

**LEARNING DISORDERS**  
**Over the Life Span**  
**Arizona Psychiatric Society**  
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# No Conflicts

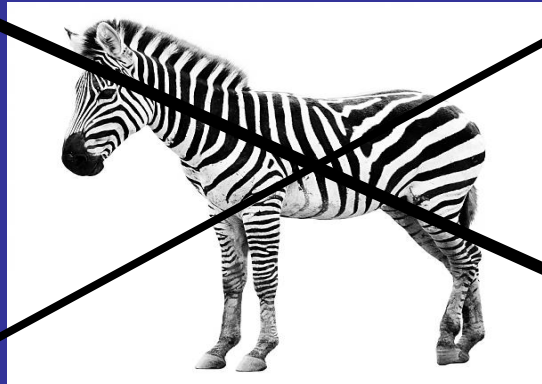
- Strong bias in favor of education
- Advocate early diagnosis and effective treatment for learning problems & associated mental health issues

# The Issue

- In childhood, learning disabilities are associated with psychiatric comorbid disorders
- Adaptations can be very dysfunctional
- Learning disabilities & dysfunctional adaptations don't go away
- Some adults with learning disability will end up in a psychiatrist's office

# Common Learning Disabilities That Persist into Adulthood

- Developmental Language Disorder (DLD) (SLI, LI)
- Dyslexia



# Dyslexia & Developmental Language Disorder

Genetic, not environmental

Developmental—appear in early childhood

School = pain

Comorbid psychiatric conditions persist across the life span

Different comorbidities

# Diagnosis

- **Dyslexia**

Reading (rate, accuracy) & ~comprehension

Other easily measured cognitive processes that are sensitive clinical/research measures

## **Developmental Language Disorder**

Standardized tests: expressive/receptive language, naming, grammar, lexical knowledge, language/social-pragmatics

# NIMH Research Domain Criteria (RDoC)

- “Specific domains of functioning that can be traced to a coherent mechanism across varying levels of human organization...”
  - So, What about Language?
- Elvevåg, B., et al. Am J Med Genet Part B (Neuropsychiatric Genetics) 171B:904-919; 2016)

# Dyslexia & DLD

## The Wellcome Language and Reading Project

- Recruited 3 year-olds based on family history of dyslexia, DLD, controls (n=234)
- Tested both parents and children;
- \*\*\*Evaluated for comorbid conditions
- Children retested at 4.5, 5.5, ~ 6-8 years
- 4 groups: Dyslexic, DLD, Dyslexic+DLD,
- controls



# The Wellcome Language and Reading Project: Take Home Messages

- 1. DLD at 3.5 years may not persist to age 8 years.
- 2. Persistent DLD impairs school performance
- 3. DLD is associated with significant psychiatric comorbid conditions
- 4. Children with dyslexia and DLD are at greater risk academically/psychiatrically than “pure” dyslexics
- 5. Family literacy/social environment is a modifying factor

# Comorbid Conditions Appearing in Early Childhood

- \*Developmental Dyspraxia
- \*ADHD
- \*Impaired Executive Function
- \*Anxiety Disorder
- \*Mood Disorder

# DLD: The Trojan Horse Kids

- They look perfectly “normal”
- They hear fine
- They can talk
- Their social skills seem OK (sometimes!)

# The Trojan Horse Kids

- They struggle in school
- Problematic peer relationships
- Very bossy, demanding
- Derailed by change
- Improve dramatically in structured environment
- TH kids have a TH relative (usually a parent)

# The Trojan Horse Kids

- Neuropsychological & language testing: significantly impaired language & academic skills
- Impoverished speech (*stuff, thing, it*)
- Lack of understanding of the world around them (time, geography, emotions)
- Inability to use self-talk for self-regulation
- The not-thinking syndrome
- The broken windshield syndrome

# Dyslexia

- Dyslexia is not due to primary dysfunction of the visual system (not “letter reversals”)
- It is due to a Phonological Awareness deficit: *the ability to Identify phonemes and their position in the sequence of other phonemes in a word.*
  - So, what is a phoneme?

# Phonemes

- Phoneme: the smallest unit of meaningful sound in a language
- Changing just one phoneme changes the meaning of a word:
  - Sit→pit
- Changing the *position* of a phoneme in a word also changes its meaning
  - tip→pit

## How does this relate to reading?

- Good readers learn to read by matching letters to phonemes
- Kids laboriously sound out common words, like *cat* 50 to 100 times.
- Then, one day they see *cat* and don't have to keep sounding it out.
- They also begin to recognize patterns inherent in language
- This is followed by a rapid growth in words they recognize



