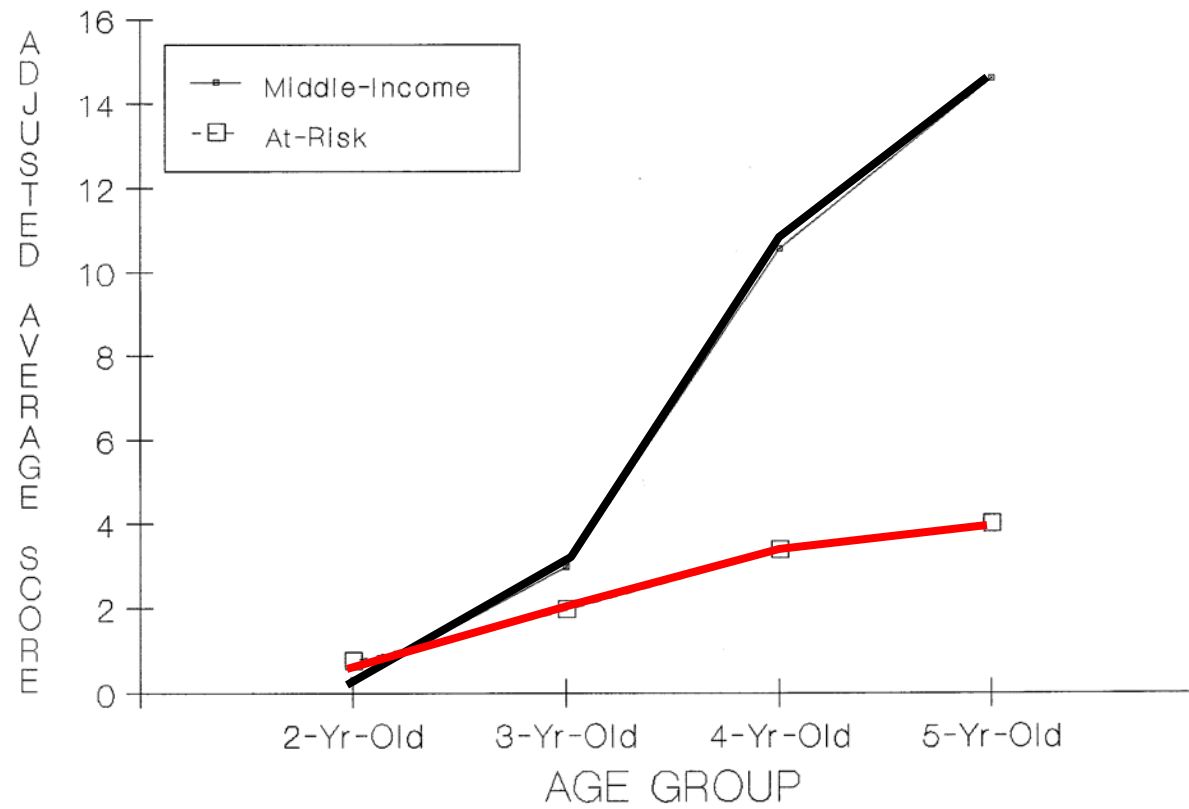
Children come to school very different from one another in the experience they have had that prepares them for learning to read

