LEARNING DISORDERS

A Different Type of Order

Perspectives on Neurodiversity

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“We see them come,
We see them go,
And some are slow.

Some are high,
And some are low.

Not one of them is
like another.

Don’t ask why,
Go ask your mother”

Diversity

Dr. Seuss One Fish two fish red fish blue fish
Meet Miguel

*The Narrative*

7.5 year old boy
Learning difficulties
(poor READING)
“Failed” Grade 1
Enrolled in a private school
Middle class family
Parents both professionals
Family history: Uncle with Learning Disability (?)
Meet Miguel

The Narrative
Inattentive, forgetful
Bad handwriting
Kind, obedient, shy
Good with numbers
Table tennis player
Champion Lego builder
IQ: 115
Diagnosis: Specific Learning Disorder (Reading Disability)
Challenges:
- Auditory processing
- Attention
- Organization
- Graphomotor skills
- Telling time
- Memory
- Orientation
- Word retrieval
- Automaticity
- Spelling
- Attention
- Social skills
- Auditory processing
Lesson in Neurodiversity

The Whole Picture Matters

#like an ICEBERG
Strengths

- Creativity
- Visualization
- Practical skills
- Motivation
- Sensitivity
- Perseverance
- Honesty
- Good with numbers
- Problem solving
- Visual-spatial awareness
Neurodiversity Strengths Checklist

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LEARNING DISABILITIES is a general term that refers to a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning, or mathematical abilities. These disorders are intrinsic to the individual, presumed to be due to central nervous system dysfunction, and may occur across the life span.
LEARNING DISABILITIES

Synonym
Specific Learning Disorders (DSM V)
Learning Difficulties
Learning Differences

Clinical Features
1. Heterogenous: within/across kids
2. Neurobiologic: Brain and Genes
3. Lifelong and not just a dev. LAG
4. Intelligence is NOT the problem
5. Biggest impact: Underachievement and poor academic performance which are UNEXPECTED
6. Compensated: High levels of effort and support
LEARNING DISABILITIES

Exclusionary Criteria

Challenges to Learning PRIMARILY due to:

1. Intellectual disability (Mental Retardation)
2. Sensory-motor disorders (hearing, visual, CP)
3. Emotional disturbances
4. Environmental, cultural, economic disadvantage
Difficulties Associated with Learning Disability

- Social Skills
- Receptive and Expressive Language
- Auditory/Phonological Processing
- Study and Organizational Skills
- Visual Processing
- Visual-Motor Processing
- Metacognitive
- Memory
- Attention
Learning Disabilities

- Reading Disability
- Written Expression Disorder
- Handwriting Disability
- Math Disability
- Nonverbal Learning Disability

- Reading Difficulties
- Writing Difficulties
- Spelling Difficulties
- Motor Difficulties
- Math Difficulties
- Visual-Spatial & Social Difficulties

READING DISABILITY
Most prevalent and well recognized (80% of LD)
Most carefully and extensively studied
READING

Basic skill that a child must master – major vehicle of learning

Process of extracting meaning from print. Involves both visual-perceptual and auditory-linguistic processes

Evolutionarily a new skill, only 5000 years old

*Not a natural process and therefore requires systematic and explicit instruction
Effective early reading instruction must build reading skills in five important areas by providing instruction that is both engaging and motivating.

- Phonics
- Phonemic Awareness
- Fluency
- Vocabulary
- Comprehension strategies

Taught by methods that are...

- Identifying words accurately and fluently
- Constructing meaning once words are identified

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

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

Skilled Reading—fluent coordination of word reading and comprehension processes

Increasingly strategic

Increasingly automatic
To Read . . . A child needs

- Spatial Relationships & spacing
- Eye Tracking
- Form constancy
- Eye-Hand-Foot Coordination
- Visual Perception
- Color
- size
- shape
- Figure ground
- Tactile Perception
- Auditory Perception
- Rhythm Timing
- Sense of time
- Self-control
- to sustain attention

- Organization of Thought Order
- Symbolism-Verbal skills
- Sense of time
- Auditory Perception
- Figure ground
READING PROCESS

Most powerful predictor of speed and accuracy in reading ~ development of phonemic awareness

Most powerful predictor of reading comprehension ~ speed and accuracy of reading single words

* Good reading instruction and practice produce robust reading ability
NEUROBIOLOGY of READING

Three Brain areas involved:
- Left inferior frontal gyrus
- Left parieto-temporal area
- Left occipito-temporal area

Diagram showing brain regions:
- Phonological processing (Kuh-aah-tuh)
- Letter identification (C-a-t)
- Word meaning
Left Inferior Frontal Gyrus: The Phoneme Producer

Helps the reader to vocalize words – silently or out loud
It starts to analyze phonemes e.g. cat has 3 phonemes: /k/ /a/ /t/
This part is most active in the brains of beginning readers
Left Parieto-Temporal Area: The Word Analyzer

Words are pulled apart into their constituent phonemes and syllables
Makes a complete analysis of written words
E.g. cat is a furry animal that meows
Left Occipito-Temporal Area: The Automatic Detector

Automate the process of recognizing words
Skilled readers can breeze through the printed words
with an assembly-line speed thereby able to
focus more on comprehension
Lesson in Neurodiversity

CONTINUUM exists as far as human abilities and talents are concerned

“Talent” in phonological language domain is NORMALLY distributed in the population
“Phonological talent” is normally distributed in the population.

Children can be strong in this talent-like some kids in your class.
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 MIGUEL.
TAKE HOME MESSAGE

There will **ALWAYS** be a “**MIGUEL**” in your class

Challenge: How to be able to **DETECT** and **HELP** that “**MIGUEL**” in your class

**CAVEAT:** You eyes will not see what your mind does not know!
"If life gives you MELONS, you maybe DYSLEXIC"
"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)
Phonologic Deficit Hypothesis

Difficulty developing an awareness that words, both written and spoken, can be broken down into smaller units of sound, and that, in fact, the letters constituting the printed words represent the sound heard in the spoken word.

