

# Revisiting the Definition of Dyslexia

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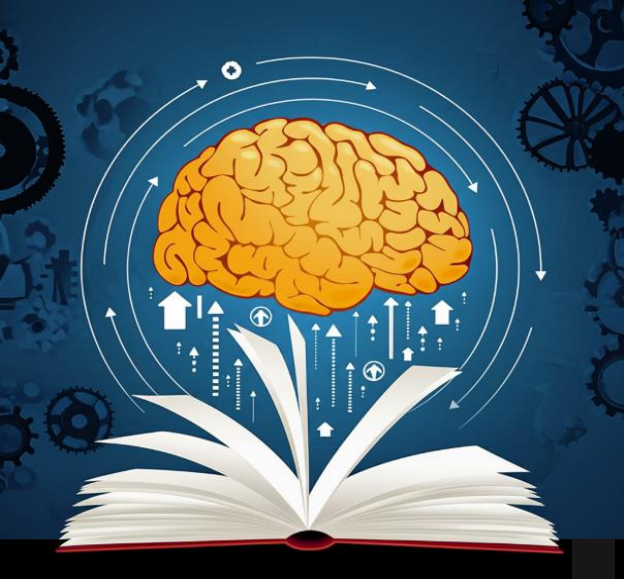
# First Consensus Definition

## **World Federation of Neurology (1968)**

Research Group on Developmental Dyslexia and  
World Illiteracy

- Promote further research into the nature and cause
- Common language for clarity and understanding
- Recognition of its neurobiological basis
- Differentiate dyslexia from other reading and learning difficulties

"A disorder manifested by difficulty in learning to read despite conventional instruction, adequate intelligence, and socio-cultural opportunity. It is dependent upon fundamental cognitive disabilities which are not attributable to visual, hearing, or intellectual handicap."



# Revised Definitions

Orton Dyslexia Society (1994)

International Dyslexia Association  
(2002)

Rose Report (2009)

Danish Ministry of Education (2012)

Delphi Definition of Dyslexia (2024)

International Dyslexia Association (in  
progress)



## Revisiting the definition of dyslexia

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### Abstract

The International Dyslexia Association definition of dyslexia was updated 20 years ago and has been referenced frequently in research and practice. In this paper, researchers from the Florida Center for Reading Research consider the components of the definition and make recommendations for revisions. These include recognizing the persistence of word-reading, decoding, and spelling difficulties, acknowledging the multifactorial causal basis of dyslexia, clarifying exclusionary factors, and denoting comorbidity with other developmental disorders. It is also suggested that the academic and psychosocial consequences of dyslexia be highlighted to reinforce a preventive service delivery model. Lastly, the inclusion of dyslexia within a specific learning disability category is supported.

**Keywords** Definition · Dyslexia · Exclusionary criteria · Multifactorial causal models · Reading disabilities

**Vaughn et al. (2024).** The critical role of instructional response in defining and identifying students with dyslexia: a case for updating existing definitions.

**Snowling & Hulme (2024).** Do we really need a new definition of dyslexia? A commentary.

**Elliott & Grigorenko (2024).** Dyslexia in the twenty-first century: a commentary on the IDA definition of dyslexia.

**Wolf et al. (2024).** Towards a dynamic, comprehensive conceptualization of dyslexia.

**Gearin et al. (2024).** An interdisciplinary perspective on the strengths and weaknesses of the International Dyslexia Association definition of dyslexia.

**Siegel et al. (2025).** Thoughts on the definition of dyslexia.

**Annals of Dyslexia**



Dyslexia is characterized by difficulties learning to read, spell, and decode words

Word-level  
literacy  
problem

**[dɔg]**

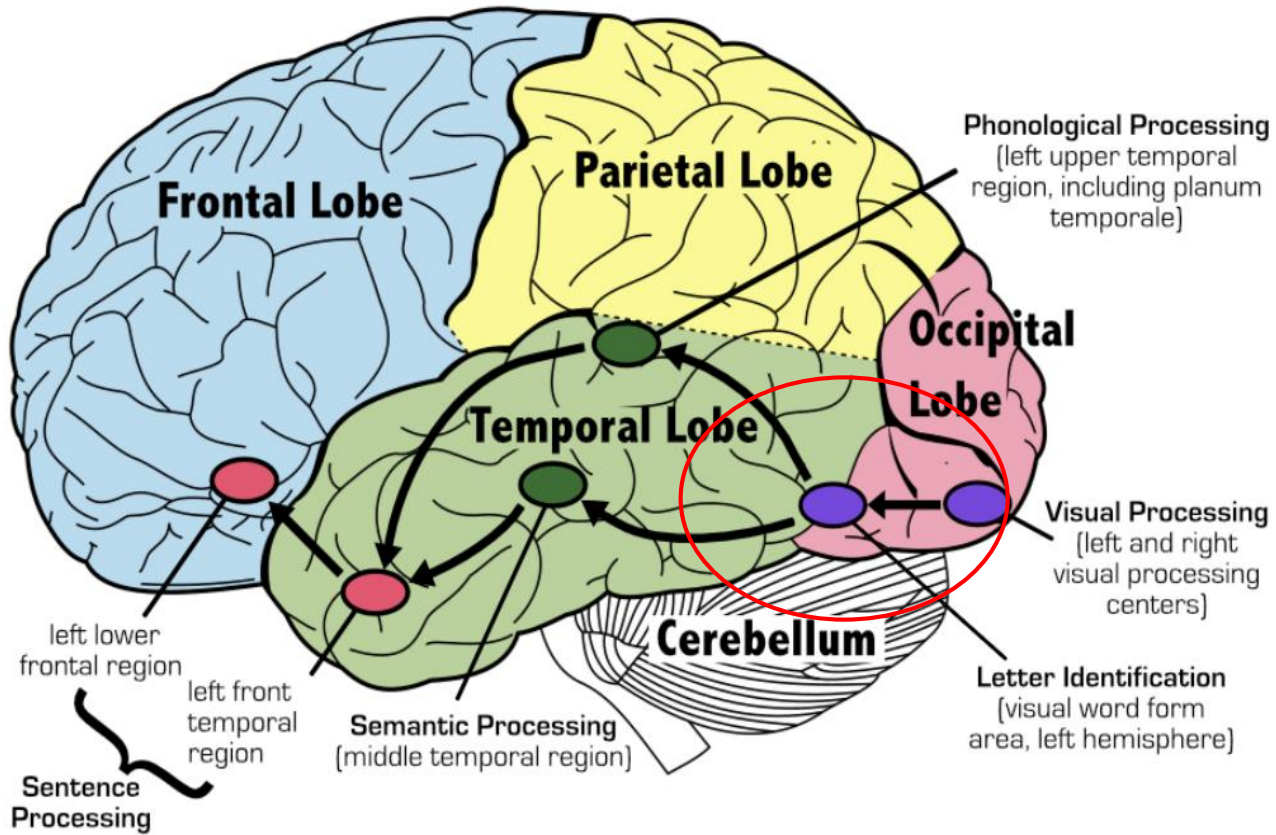
[ 'hunʔ ]

A domesticated mammal,  
that typically has a long  
snout, an acute sense of  
smell, non-retractile  
claws, and a barking,  
howling, or whining voice

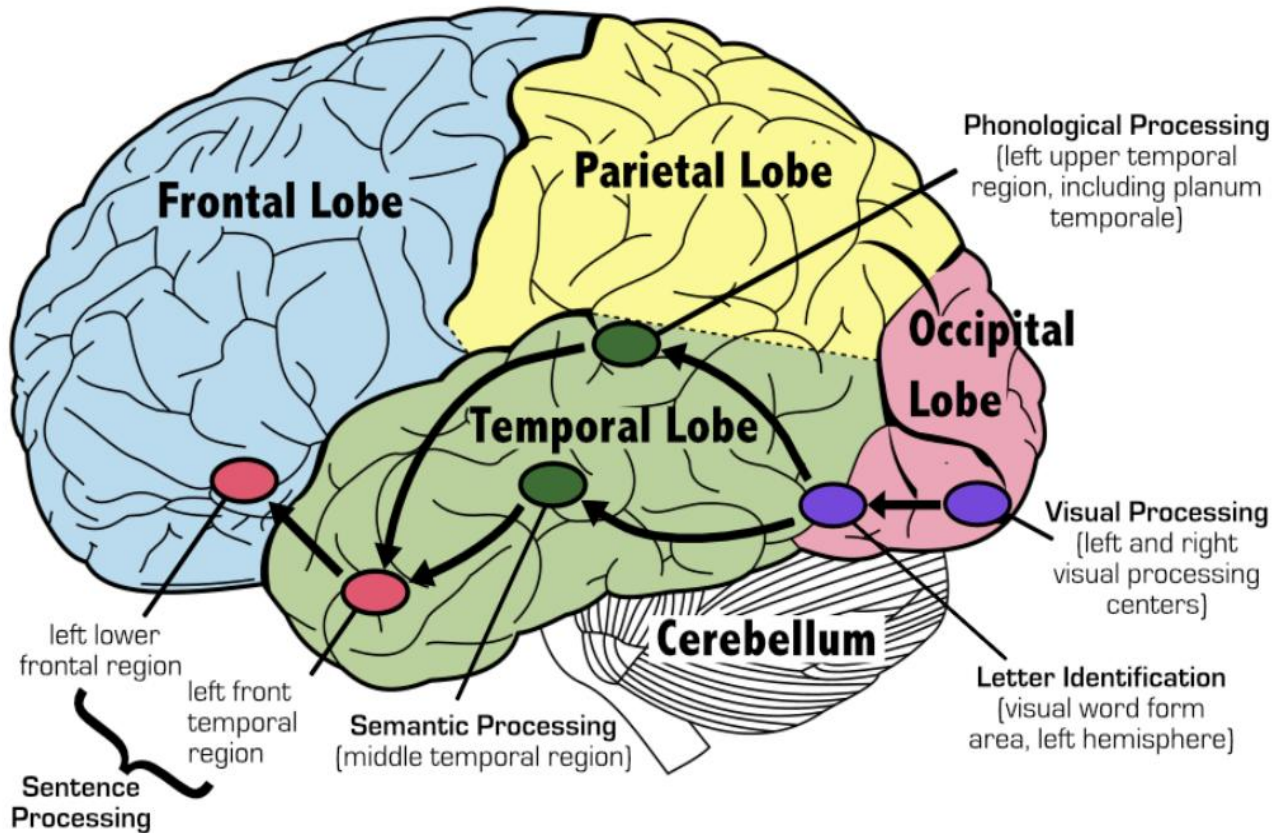
dog







By learning to use the relationships between print and a relatively **small set of sub-word units** (phonemes, syllables, morphemes) the reader is able to decode most words