Development of Phonological Sensitivity

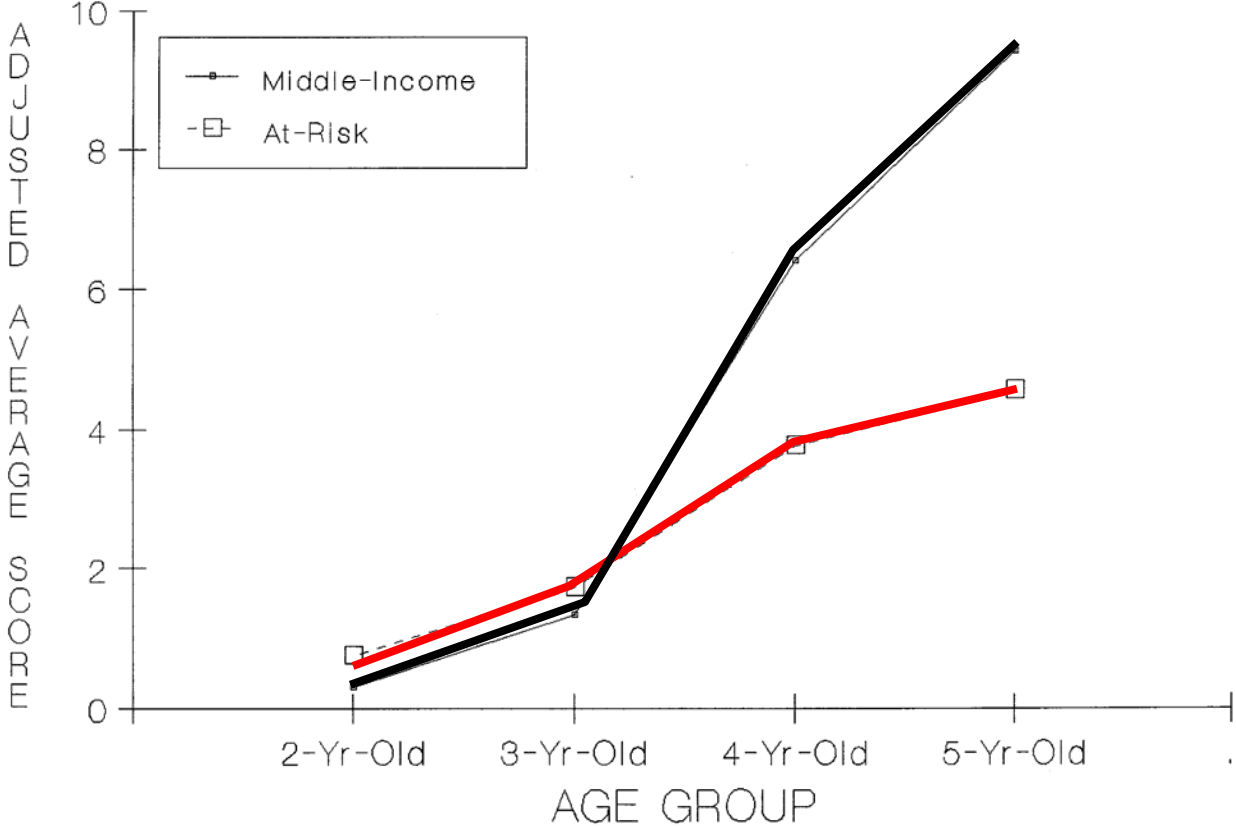
Cross-sectional study comparing the performance of 250 children from higher income families to 170 children from lower income families.

← Children were between two- and five-years of age.

Blending Task



Elision Task



To summarize:

Children can come to school weak in phonological ability either because of their biology or their language experience

Regardless of whether they also have broader weaknesses in verbal ability, both types of children need similar intensive early reading support in order to prevent reading failure

Do we know how to prevent reading failure in children who come to school with weaknesses in the phonological domain?