As a result, the reader experiences difficulty, first in decoding the word and then in identifying it.
Which is the real word?

smoak     smoke

circuscercus

wagon     wagun

first     ferst

traid     trade
The phonologic deficit in dyslexia is domain-specific. The higher-order critical thinking and cognitive-linguistic functions as well as creativity are intact.

The paradox of an otherwise intelligent people who experience great difficulty in reading!
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.
Non-impaired: IQ-Reading Linked

Dyslexia: IQ-Reading Diverge

Based on Ferrer et al., 2010
READING DISABILITY
DYSLEXIA

Epidemiology

Prevalence rate
~ 5-10%

Almost equal: male:female ratio  ~ 3:2

No racial nor ethnic predilection

No socio-economic group predilection
READING DISABILITIES: *Co-morbidities*

DYSLEXIA

Dyspraxia / Dysgraphia

Tic Disorder

Specific Language Impairment (SLI)

Dyscalculia

Attention Deficit Hyperactivity Disorder (ADHD)

* marker of the disorder
READING DISABILITY

NEUROBIOLOGY of DYSLEXIA
Brain and Dyslexia

KINDERGARTEN
BEFORE INTERVENTION

FIRST GRADE
AFTER INTERVENTION

Simos et al, 2005
Neural Signature for Dyslexia: Inefficient Posterior Reading Systems

© Sally Shaywitz, M.D., Overcoming Dyslexia
NEURAL MIGRATION GONE AWRY IN DEVELOPMENTAL DYSLEXIA

http://www.thebrain.mcgill.ca/flash/a/a_09/a_09_cl/a_09_cl_dev/a_09_cl_dev.htm
Brain with Dyslexia: Ectopic Neurons

Ramus, 2004
READING DISABILITY

Neurodevelopmental Assessment

1. Establish a reading problem according to age and grade/educational level

Look for “at risk” pre-school kids
Child’s reading level below grade/age level competency

Tip: Developmental stages of reading gives a rough guide

More sophisticated reading achievement tests are available
READING DISABILITY

Neurodevelopmental Assessment

2. Gather evidence supporting its “UNEXPECTEDEDNESS”

Child must have normal or even above average intelligence

Look at Psychometric tests (if available)

Tip: Look at areas of strengths
e.g. thinking skills
reasoning skills
mathematical ability
3. Demonstrate evidence of isolated phonologic weakness

   a. Letter identification (naming letters of alphabet)
   b. Letter sound association (identifying words that begin with the same letter in the list) e.g. dog (doll, ball, goat)
   c. Phonologic awareness (identifying the word that would remain if a particular sound was taken away) e.g. if the /k/ sound was taken away from cat
   d. Rapid naming/word retrieval
READING DISABILITY
Neurodevelopmental Assessment

4. Satisfy the exclusion criteria

a. The child must have no major neurologic abnormalities
e.g. cerebral palsy
b. The major sensory function must be intact
   e.g. no visual/hearing impairment
c. The child must have no major psychiatric problem
d. The child must be in a social and educational environment conducive to learning to read
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Impairment versus Competence

Our strengths or weaknesses may be manifested at different life stages and contexts. Human competence is defined by the values of the culture to which you belong.

TIMELY Intervention as well as Opportunities provided (accommodations, compensations and modifications) will be the game changers.

“If you don’t expect things from people they will never disappoint you.”
A Social Model of Dyslexia

We challenge the deficit models of dyslexia in favour of a social model that maintains that we are not ‘disabled’ by our dyslexia, but by the expectations of the world we live in. There is nothing ‘wrong’ with being dyslexic per se.

We would argue that dyslexia is an experience that arises out of natural human diversity on the one hand and a world on the other where the early learning of literacy, good personal organisation and working memory are mistakenly used as a marker of ‘intelligence’. The problem here is seeing difference incorrectly as ‘deficit’.

ROSS COOPER, 2006
Neurodiversity
Neurodiversity: *Paradigm Shift*

- **Disability Model**
  - Message: You are disabled.
  - Goal: Fix the problem.

- **Neurodiversity Model**
  - Message: You are unique.
  - Goal: Observe, Learn, Optimize
What is Needed for Meaningful Learning?

• Feeling valued
• High interest active learning
• The big picture before the detail
• Visual and verbal concepts
• Multisensory learning environments to enable meaningful experiences
• Meaningful feedback about what you are doing well and how to do it better.

Ross Cooper, 2006
NEURODIVERSITY
Dyslexic People are Successful

• Problem solving and entrepreneurial skills make dyslexic people very good business men

• Ted Turner, Steve Jobs, Bill Gates and Richard Branson are dyslexic
Dyslexic People are Successful

• A different way of thinking can bring wonderful creative and artistic abilities

• Keira Knightly, Picasso, John Lennon and Tom Cruise are dyslexic
Dyslexic People are Successful

• Imagination and curiosity have helped many dyslexic people become inventors and scientists

• Henry Ford, Einstein and Thomas Edison were dyslexic
What's the next step?
The Essential Elements for Success

Scientific research on Reading disability and Reading remediation

Provides Evidence-based Risk assessment and Early intervention programs that are most effective in correcting the deficits

Provides information on how to assemble and integrate all the components that are effective in improving reading and learning skills
“Everybody is a genius. But if you judge a fish by its ability to climb a tree, it will live its whole life believing that it is stupid”  

Albert Einstein

Strength lies in differences, not in similarities.  

Stephen R. Covey

THANK YOU