The Science of Dyslexia: Translating Science into Practice

2013 KAAP Annual Fall CME Meeting

October 4, 2013

Sally E. Shaywitz, M.D.
Bennett A. Shaywitz, M.D.
Yale Center for Dyslexia & Creativity

Disclosure

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Dyslexia – represents >80% of all LD
Often un-diagnosed
Associated with ADHD and anxiety

Historical Background
1896 - W. Pringle Morgan: 14-year-old boy who was "bright and intelligent" but whose "great difficulty has been--and is now--his inability to read."

Definition
Dyslexia is an unexpected difficulty in reading, unexpected in relation to: intelligence, motivation, education, professional status
Empiric support: In typical readers, reading and IQ development are dynamically linked over time; In dyslexia developmental uncoupling between IQ and reading

Sea of Strengths Model

Epidemiology
Connecticut Longitudinal Study: 1 in 5, 10 million children nationally
Universal, occurs in every language, affects both boys and girls
Dyslexia persists: not simply lag in development that children will outgrow

Etiology
Multi-factorial model - multiple genetic and environmental risk and protective factors
Less than 1% of risk related to genetic variants
Dyslexia best explained by multiple genes, each contributing a small amount of the variance

Why print has meaning
Difference between spoken and written language
Phoneme: smallest unit of speech distinguishing one word from another; basic unit of spoken language, e.g., word “cat” composed of three separate phonemes: k aaa t

Alphabetic Principle
Words not whole envelopes of sound: segments represent sounds
Printed word has same number and sequence of sounds as spoken word
Neurobiologic Mechanisms in Dyslexia: fMRI & psychopharmacology

**Neural Systems in Reading: fMRI in dyslexic readers**
“A neural signature for dyslexia”
Inefficient functioning of neural systems for skilled, fluent reading
Made “visible” previously hidden disability
Similar neural systems in all alphabetic and logographic languages
Brain connectivity differences in dyslexic and typical readers over time

**Pharmacotherapy as Potential Adjunct Treatment in Dyslexia**
Atomoxetine improved reading in children with dyslexia only and ADHD+D.

**Translating Research into Policy and Practice**

**Diagnosis**
Dyslexia puts all the pieces together
No longer just a collection of psychological test scores

**Spoken language**
Delayed speech, lacks verbal fluency, mispronunciations, not glib,
Word retrieval difficulties – needs time to summon verbal response when questioned; struggle to retrieve words, “on tip of my tongue”
Avoids saying words that may mispronounce
Spoken vocabulary < listening vocabulary
**Dyslexic knows what s/he wants to say, but can’t find/retrieve the right sounds to form the spoken word that represents that word.**

**Reading**
Trouble learning letters, letter-sounds, sounding out words
Lacks strategy for reading new words
Avoids reading aloud
Slow reading, lacks fluency

**Other problems**
Poor spelling
Poor handwriting
Problems with attention
Difficulty learning foreign language
Anxiety, problems with self-esteem

**Diagnostic Criteria**

*Clinical Diagnosis*
History
Observation of spoken language and reading
Disparity between reading and intelligence, education or professional status
Assessment of fluency critical

Management of Dyslexia:
Reading interventions
Accommodations

Accommodations
by themselves do not produce success
only act as catalyst that allows success to happen

Extra time – dyslexia robs a person of time; accommodations return it.
Neurobiological evidence for requirement for extra time
Oral exams may not allow demonstration of knowledge and skills, especially if in artificial, anxiety-provoking setting \(\rightarrow\) minimize factors exacerbating anxiety

Practical Consequences
Dyslexic speakers:
word retrieval difficulties, lack of glibness; pauses, um’s; mispronunciations
particularly penalized by oral exams when put on the spot – interacts with anxiety
Dyslexic readers:
require more time to read

Young adults with dyslexia: in college, graduate and professional schools:
access often determined by high stakes tests

Long Term Outcome
High level conceptualizers
New insights – “out of the box thinking”
Specialization – automaticity
High accomplishment
Leaders in science, medicine, law, business, writing/literature, poetry
Disproportionately high number of dyslexics leaders in medicine and science;
Nobel Laureates

References