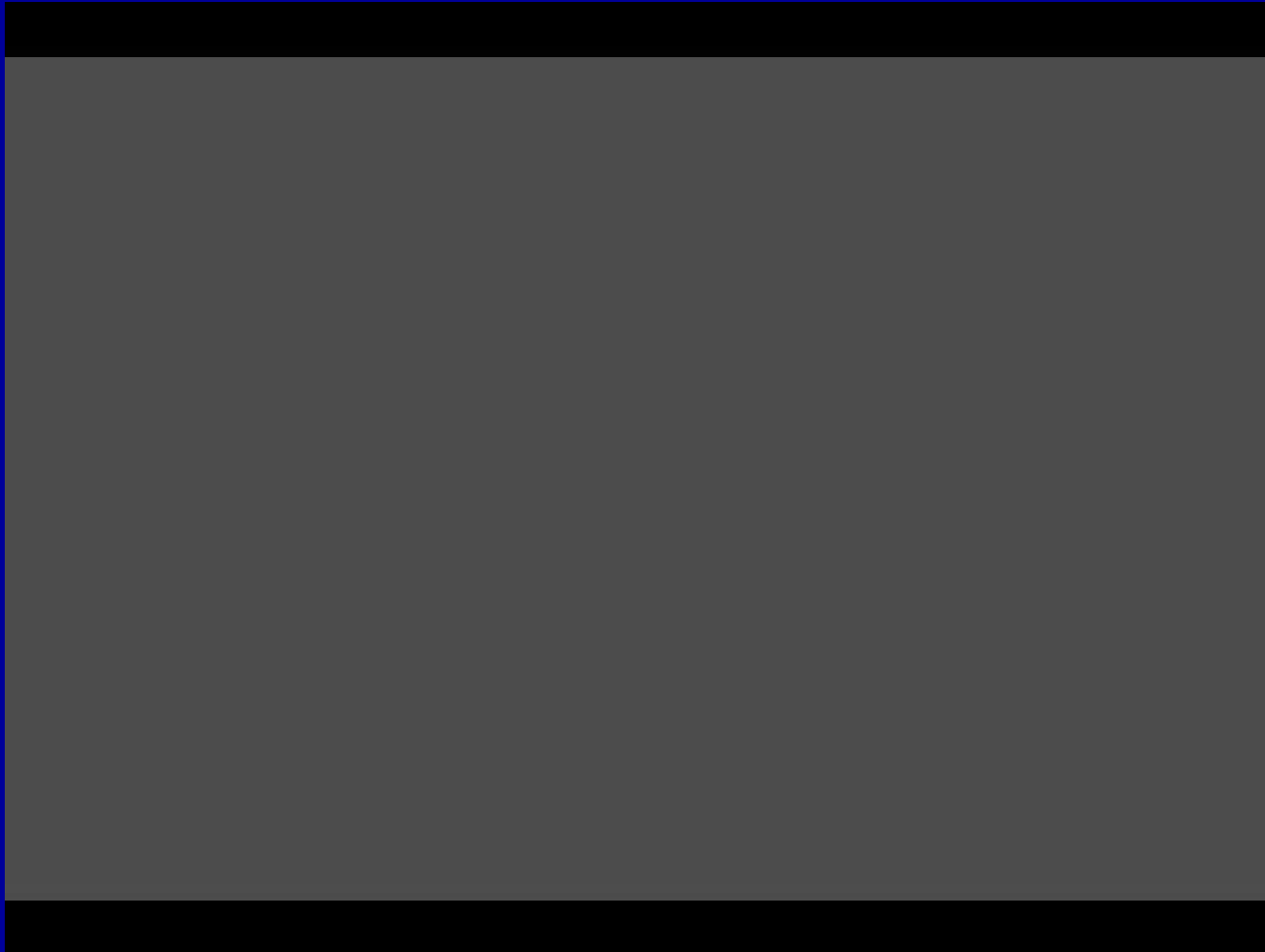
An Example of an Effective Intervention

Design of Study in which intervention occurred

1. Most “at risk” first graders from five elementary school - PPVT above 70
2. Instruction provided in 45 min. sessions every day from October through May in groups of 3 or 5 by experienced teachers or well-trained paraprofessionals
3. Used a structured (scripted) reading program that contained instruction and practice in phonemic awareness, phonics, fluency, and comprehension
4. Used a number of methods to achieve fidelity of implementation
 - 3 days of initial training
 - Weekly supervisory visits
 - Monthly inservice (3 hours)