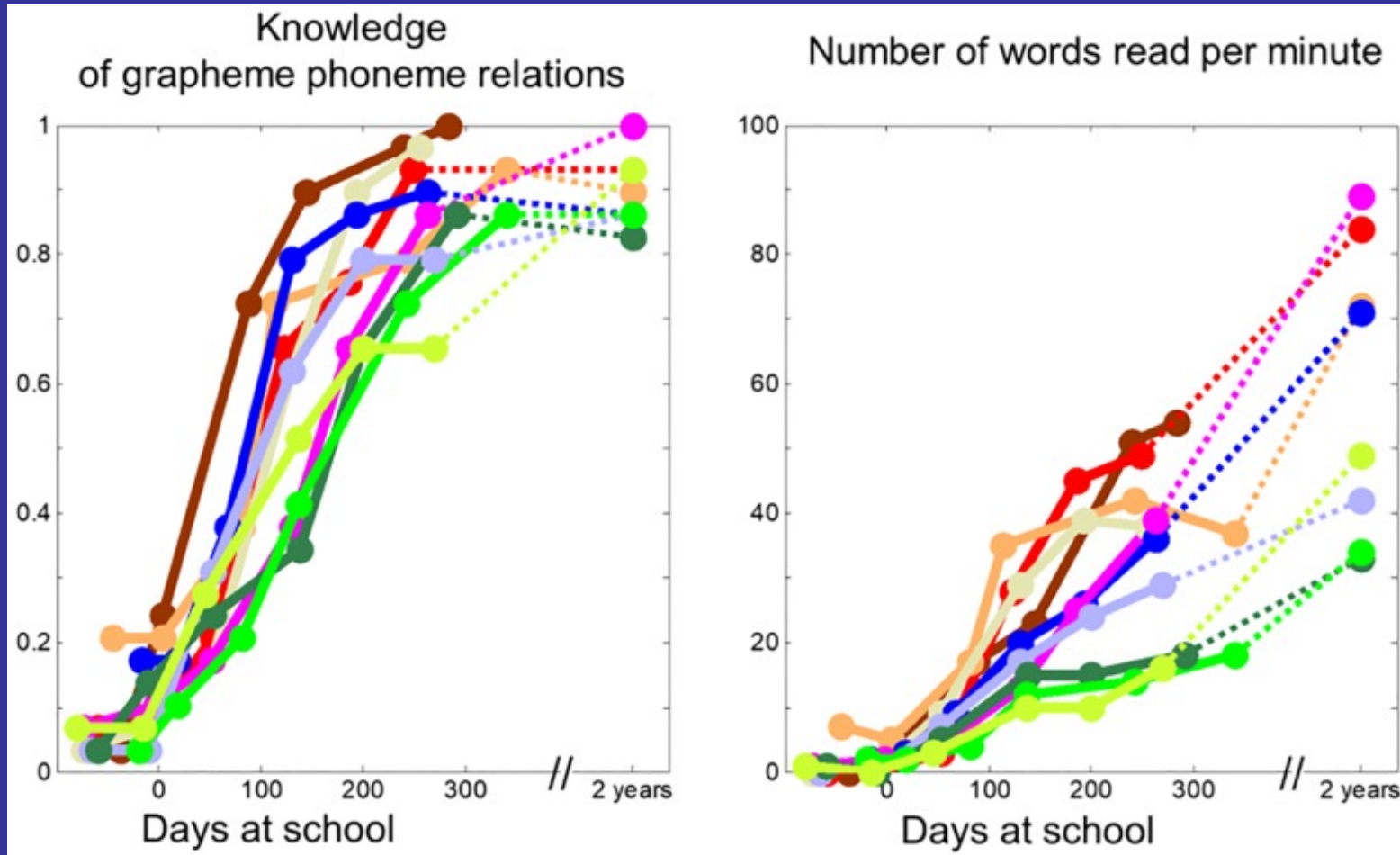
# The Visual Word Form Area

- VWFA –tiny area nestled under left hemisphere in ventral occipital area
- Area of the brain that is enhanced in the expert (e.g., lepidopterist)
- Also contains columns of neurons that respond to pictures of tools, houses, bodies, faces and words.