After 5-10 trials of decoding a word, the reader "**unitizes**" the word, so that it is recognized as a whole unit. This "**orthographic mapping**" allows a word to be read as fast as any single letter within the word

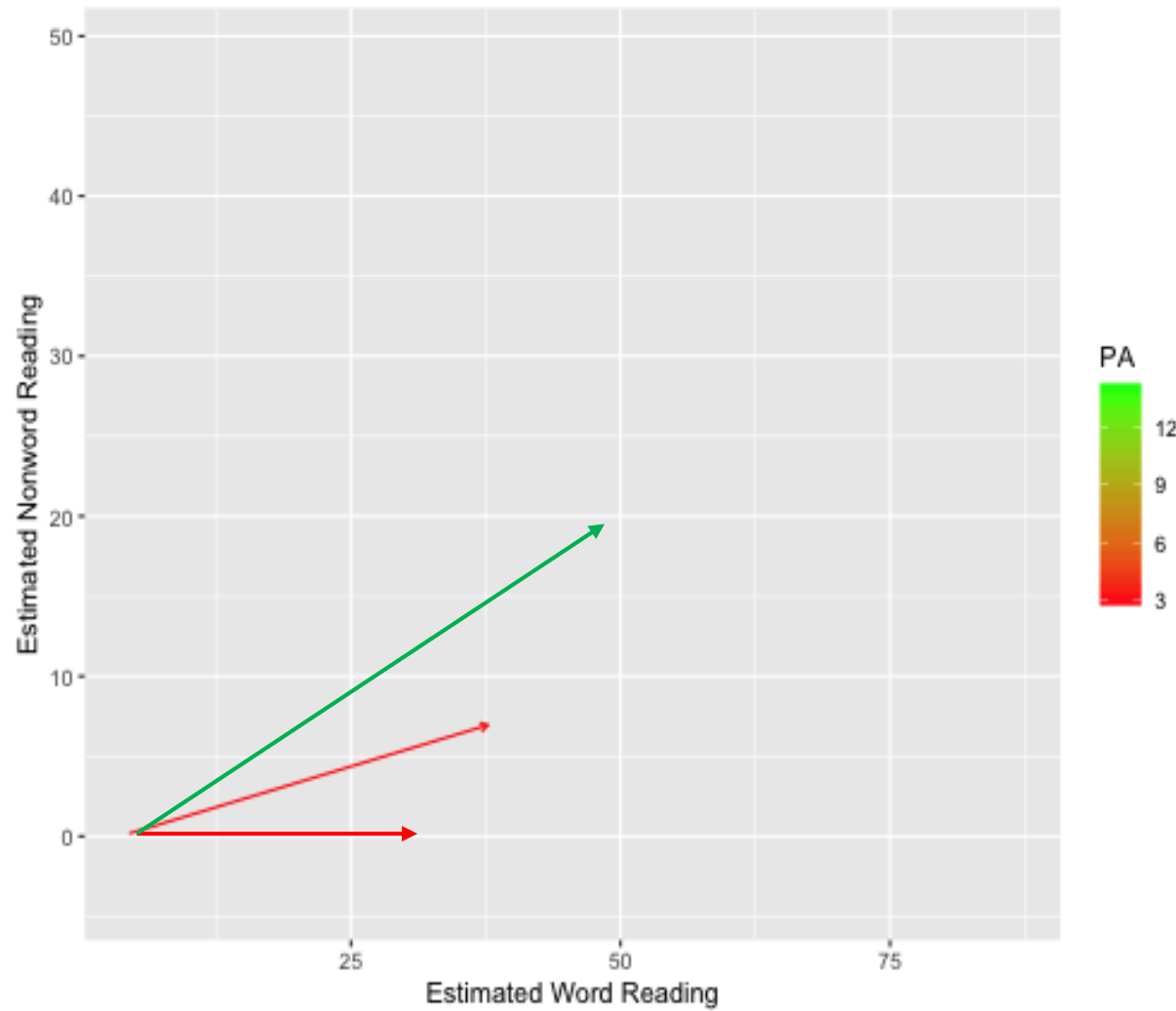
Poor readers have difficulties learning the code and orthographically mapping the words (Gellert & Elbro, 2018; Poulsen et al., 2023; Steacy et al., 2021; Share, 2008)