Work on phonemic awareness



Blending sounds into words

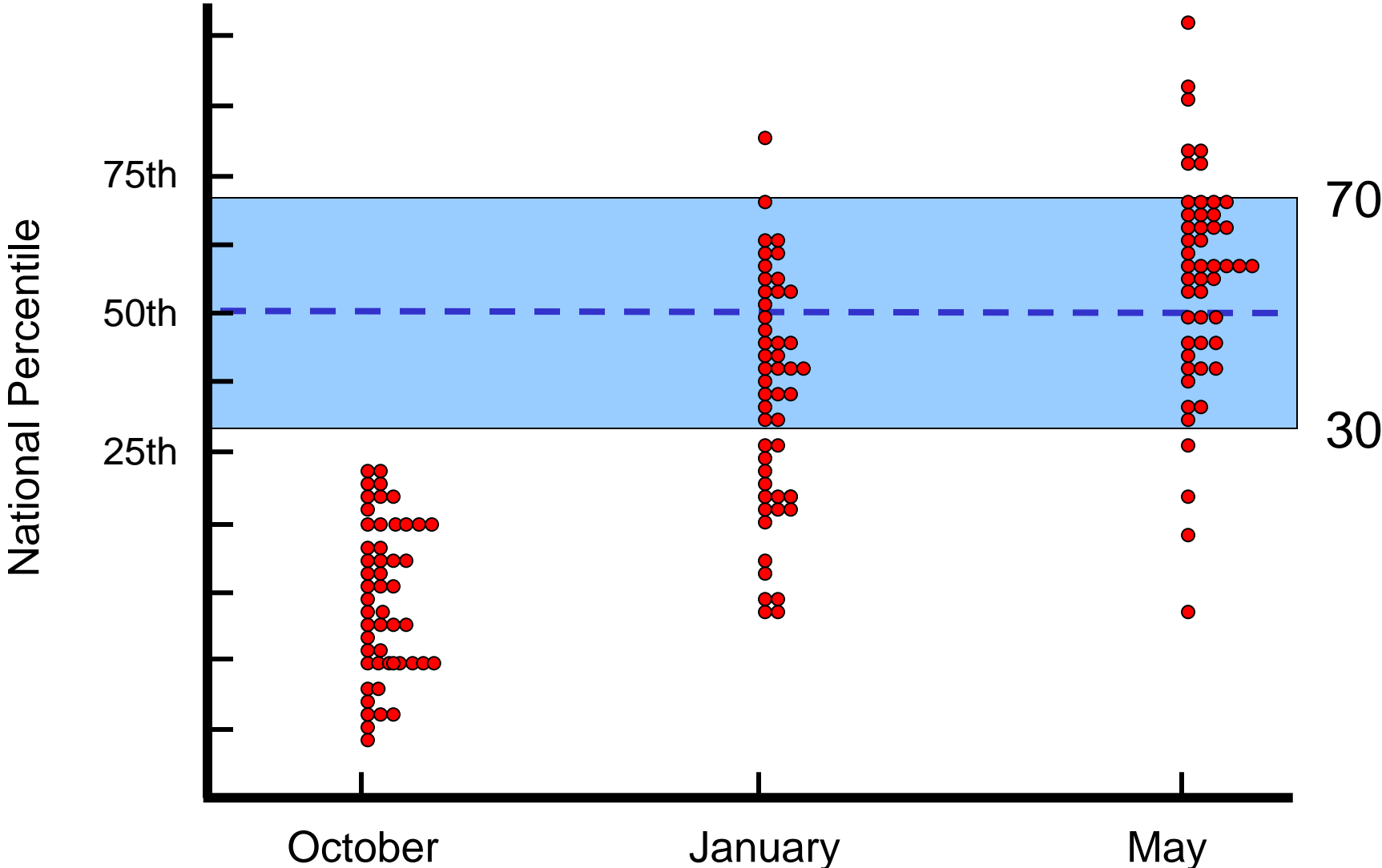


