What about the brain is important for us to understand as educators who are trying to help children with learning differences?
Your Brain has . . .

• At least 100 billion nerve cells (neurons) in your brain.
• Neurons which make between 5,000 and 50,000 contacts with other neurons.
• One million billion (one quadrillion) connections between neurons in the cortex.

NEUROTRANSMITTERS -
Play a vital role in key bodily function . . .

**Acetylcholine** - widespread in the brain - involved in muscle action, learning & memory

**Dopamine** - plays major role in regulation of movements & emotions

**Norepinephrine** - involved in reward, mood regulation, arousal, activation fight/flight behavior

**Serotonin** - regulates body temperature, pain perception, onset of sleep

**Endorphins** (opioids) - minimize pain, produce feelings of pleasure
When we consider medical research and what it has to offer about dyslexia we can look to three areas:

Anatomy
Genetics
Brain Imaging

“While no two brains are alike, the brains of people with dyslexia are distinctly different compared to those without dyslexia.”

Dr. Gordon Sherman
ECTOPIAS

Dr. Gordon Sherman

What Is A Learning Difference?
Learning Differences

A learning different child shall be defined as a child with:

- average or above average intelligence
- adequate vision and hearing
- without primary emotional disturbance
- who has failed or is at high risk to fail when exposed to school experiences using conventional educational techniques

8 Major Causes for Problems in School

- Sensory Deprivation
- Cultural Deprivation or Differences
- Educational Deficiency
- Low Mental Ability
- Mental Retardation
- Frank Brain Damage
- Primary Emotional Problems
- Perceptual Dysfunctions
- Giftedness
The Learning Process

- An Experience is encountered
- If Received through one or more of the senses-sensory impression formed
- If Attention is given to sense impression- perception is formed
- If Language is attached to the perception- concept is formed
- If Stored in Memory- higher order functions can occur
Processing with Dysfunctions

Sensory Integration
The normal neurological process of taking in information from one’s body and environment through the senses, of organizing and unifying this information, and of using it to plan and execute adaptive responses to different challenges in order to learn and function smoothly in daily life.

For more information on sensori-motor integration
The Out of Sync Child
by Carol Stock Kranowitz
Language learning differences are the result of auditory and visual processing dysfunctions, these are types of perceptual errors.
Types of Perceptual Errors - Visual

• Visual Discrimination
  • Examples:
    • db pq mw nu

• Visual Memory
  • Example: Copying from rug, for lesson layout

• Visual Motor
  • Examples:
    • Dictation
    • Written Expression

Types of Perceptual Errors - Auditory

• Auditory Discrimination
  • Examples: Errors in perceiving words auditorially
    • wisp/whisk
    • smug/snug
    • deaf/death
    • "blurry sound"

• Auditory Memory
  • Examples:
    • Following directions
    • Understanding through connections during lessons
What do we look at specifically in young children to see that they may be at risk of having a learning difference?

Early Observations

- **Coordination**- fine and gross motor development
- **Language**- oral, receptive and expressive, and written
- **Attention**- activation, attention, effort, emotion, memory, action
- **Perception**- visual and auditory, spatial, time, social, emotional
The sensorial materials can provide diagnostic insight into perceptual development in the areas of vision, audition, kinesthesia, tactation, olfactory and gustatory Sensitivities or differences even, all at a very young age

The Mathematical Mind
Design of Sensorial Materials

- Distinguishing what is accidental from what is essential
- Least noticeable human difference
- Diagnostic
- Relationships between different materials

Knobbed Cylinders, and Many Others

- Eye hand coordination
- Fine motor and gross motor
- Grasp
- Graded movement
- Tactile exploration
- Visual perception
- Attention
- Problem solving
- Bilateral coordination
- Midline crossing
- Posture
- Language
- Predicting
Sound Cylinders

- Auditory Discrimination
- Memory
- Attention
- Fine motor skills
- Proprioception
- Language
- Speech

- Graded movement
- Using both hands
- Order
- Organization
- Independence
- Concentration

4 levels a child moves through to get from sensations to ideas

- Exploration
- Imitation
- Initiation
- Pattern completion

5 Material Strategies for the seriated materials

Classic presentation
Variations
Extensions
Coding
Non standard measurement
Levels of Perception

• Which one is missing? Where is the pattern broken?
  From well developed to less developed
1. Sees easily
2. Must see missing piece
3. Must handle missing piece
   a. Places correctly first time
   b. Makes small errors
   c. Makes gross errors
Some Language of Sensorial That Relates to Math