*Steacy  
et al.  
2021*

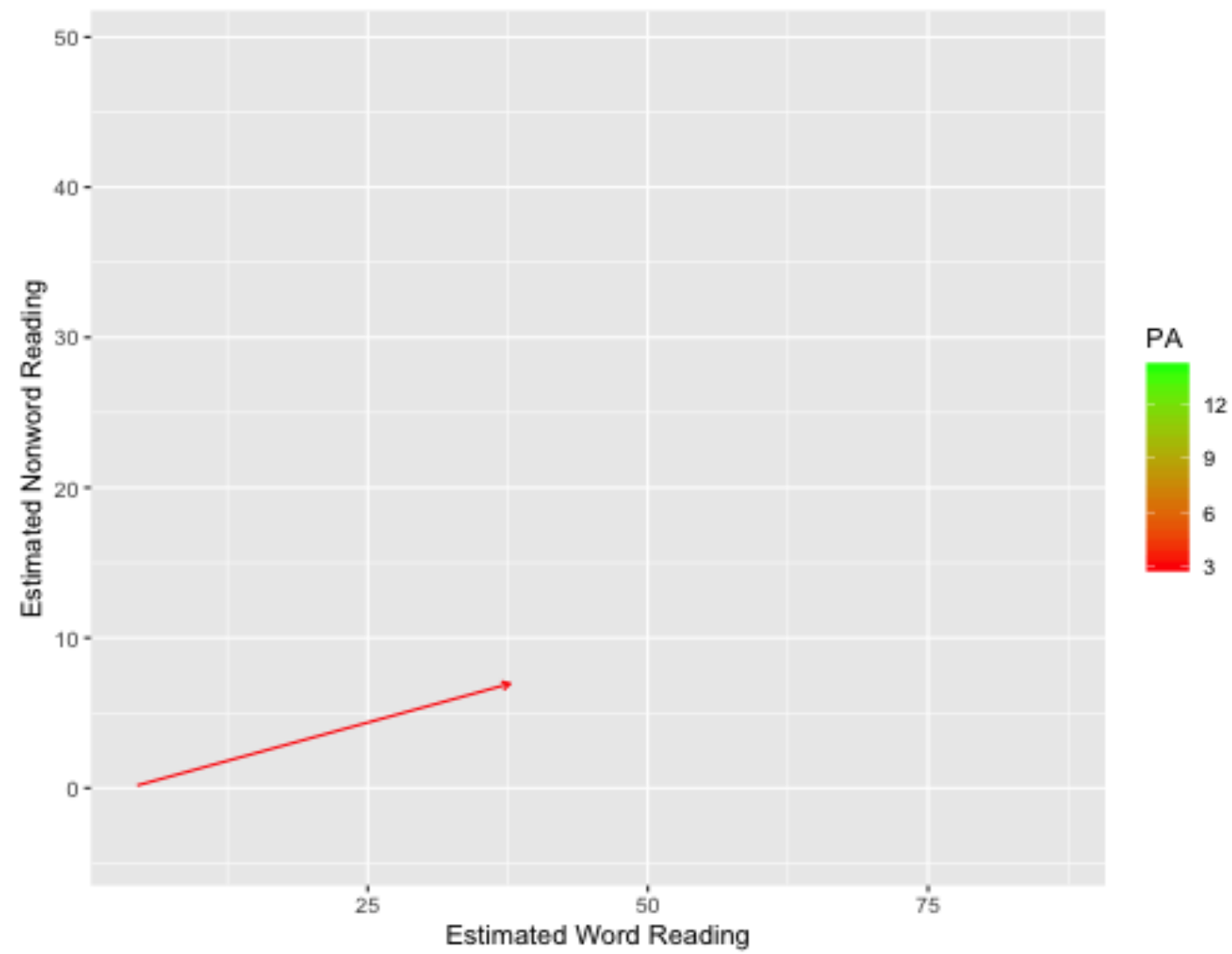
*N=588*

*1<sup>st</sup>-4<sup>th</sup>  
grade  
EOY*

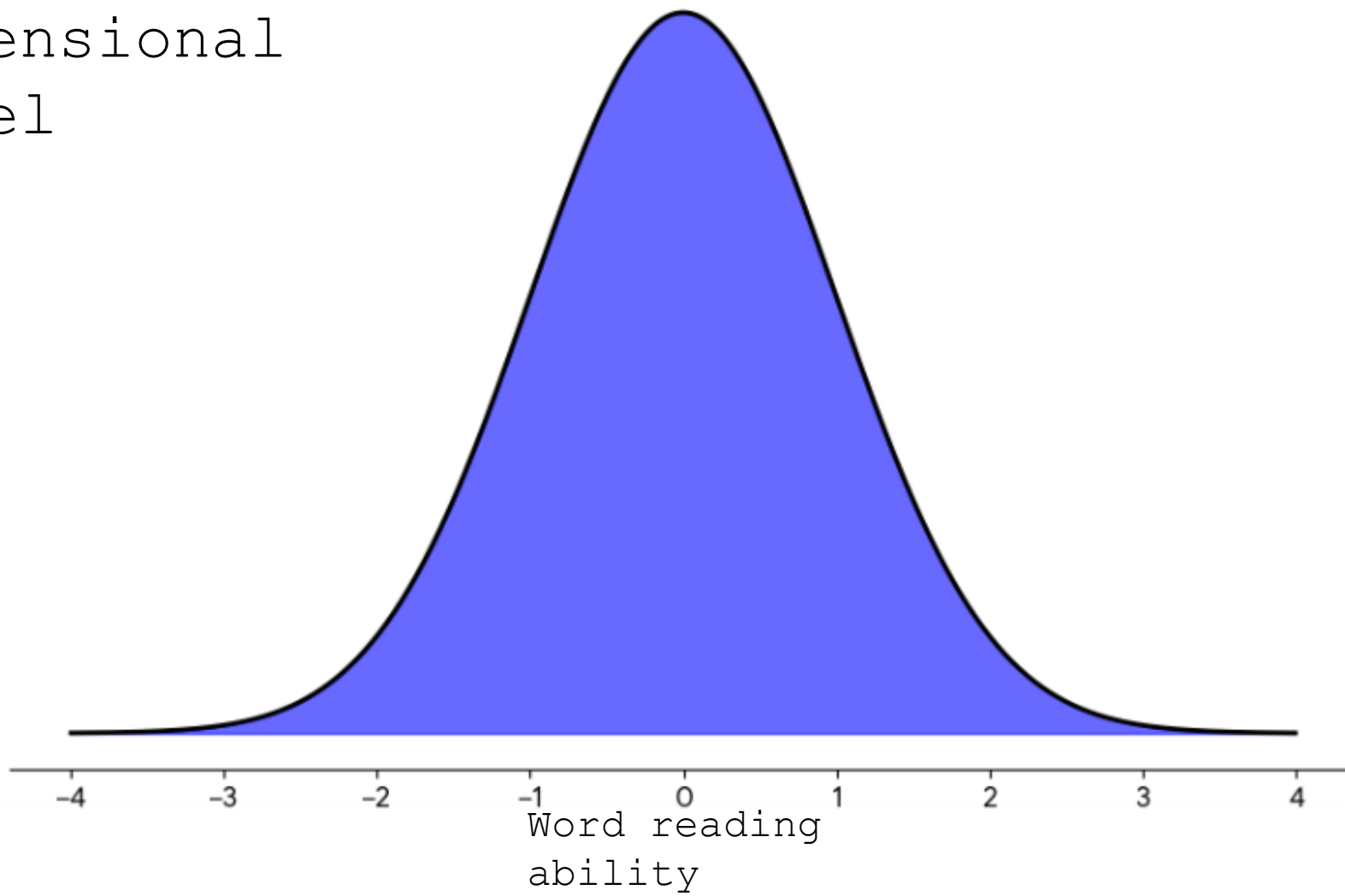
WRMT-R  
TOWRE



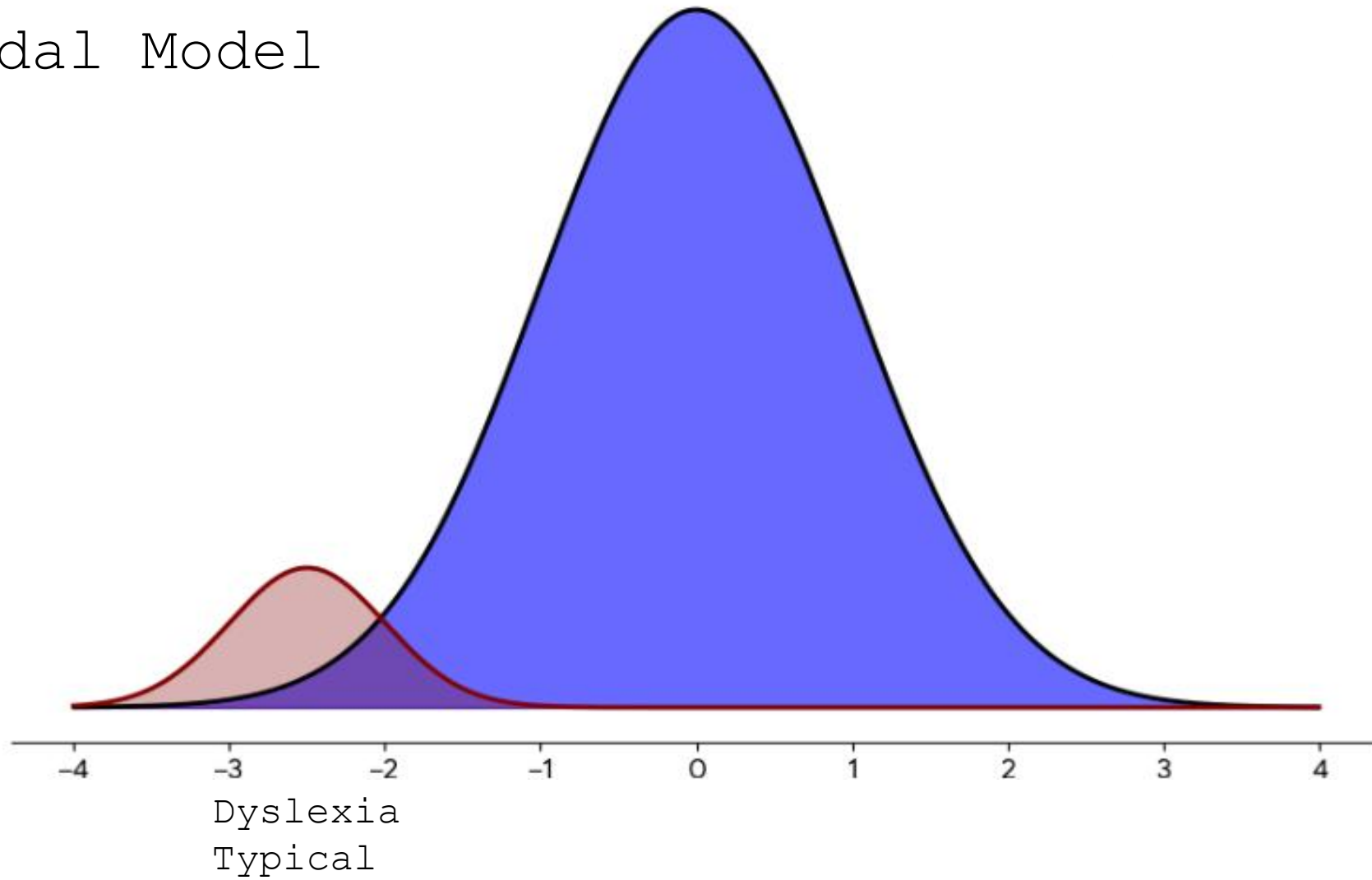
What  
happens  
when child  
does not  
have good  
decoding  
skills