Directly building sight recognition of high utility words

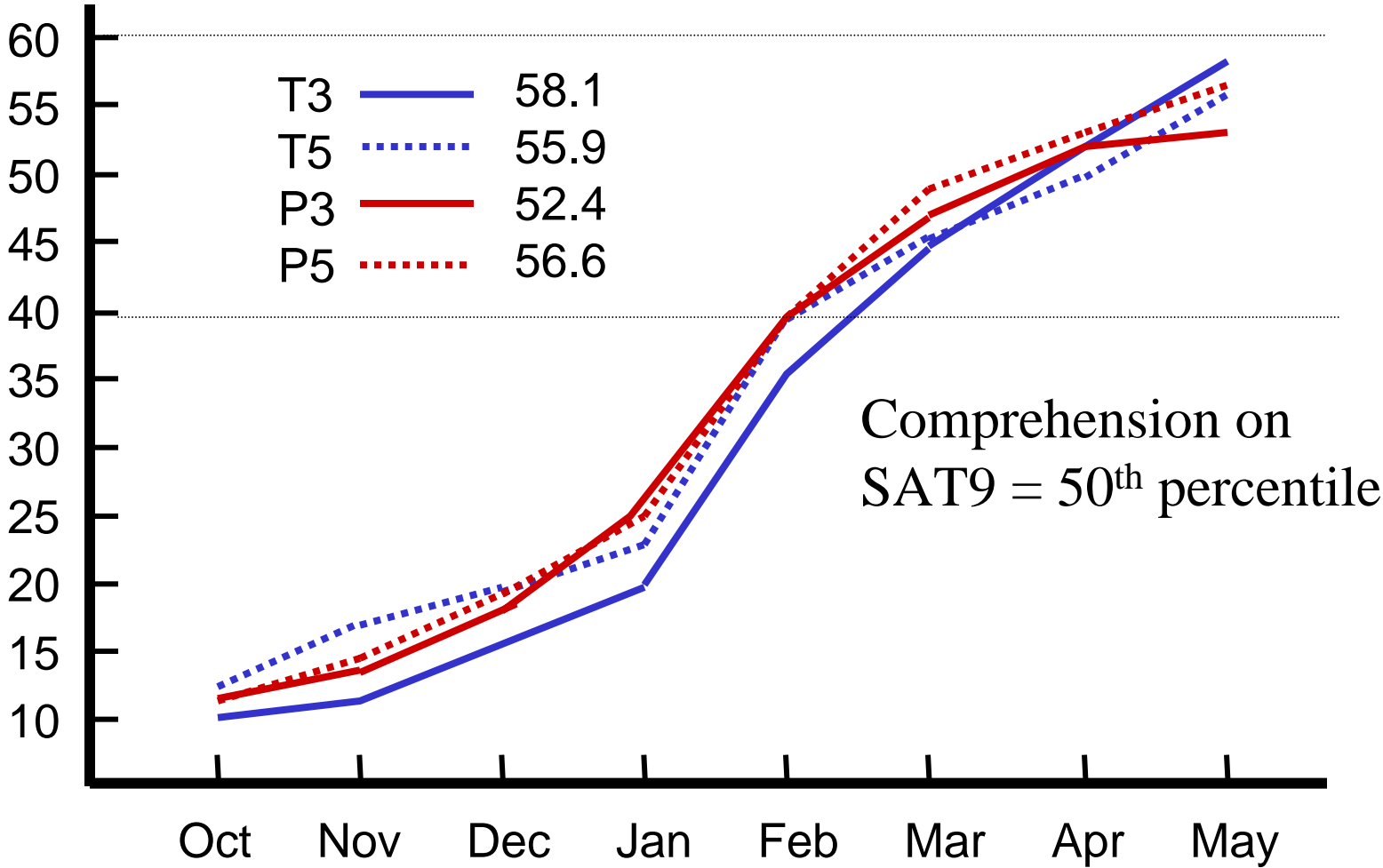


Reading text...