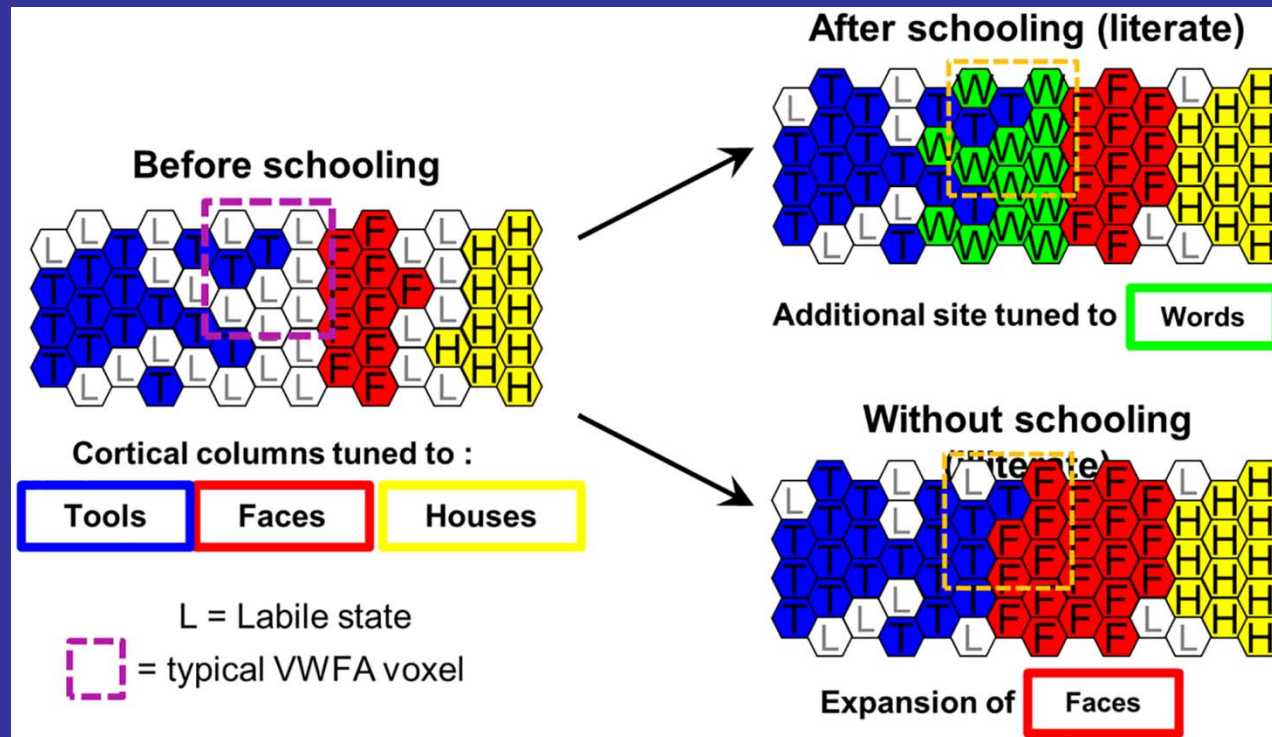
# Visual Word Form Area

- Ten 6-year-old children.
- Normal development
- Minimal previous exposure to letters
- fMRI scan before entering school & 6-7 scans over first year in school, while learning to read

# Rapid Learning!



# VWFA Learning to Read



Dehaene-Lambertz et al. PLOS Biology 2016

# FOR TYPICAL READERS READING IS FUN!

- \*



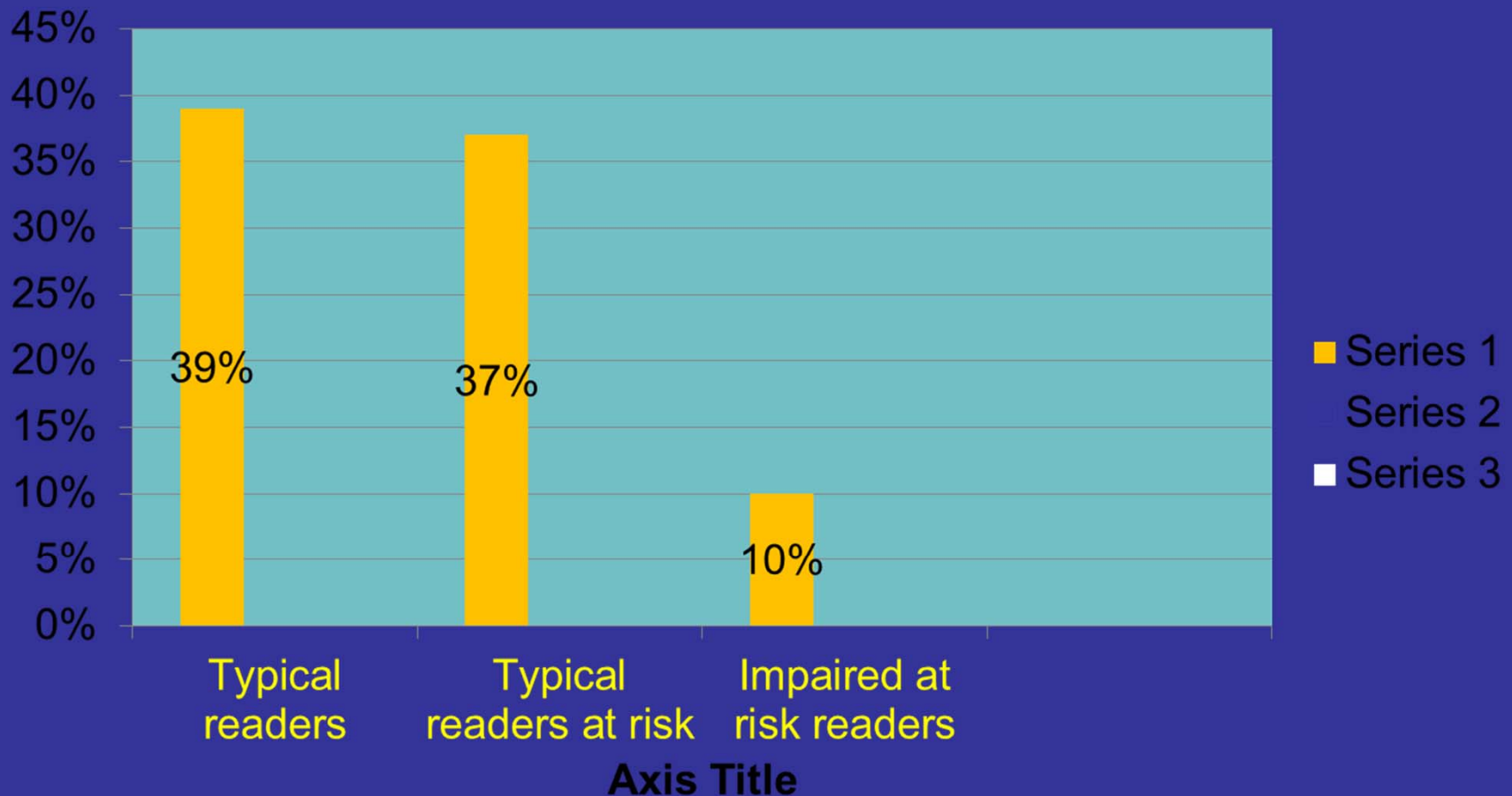
# Phonological Awareness is Essential to Learning to Read

