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 connetomes
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?

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
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!

---

Knowledge of grapheme-phoneme relations

Number of words read per minute

Days at school
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 2nd 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

- Typical readers: 39%
- Typical readers at risk: 37%
- Impaired at risk readers: 10%
• Before even *starting* to learn to read, a child who will end up as an impaired reader in 2nd 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!

<table>
<thead>
<tr>
<th>Patient Self-Report</th>
<th>Formal Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congruent</td>
<td>Yes: Manageable</td>
</tr>
<tr>
<td></td>
<td>No: Denial</td>
</tr>
<tr>
<td>Incongruent</td>
<td>Need to Explore</td>
</tr>
</tbody>
</table>
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?