Dimensional  
Model

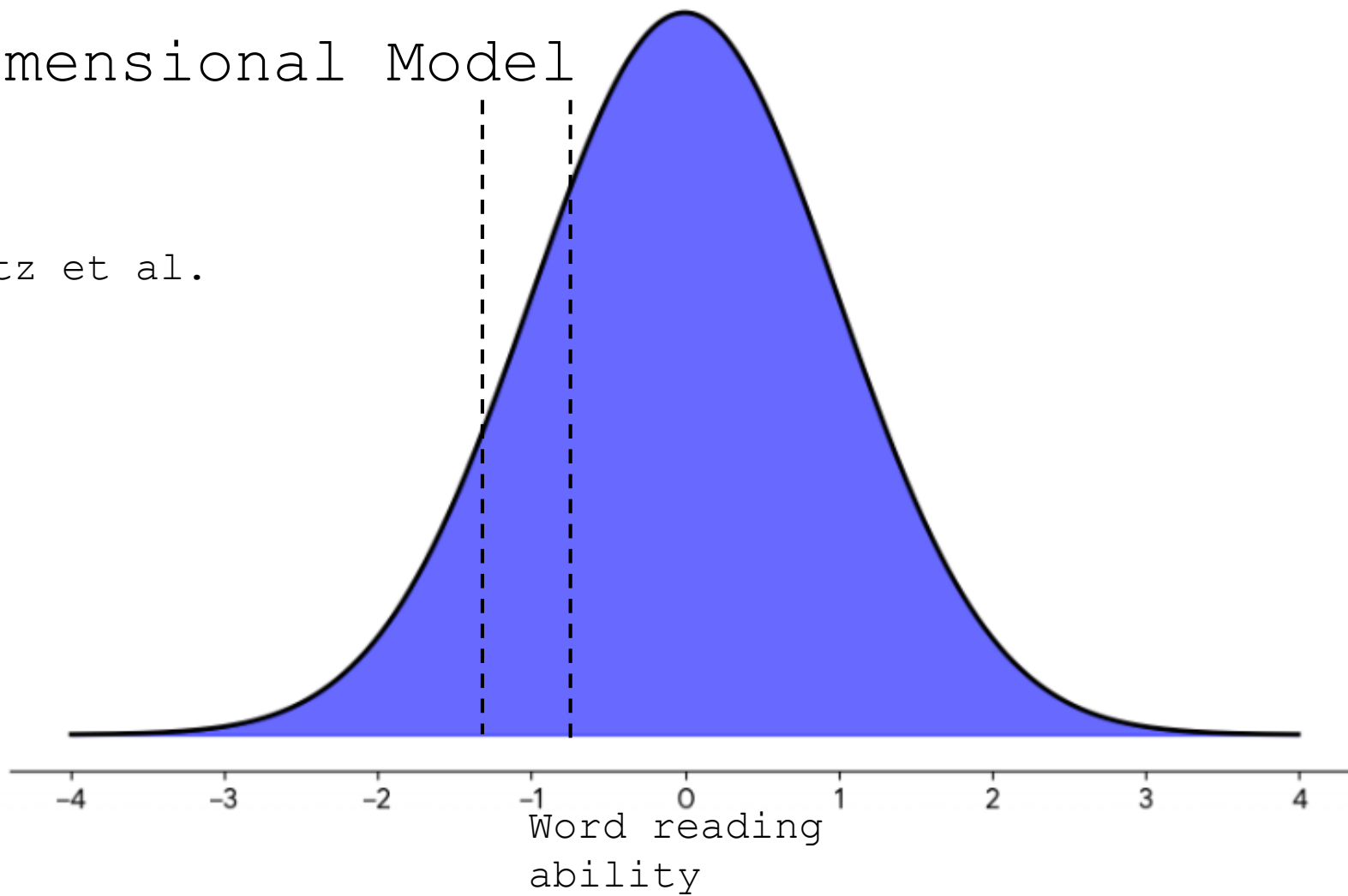


# Bimodal Model



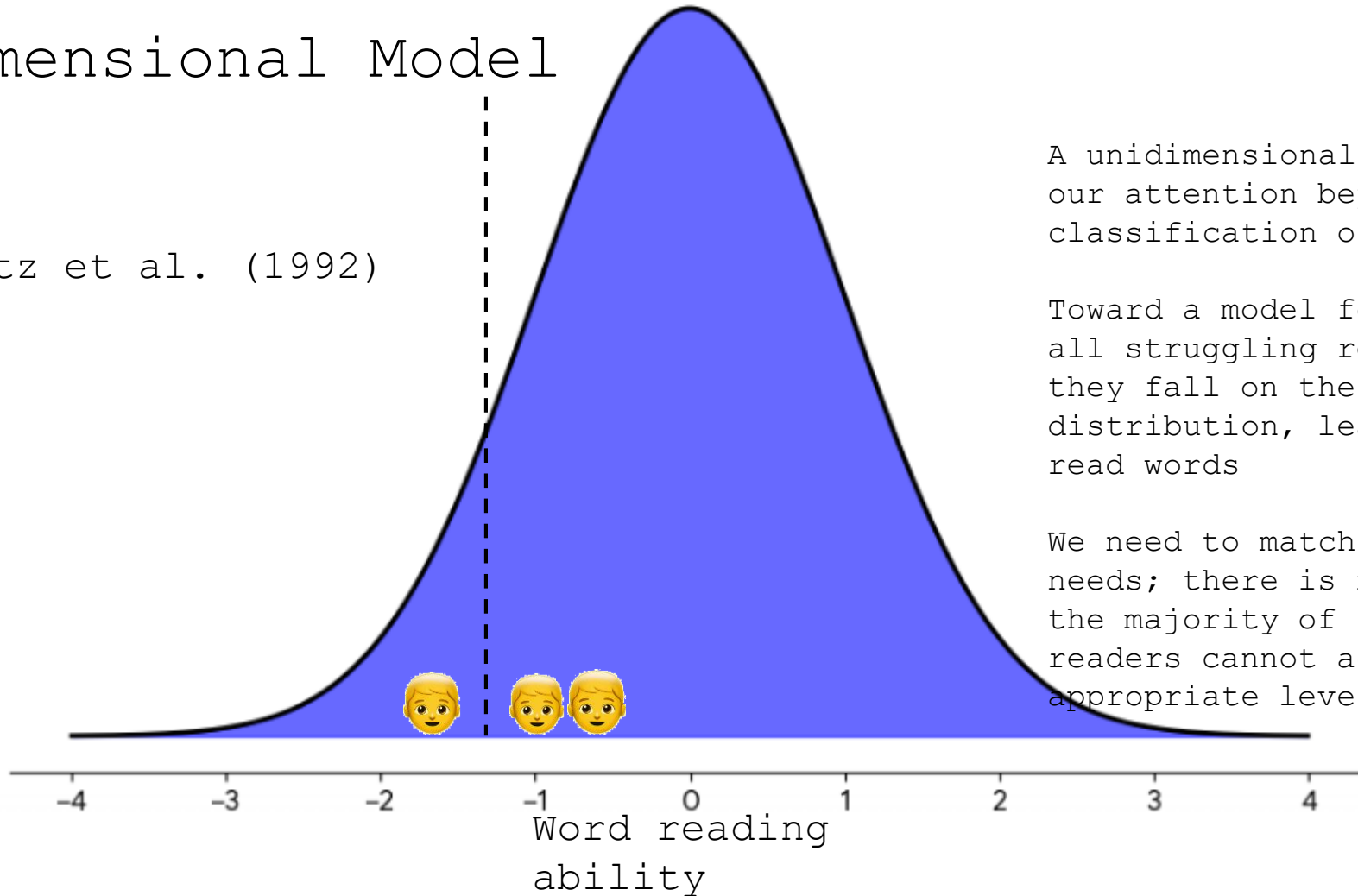
# Unidimensional Model

Shaywitz et al.  
(1992)



# Unidimensional Model

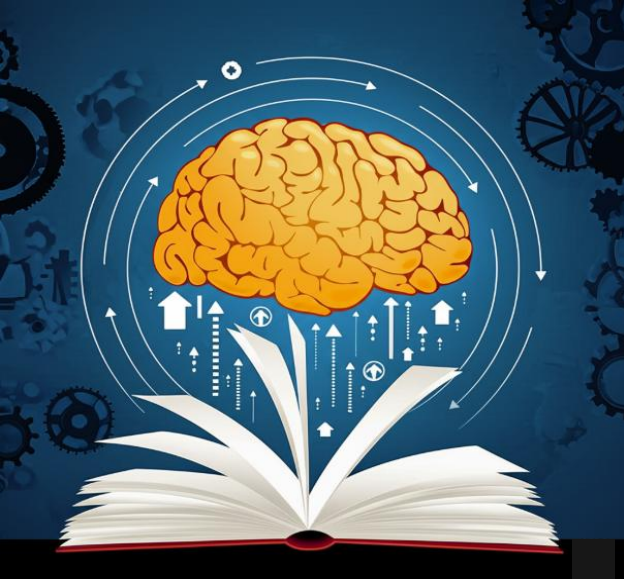
Shaywitz et al. (1992)



A unidimensional model directs our attention beyond the classification of dyslexia

Toward a model for assuring that all struggling readers, wherever they fall on the lower end of the distribution, learn to decode and read words

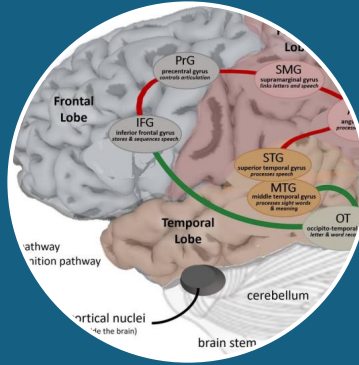
We need to match instruction with needs; there is no reason that the majority of struggling readers cannot acquire an appropriate level of mastery