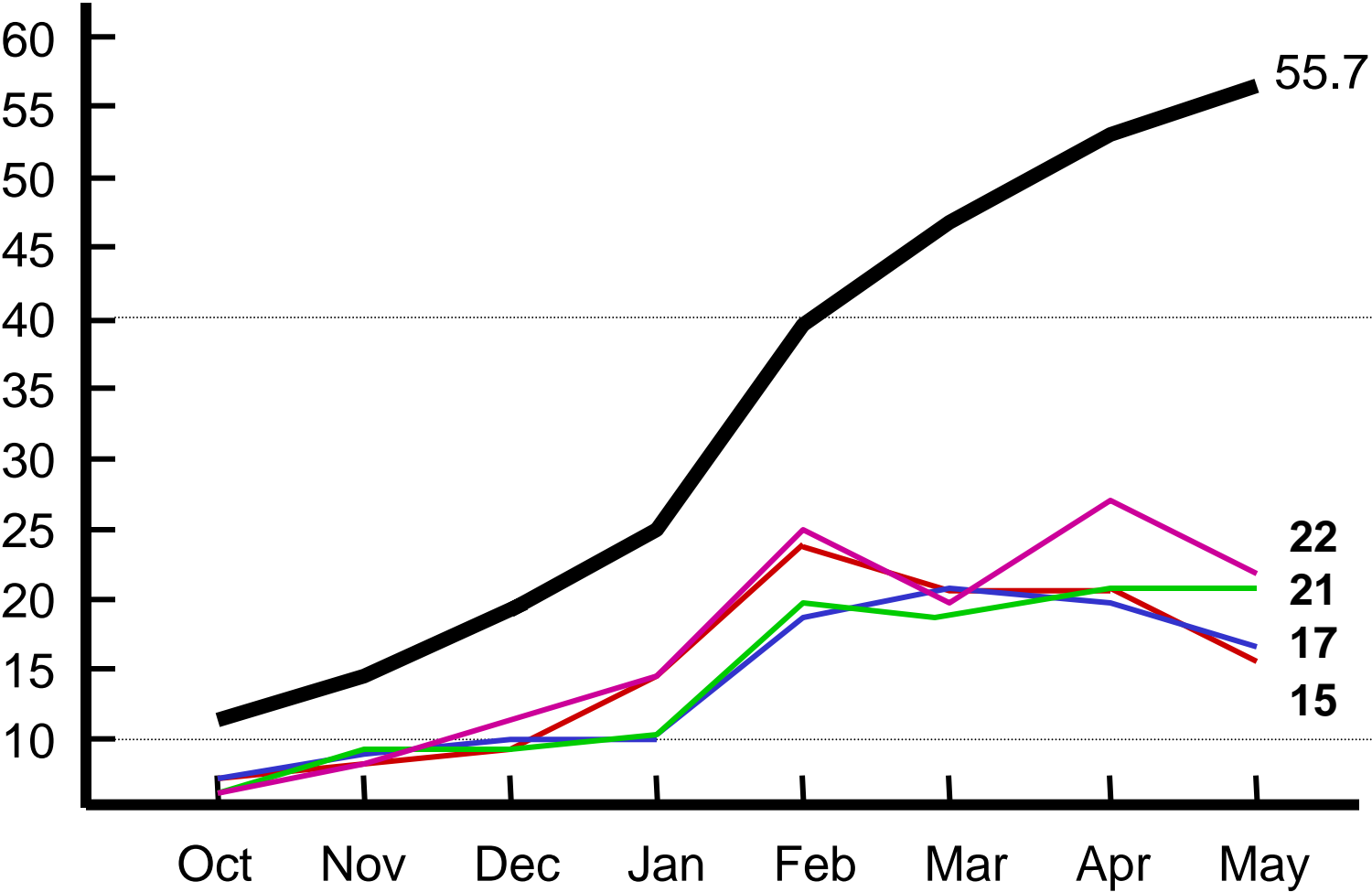
Growth in Word Reading Ability



Growth in Correct Words Per Minute on First Grade Level Passages



Growth in Correct Words Per Minute on First Grade Level Passages for four lowest performers



What about remediation for
older students who did not get
effective preventive
interventions?

A study of intensive, highly skilled intervention with 60 children who had severe reading disabilities