- For dyslexics this is a daunting process
- A recent fMRI sheds light on this process:
- scanned & tested children at the end of kindergarten and then tested them at the end of 2<sup>nd</sup> grade to identify those who were reading impaired.

# VFWA in Children Destined to be Dyslexic

- Children recruited at end of kindergarten year (n-161)
- Classified not at risk or at risk based on family history.
- Tested, fMRI *before* learning to read
- Re-tested, re-scanned at end of second grade
- Centanni et al. (2019)

# Percent signal change to letters in left fusiform area (VFWA) before reading instruction





- Before even *starting* to learn to read, a child who will end up as an impaired reader in 2<sup>nd</sup> grade demonstrates an atypical lack of activation to letters in the VWFA

# READING IS NOT FUN



# School is Miserable

- 5 ½ year-old : “I’m dead meat.”
- 7-year-old: “She was a happy kid...but by the end of first grade, It was like a dark curtain descended.”
- Charismatic 6-year old: Organize an insurrection?

# Dyslexia Diagnosis

- SCHOOL-AGED CHILDREN, ADULTS
  - Read real/pseudowords rapidly, accurately
  - Read text passages rapidly, accurately
  - Spelling
  - (Reading Comprehension)

# DYSLEXIA DIAGNOSIS

## Identification in Preschool

- Positive family history
- Letter knowledge
- Phonological awareness
- Rapid automatized naming
- Working memory

# Identification at Birth

- *Jyvaskyla Longitudinal study of Dyslexia.* N= ~200. Babies at family risk for dyslexia vs. no family risk
- Event-related potentials (ERPs)—tones of different pitch. Followed to age 8 years.
- Atypical neonatal ERPs in infants at family risk associated with reading issues at age 8 years. (Lytinen, et al. 2010)

# Dyslexia & DLD

- Persist (variably) into adult life,
- May profoundly affect adult social-emotional function & occupational success
- But, not always!
- Learning problems are rarely the problem for adults...it's the dysfunctional "echoes"...
- Comorbid psychiatric conditions can appear primary in adults

# PATIENT PRESENTS WITH PSYCHIATRIC PROBLEM

- Aware of past/current history of childhood LD –need management
- Not aware of history of childhood LD
  - Formal diagnosis
  - No formal diagnosis, but highly likely
  - may need testing to establish a baseline



# PATIENT PRESENTS WITH PSYCHIATRIC PROBLEM-2

- Has a documented or undocumented history of LD.
- Incorrectly attributes current psychiatric problems to history of LD

# This Can Be a Hot Mess!

		Formal Diagnosis	
		Yes	No
Patient Self - Report	Congruent	Manageable	
	Incongruent	Denial	Need to Explore

# Suggested Questions

- Review previous school history
- How is your spelling?
- What do you read? Do you like to read? Do you read for pleasure?
- Review family (parent/sibling) history:
  - Educational history? Reading/spelling?
  - Occupational history?
  - Emotional/psychiatric history?