Cause



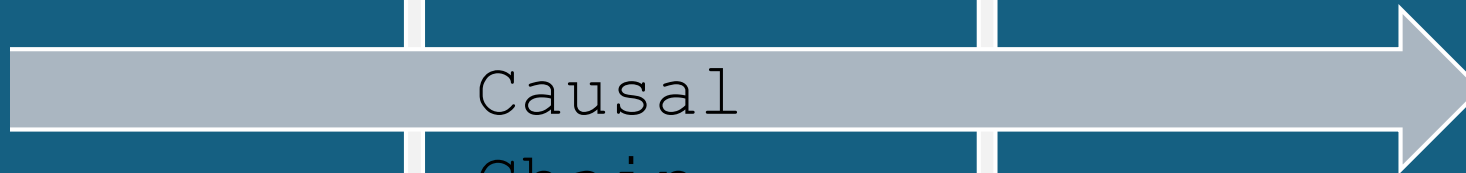
Genes



Brain



Behavior



Causal  
Chain

Distal

Proximal

# Genetic Basis

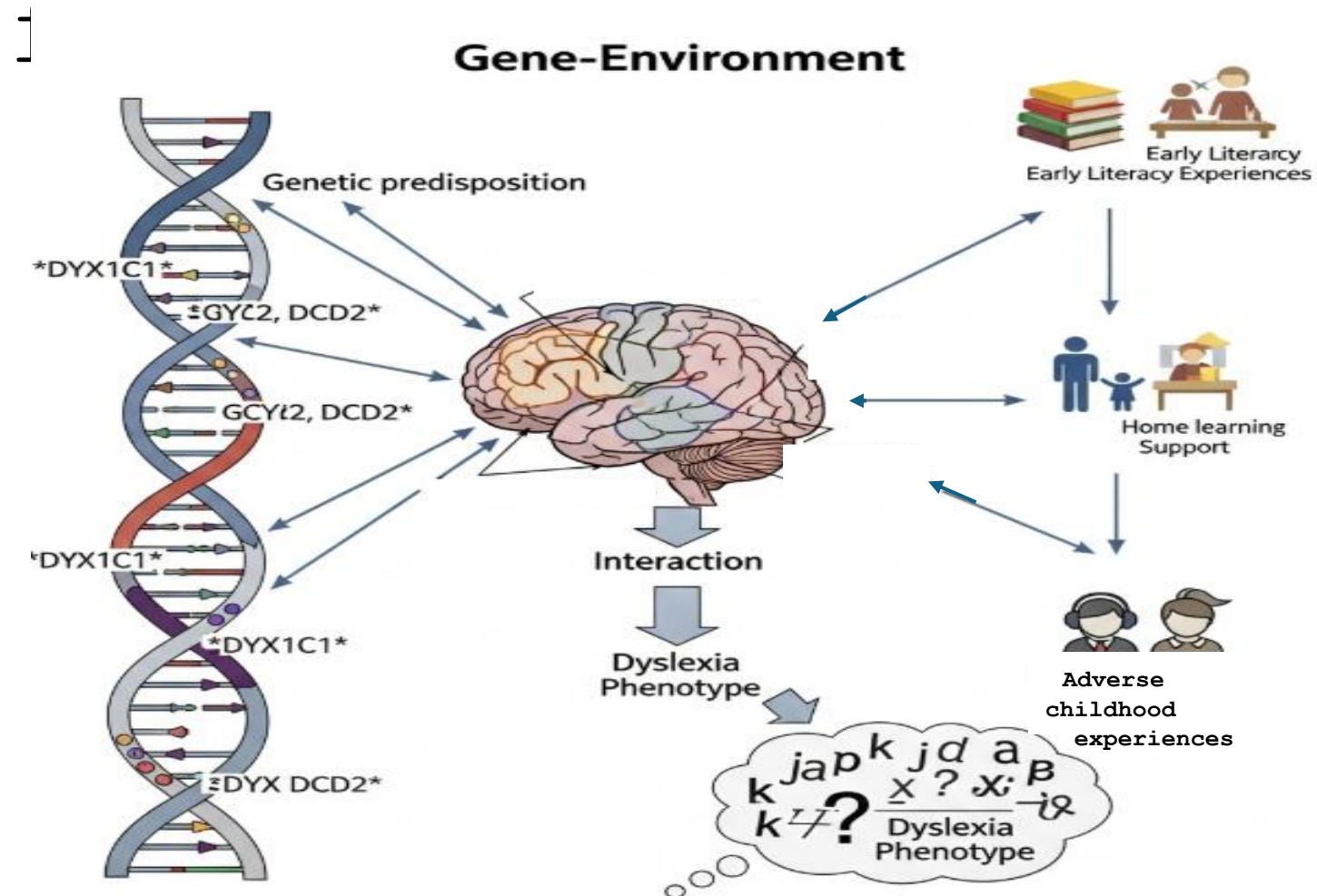
- Runs in families. About 50% of children with a parent or sibling with dyslexia will have dyslexia themselves
- Not a single gene but a complex interplay of **hundreds of genes**
- Currently numerous genes or gene locations have been found to be associated with dyslexia
- Genetic association with reading is **continuous**

Doust et al., 2022, Grigorenko, 2022,  
Mouton-Rouge et al., 2023, Samadpour-Zhad,  
2024



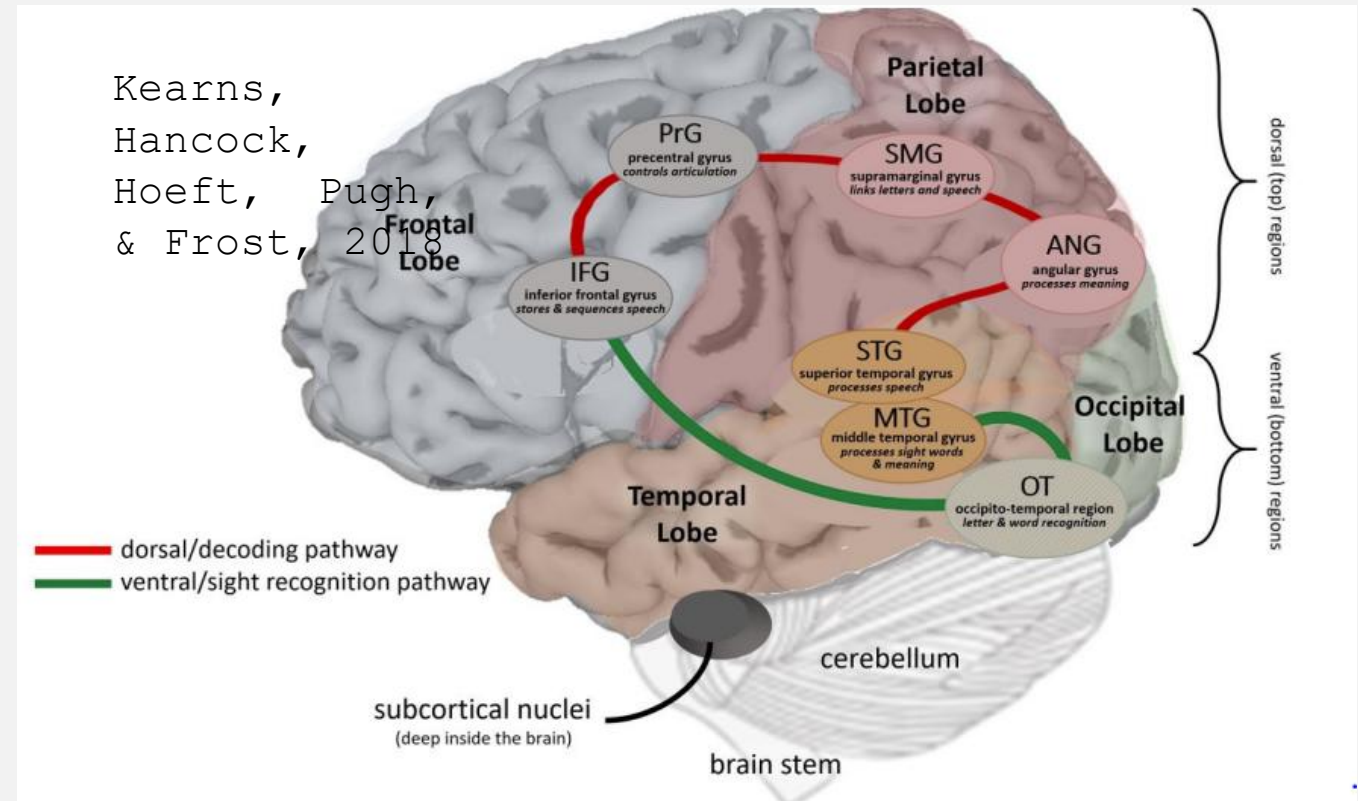


# Environmental



# Neurological Basis

- Considerable evidence of brain differences in dyslexia  
Kearns, Hancock, Hoeft, Pugh, & Frost, 2018
- Most evidence in those with reading problems; but do observe differences in very young children
- Evidence does not suggest a neurological disorder but rather brain development at the lower end of the normal distribution
- Observed brain differences are more continuous than distinct and quite variable across individuals  
Gaab & Duggan, 2024; Norton et al., 2015; Protopapas, 2019; Ramus et al., 2018
- No brain-based marker of dyslexia





Cause

Proximal

# Phonological Processing Deficit

Shankweiler et al.  
(1979) Lundberg et  
al. (1981) Wagner  
& Torgesen (1987)  
Stanovich (1988)  
Catts (1989)

Phonological Awareness

Phonological Memory

Phonological Retrieval

Phonological Production



Not necessary or

- ~~sufficient~~  
Absent in some poor readers

Pennington et al., 2012; Mundy & Hannant, 2020; Obrien & Yeatman, 2022; Carroll et al., 2016

- Not sufficient when present

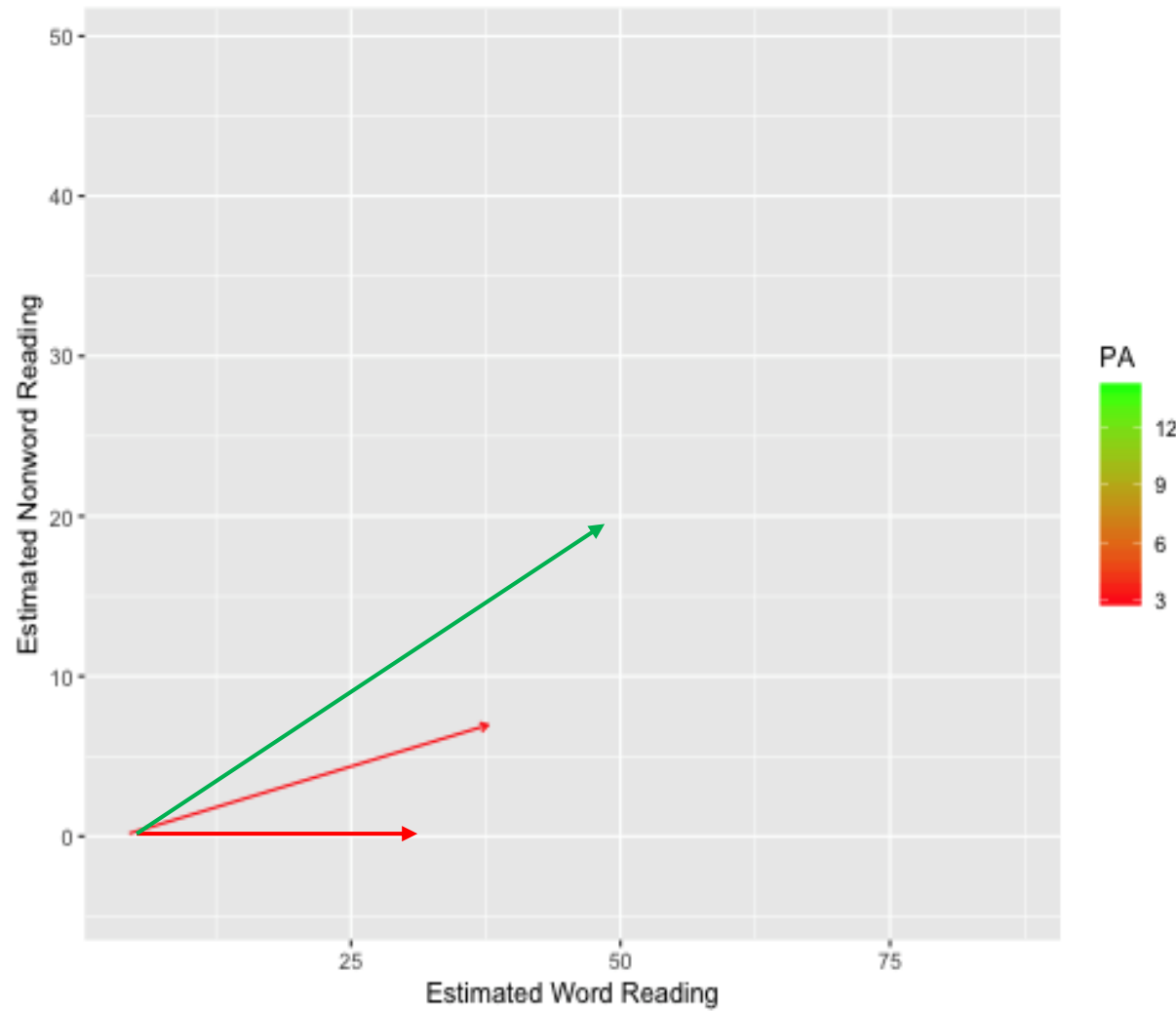
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*Steacy  
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2021*