Children were between 8 and 10 years of age

Had been receiving special education services for an average of 16 months

Nominated as worst readers: at least 1.5 S.D's below grade level

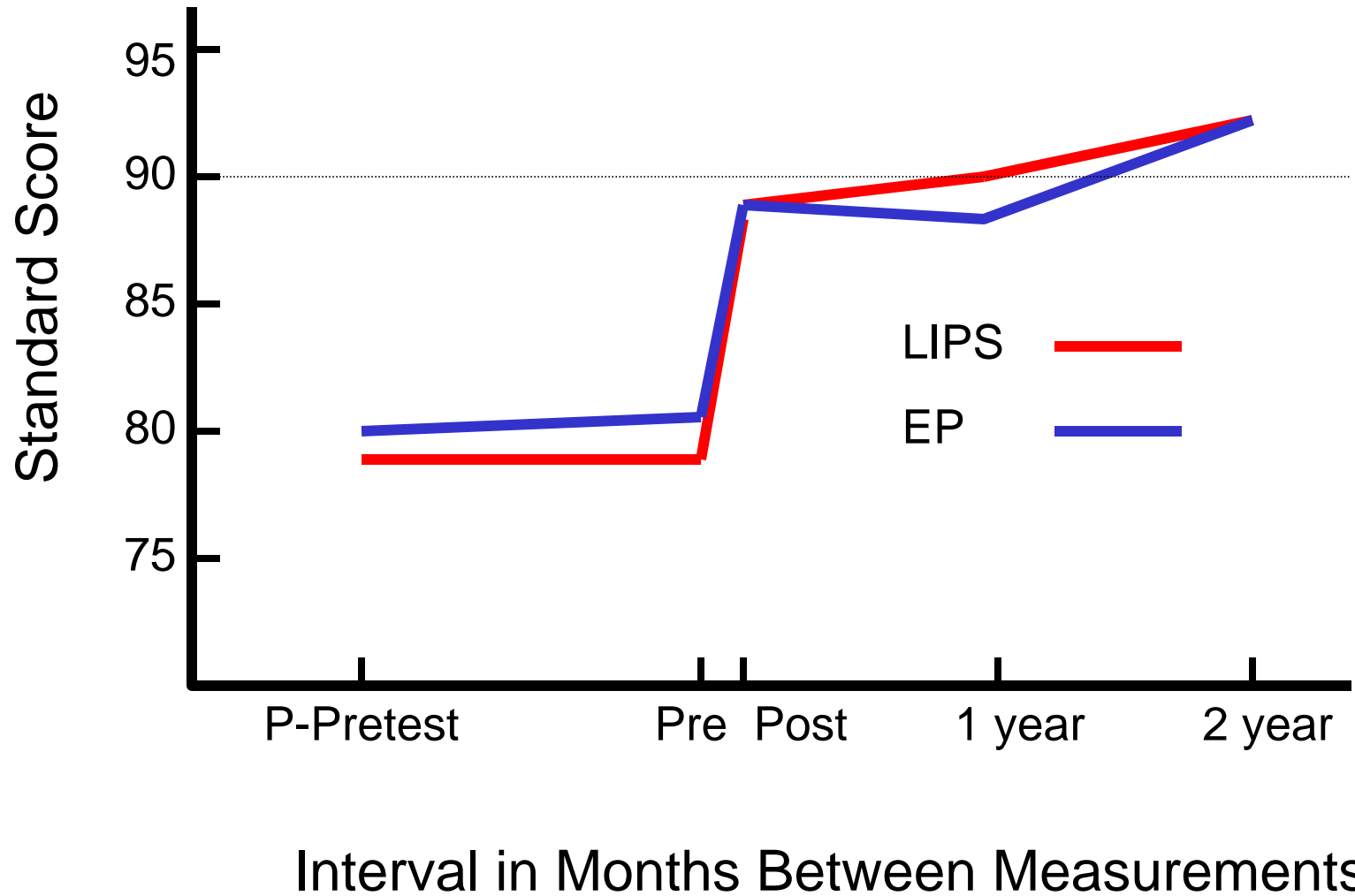
Average Word Attack=69, Word Identification=69, Verbal IQ=93

Randomly assigned to two instructional conditions that both taught “phonics” explicitly, but used different procedures with different emphasis

Children in both conditions received 67.5 hours of one-on-one instruction, 2 hours a day for 8 weeks

Children were followed for two years after the intervention was completed

Growth in Total Reading Skill Before, During, and Following Intensive Intervention



The challenge for this group--

As we acquire more and more knowledge of what works.....

Another set of questions assumes more and more importance....

How do we make this kind of instruction available to every child who needs it?

The essential elements for success

Scientific research
in reading and
reading instruction

**Provides information
about the instructional
and assessment
procedures that are
most effective**

**Practices from effective
Districts, Schools, and
Classrooms**

**Provides information
about how to assemble
and integrate all the
components that are
effective in improving
achievement.**



A reason for working toward effective solutions for all students...

Thank
You

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Science of reading section