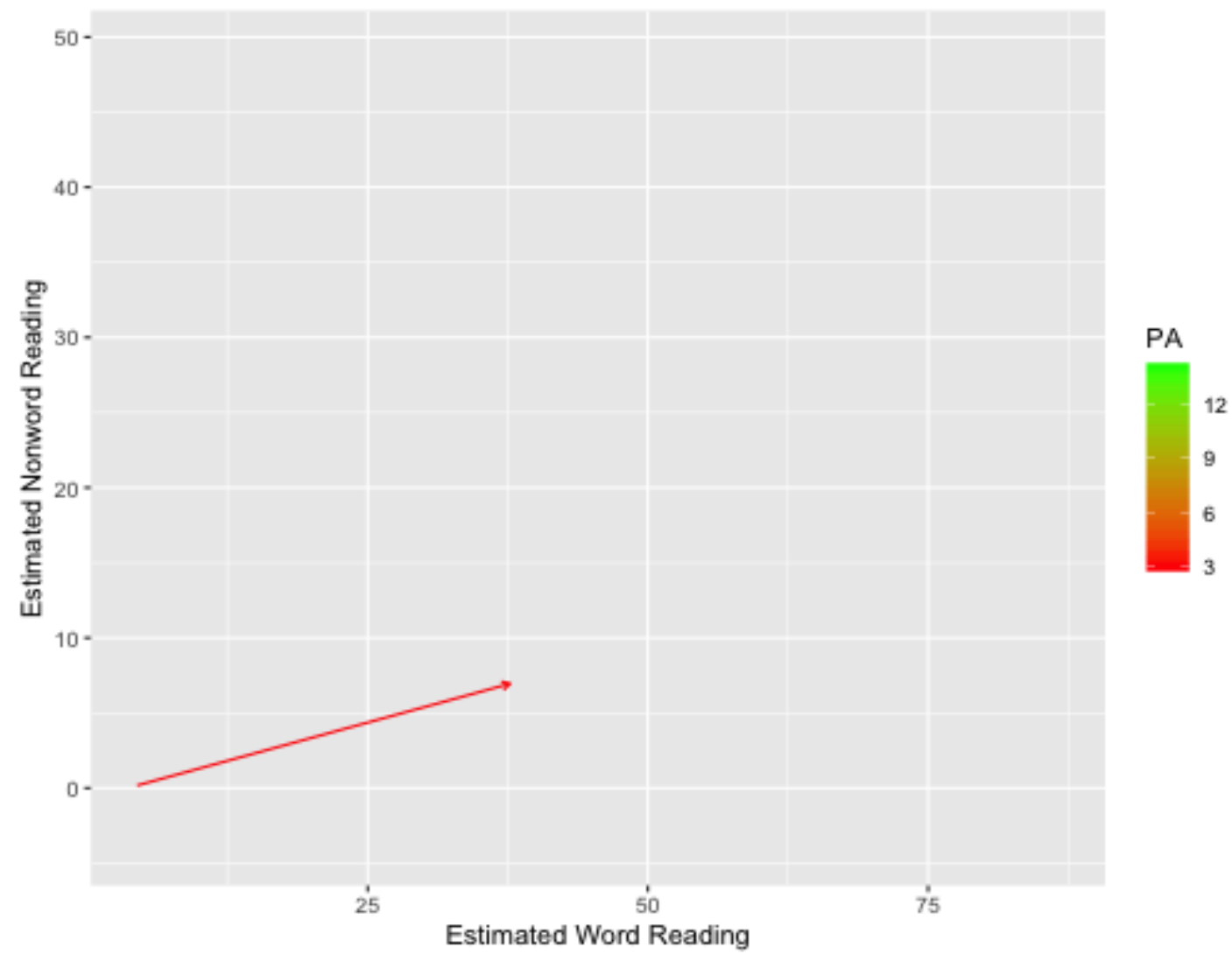
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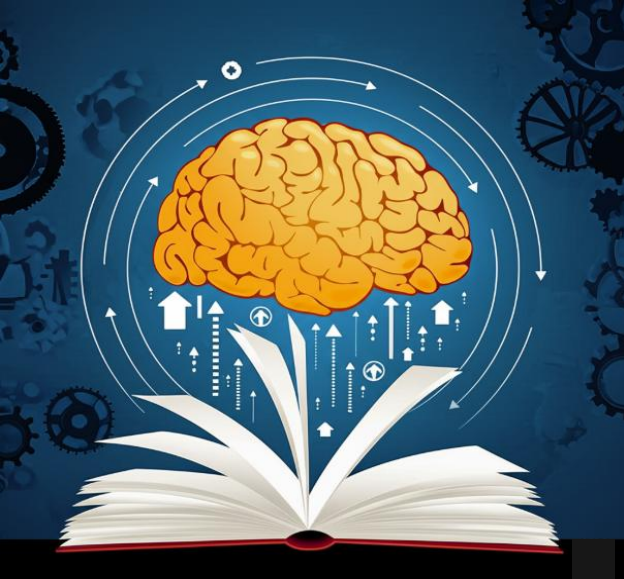
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# Not necessary or sufficient

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Pennington et al., 2012; Mundy & Hannant, 2020; O'Brien & Yeatman, 2022; Carroll et al., 2016

- Not sufficient when present

Catts et al., 2017; Ramus et al., 2013; Ring & Black, 2018

- Research continued to confirm that other deficits are associated with dyslexia

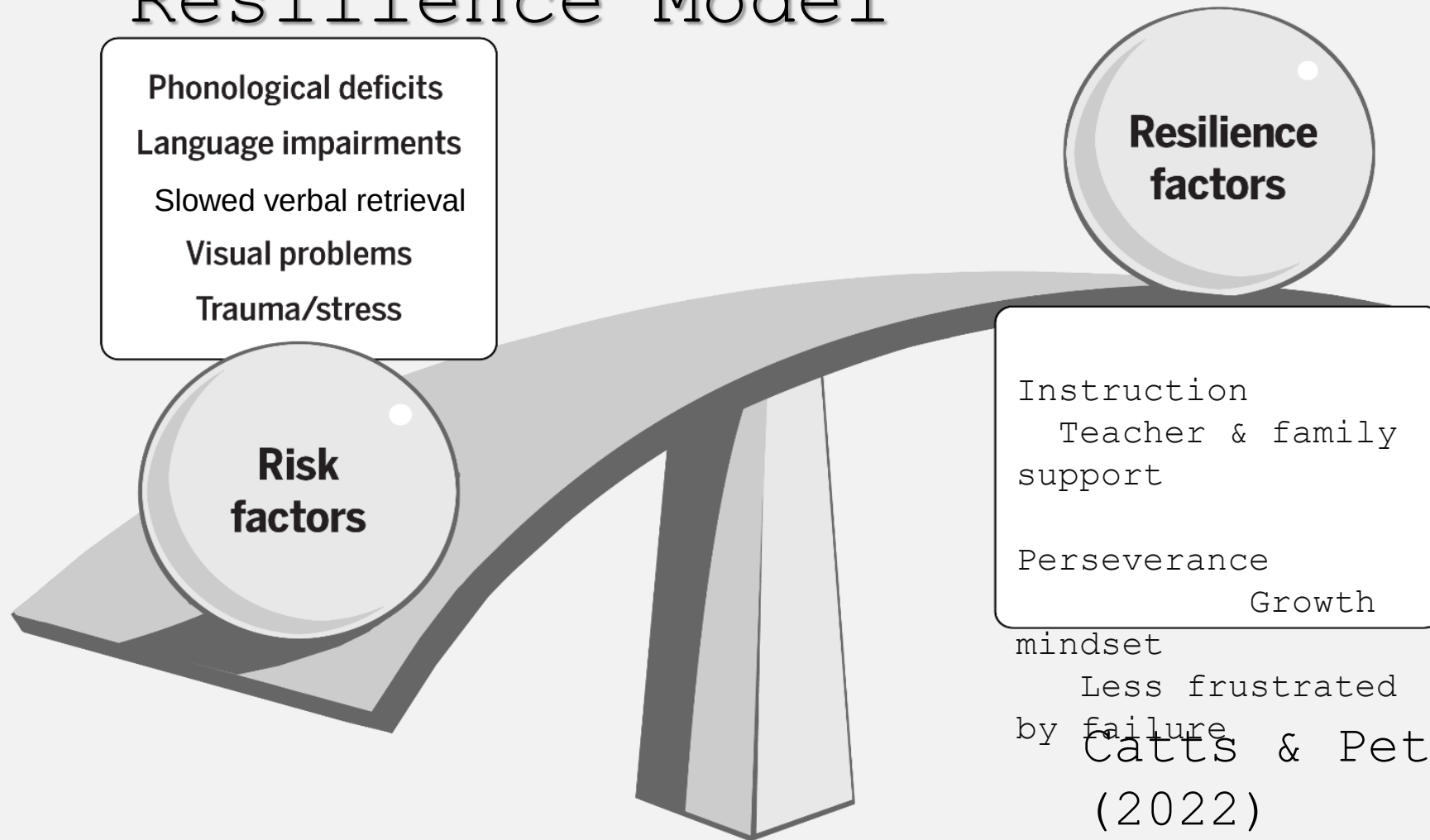
**O'Brien & Yeatman, 2020;** Snowling & Melby-Lervag, 2016; Pennington et al., 2012

# Multifactorial Causal Models of Dyslexia

Pennington, 2006; Catts & Adlof, 2011; Catts & Petscher, 2021; McGrath et al., 2019; Snowling, 2012; Van Bergen et al., 2014; Ring & Black, 2018; O'Brien & Yeatman, 2020

- Multiple causal factors add and interact to result in dyslexia
- Phonological processing deficit may be a major causal factor, but other factors operate in combination with it, and in some cases, in place of it to increase or decrease the likelihood of dyslexia
- Better explains the complex interaction between environmental factors and the multiple genes involved - polygenetic
- Probabilistic rather than deterministic
- Not just deficits; children with the same level of deficits often show divergent outcomes
- Multifactorial models challenge the notion of a specific dyslexic profile

# Cumulative Risk and Resilience Model

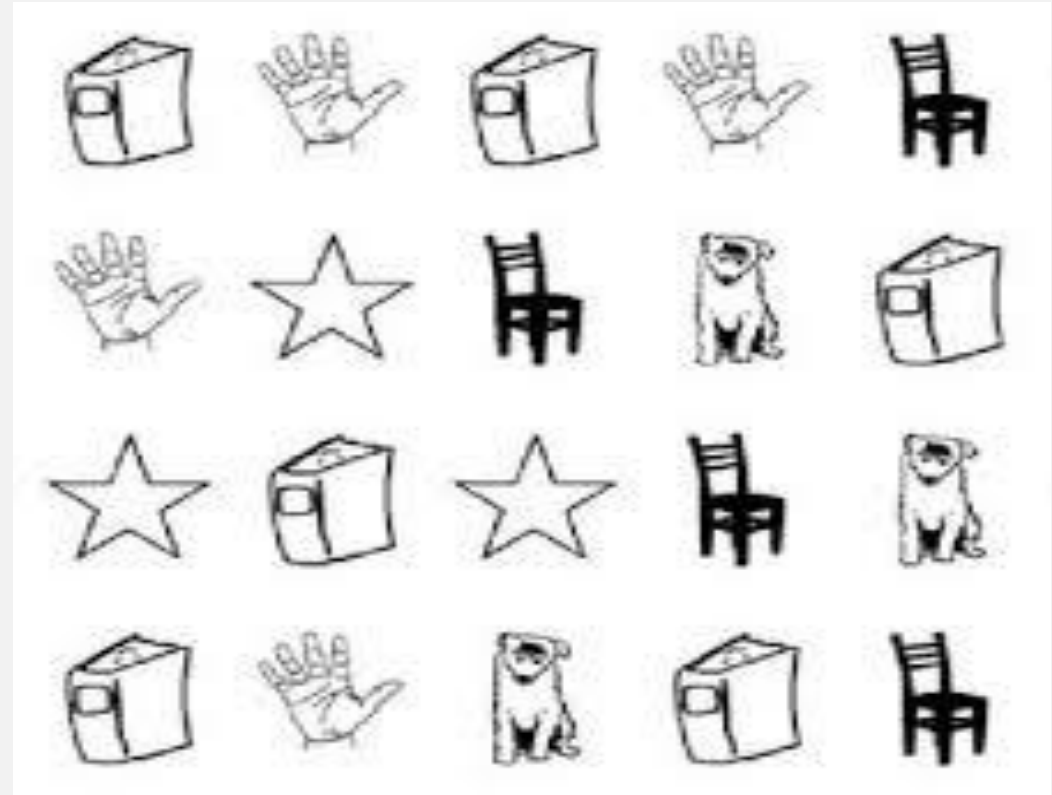


Less frustrated  
by failure  
Catts & Petscher  
(2022)

(updated)

# Slowed Verbal Processing

- Underlies RAN performance independent from phonological processing
- Observe some children with RAN only deficits and many of these have word reading problems
- May be particularly related to word reading in transparent orthographies



Wolf & Bowers, 1999; Georgiou et al., 2008; Norton & Wolf,

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|          |          |          |          |          |          |
|----------|----------|----------|----------|----------|----------|
| <b>a</b> | <b>p</b> | <b>o</b> | <b>s</b> | <b>p</b> | <b>d</b> |
| <b>o</b> | <b>d</b> | <b>p</b> | <b>a</b> | <b>d</b> | <b>o</b> |
| <b>p</b> | <b>o</b> | <b>a</b> | <b>s</b> | <b>p</b> | <b>s</b> |
| <b>s</b> | <b>d</b> | <b>o</b> | <b>d</b> | <b>s</b> | <b>a</b> |
| <b>o</b> | <b>p</b> | <b>d</b> | <b>o</b> | <b>a</b> | <b>d</b> |

Wolf & Bowers, 1999; Georgiou et al., 2008; Norton & Wolf,

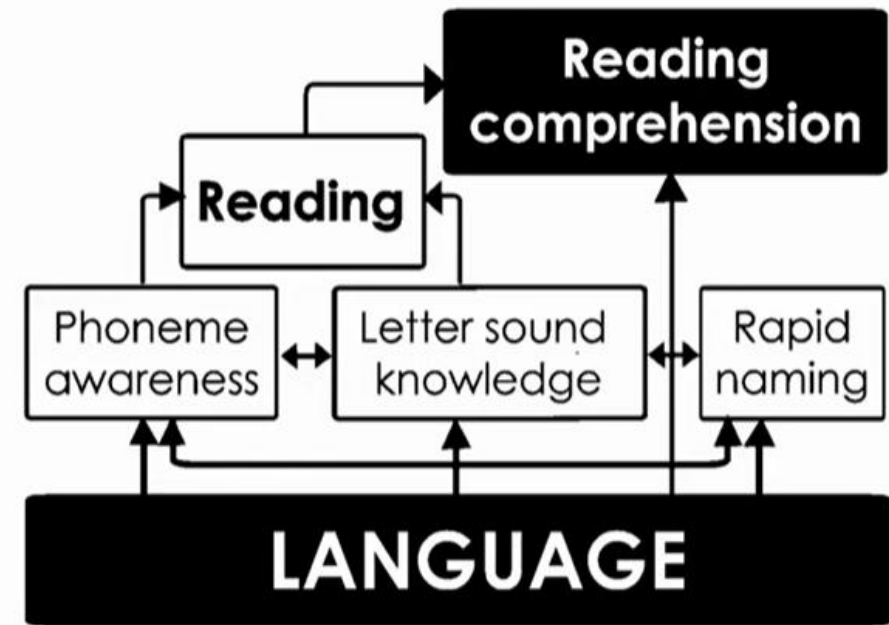
# Oral language problems and dyslexia

- Children with dyslexia often have a history of other language difficulties
- First sign of risk for dyslexia
- Many have mild problems in vocabulary & grammar
- Some have a history of developmental language disorder (DLD)



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- Reading is Language Model



Hulme et al.,  
2015

# Language-focused interventions

*Let's Know*

*Story Champs*

*Word Generation*

*WORLD*

*Language in Motion*

*World of Words*

*On My Way Pre-K*

*Nuffield Early Literacy  
Intervention (NELI)*

*Supporting Knowledge in  
Language & Literacy  
(SKILL)*

- Strong evidence of impact on language development and some support for impact on reading
- Language intervention can begin at earliest sign of language difficulties

Snowling et al. 2025; Petersen et al., 2022; Neuman et al., 2011; Gillam et al., 2024; LARRC et al., 2022; Jones et al., 2019

# Visual Deficits in Dyslexia

- *Not problems with:*
  - reversals
  - visual stress
  - eye movements
  - eye asymmetry



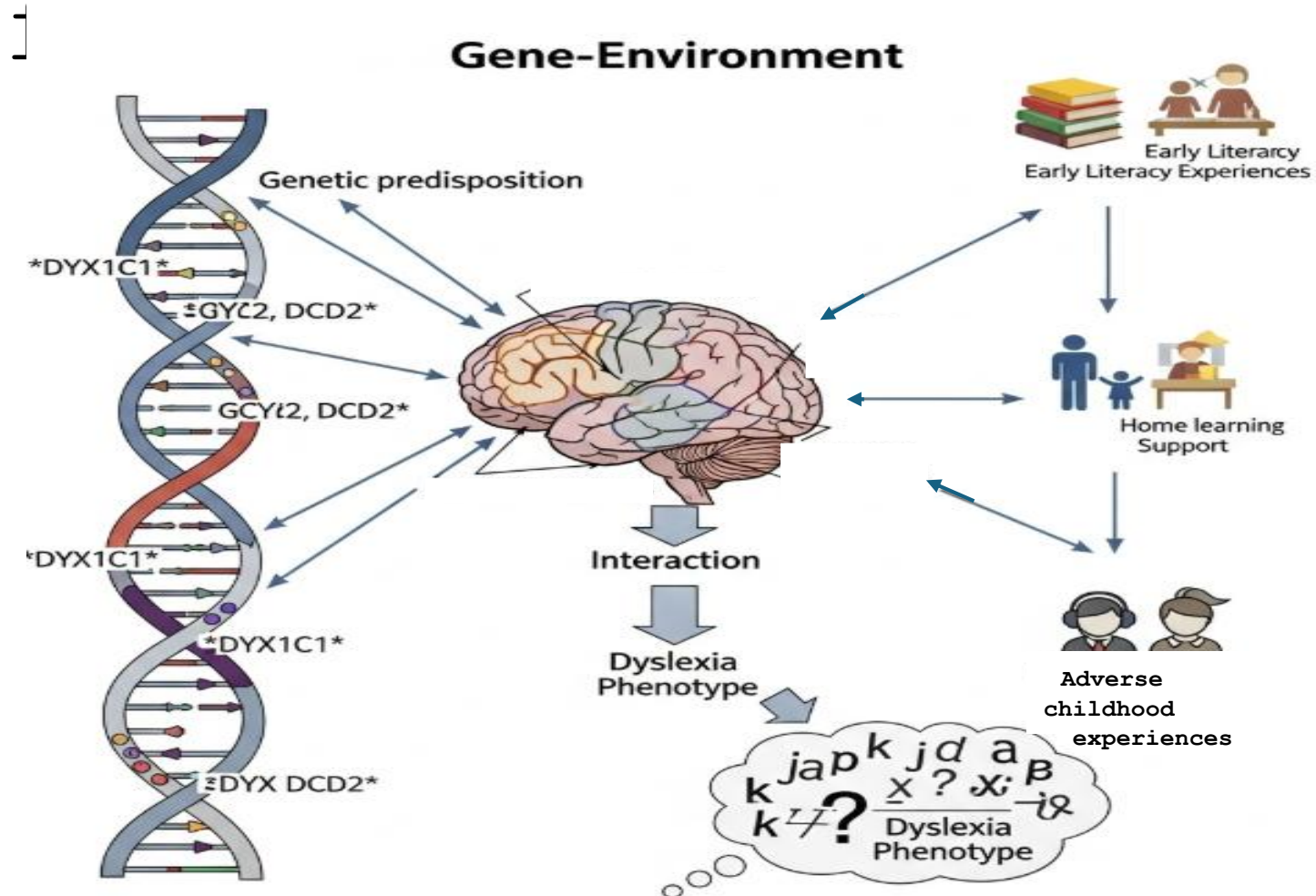
# Visual Deficits in Dyslexia

- *Motion sensitivity deficit* - failure to suppress visual information during eye movements that leads to masking
- *Visual crowding* - letters in periphery appear close together and may mask each other
- *Visual attention problems* - reduced span or how much one can "see" in a single glance (rapid visual

Bosse et al., 2007; Franceschini et al., 2012, Joo et al., 2018, O'Brien & Yeatman, 2021; Ramamurthy et al. 2025



# Environmental

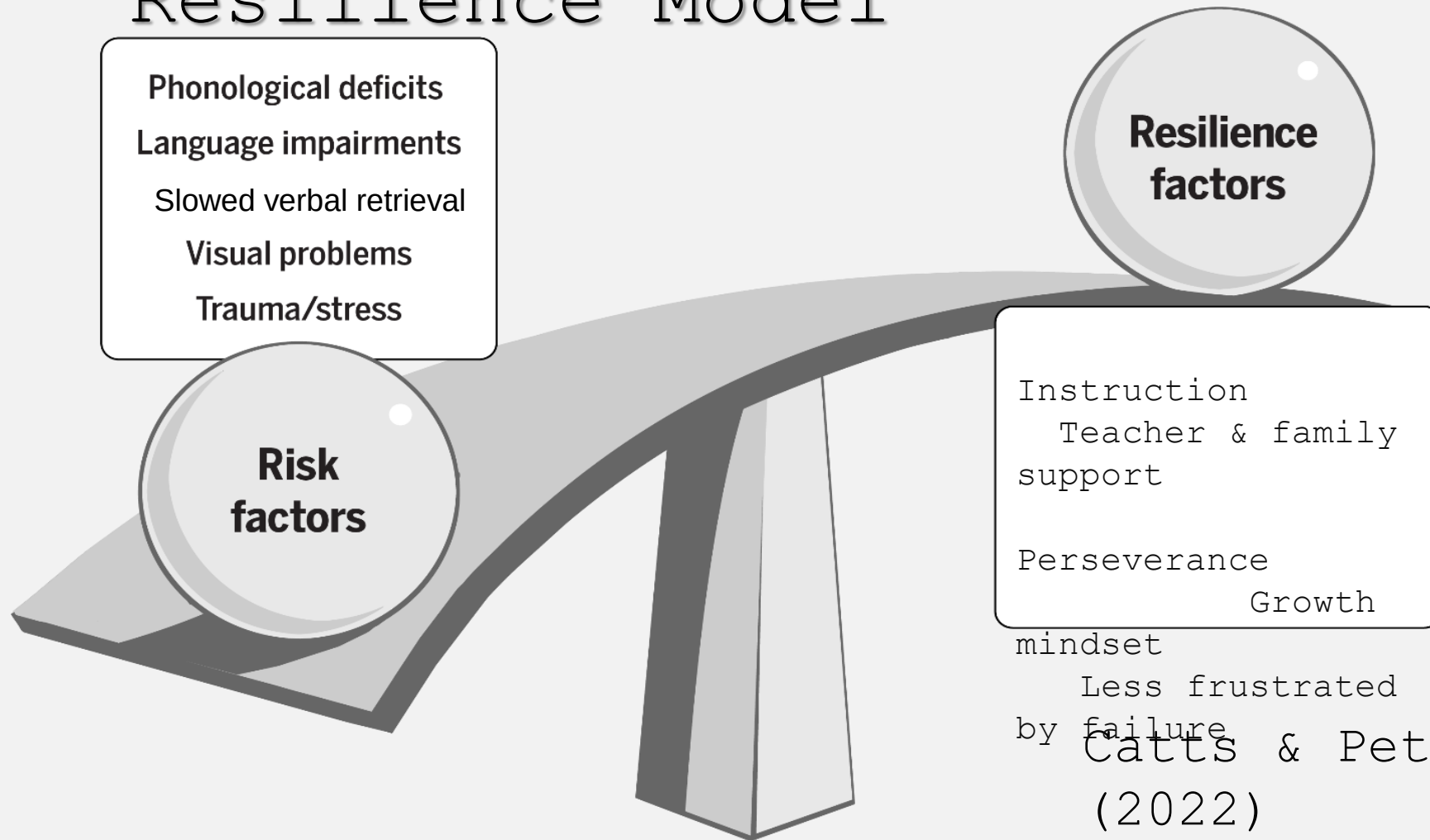




# Trauma

- Extreme reaction to Adverse Childhood Experiences (ACEs).
- Experiences such as physical, sexual, or emotional abuse,\* neglect, the sudden loss of a family member,\* a natural disaster,\* exposure to violence,\* mental illness or incarceration by members in household, or parental separation/divorce can lead to trauma
- Cause “toxic stress” and have neurological consequences
- **ACEs are common.** About 60% of adults surveyed across 25 states reported that they had experienced at least one type of ACE
- Cumulative effects of multiple experiences (dosage), type (TRACES+) and the co-occurrence of other factors that place children at the highest risk of

# Cumulative Risk and Resilience Model





# Instruction

- **High quality instruction** is critical for learning to read
- Such instruction can be particularly effective for children at risk (Connor et al., 2004; Foorman et al., 2003). Explicit, systematic, supportive, & intensive code-based instruction
- Teachers can also be mindful of negative consequences and provide **emotional support** – promote success; great motivator
- Also, mitigate negative peer interactions

# Resilience characteristics

- ❑ Oral language profic
- ❑ Less frustrated by f
- ❑ Perseverance; grit
- ❑ Growth mindset
- ❑ Higher self-efficacy
- ❑ More hopeful



# Secondary Consequences

- Reading comprehension
- Vocabulary development
- Academic progress



# Psychosocial Consequences

- Heighten anxiety
- Lower self-concept/self-efficacy
- Behavioral problems
- Truancy and/or delinquency
- Substance abuse
- Limited employment opportunities
- Lower emotional well-being



# Affective condition

- Reading becomes an aversive activity; Child avoids, act outs, or freezes up when forced to read
- Becomes anxious about reading
- Accused of not trying hard enough
- Others think child is not very smart; Child begins to think so as well. Others may tease the child
- Child's self-concept is impacted and has feelings of less self worth - can become



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## **Dyslexia: An Ounce of Prevention is Better Than a Pound of Diagnosis and Treatment**

*by Hugh Catts and Tiffany Hogan*

Dyslexia is a significant developmental disorder that is associated with a host of negative consequences. Most states in the US have recently passed legislation requiring the diagnosis and treatment of dyslexia in school settings. Whereas this legislation brings needed attention to children with dyslexia, diagnosis and treatment are typically delayed until several years after school entry. By this time, reading problems and associated negative consequences are well underway. In this paper, we argue for an alternative, prevention-based approach that focuses on the early identification of children at risk for dyslexia and the provision of instruction/intervention that is matched to their needs.

Reading League Journal, Jan/Feb 2021

- ❑ High-quality code-based instruction
- ❑ Early identification
- ❑ Universal screening
- ❑ Dynamic assessment
- ❑ Supplemental instruction
- ❑ Progress monitoring
- ❑ Intensive intervention
- ❑ Focus on support & success

Thank you

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