- Smaller, smallest, larger, largest
- Before, after, between
- More, less
- Many, few
- Columns, rows
- Take some away, add more
- Greater than less than
- Skip one, every other one, skip several
- Further away, closer to
- Up, down
- Missing
- In order, out of order
Levels of Counting

- Move to count
- Touch to count
- Count with eyes
- Recognizing quantities by patterns or groupings

- Importance of learning to count on one’s fingers

Conservation

- The principle that mass, number, and volume do not vary despite transformations in their form or embodiment in developmental psychology, the recognition or understanding of this phenomena. The ability to keep in mind what stays the same and what changes in an object after it has changed aesthetically. One who can conserve is able to reverse the transformation mentally and understand compensation.
- Mass- 7-8 years of age
- Weight- 9-10 years of age
- Volume- 11-12 years of age
“Conservation” in the Environment

Volume
- pouring
- sponge squeezing
- table washing
- spooning
Mass
- clay
- folding cloth, paper

Length
- sewing
- weaving
- braiding
- tying
- pipe cleaners

Readiness for Numeration
Suggested by Constance Camii

• Open ended sorting
• Matching “groupings” to five
• Rote counting to 5
• Sharing equally with up to 4 people, 12 items
Cylinder Games
Developed by Bea Pape

• Matching Game
• Matrix Matching
• Attribute Problem Solving Cards
  • sets created by inclusion
  • sets created by negation

subsets, subsets of subsets
Math

- Counting
- Sand paper numerals- memory board large, small
- Red and blue rods
- Spindle boxes-tapping hand
- Cards and Counters-language and intonation
- Colored Bead Stair- larger, wire for movement?
- Teen boards (see following)
Math

- Decimal demonstration tray - count
- Scrolling - importance of
- Number lines (major weakness underlying development) Diagnostic
- 45 layout - talking work
- Number building - conservation, remember
- Addition large numerals - matrix, or stripped down, time, are underlying skills in place?
- Addition simple – what equals means-over time, 1+ [] = 5

Some research shows that there are important areas to look toward and focus on when a child is struggling in math:

- linear counting
- spatial awareness and understanding
- flexibility in thinking
- attention
- language
- motor skill development

‘readiness’/ neurological development (JoAnn Deak neurologist /experiences and “neurosculptor”)

Weaknesses will often be found in these areas that are causing the child to struggle
Teaching transitions from one material to another

Oral Language Development
Casey Barnett, M.Ed.
Shelton School
Oral Language or Spoken Language

• **Receptive Language**: Listening, Then Processing, Then Understanding

• **Expressive Language**: Speaking

**Expressive Language**

**Form**
- Phonology
- Morphology
- Syntax

**Function**
- Semantics

**Content**
- Pragmatics
• Articulation- disorder or delay

• Voice

• Fluency

• If oral language development is developing in an average or above average way then the skills of written language can begin to develop. Oral language is the foundation upon which written language is built.
Drawing a Story

- Expressive and receptive language
- Memory
- Vocabulary
- Visualization
- Attention
- Sequencing
- Main Idea
- Story Components

Reading Comprehension
Attentional Difficulties Alone May Cause Children to Misperceive:

- Some or all of the sounds in words
- The correct order of the sounds
- The order in which the words come
- The loudness of their own voice
- That someone is speaking to them
- Body language in conversational and play situations
- Visual and auditory patterns in words
- Rhyme
- Rythm

In the Classroom, For the Children

- Allow and encourage children to talk to each other
- Take time to visit with the children and consider it important
- Attune ourselves to their oral language development, receptive and expressive
- Attach more language to the activities and materials once other perceptions are absorbed
- Model language skills in a direct way
- Make oral language a curriculum area
• Call the parents attention to the idea that oral language development may not be developing as expected, recommending a speech and language evaluation if warranted

• Be aware that behavioral difficulties may be rooted in poor language skills, direct teach social skills and how to recognize, understand, label, express, and regulate feelings

• Plan activities in which listening and following directions are a focus

• Make sure that hand movements are simultaneously paired with language during lessons

• Directly teach vocabulary

• Base new language taught with an awareness of child’s present level of language development, explaining things at the child’s level of receptive language, bridging from already acquired language to new

• Become more aware of the speed at which a child seems to process information so that new information, be it auditory, visual or kinesthetic, can be delivered to match that speed during lessons
• Monitor child’s attention carefully and become responsible for maintaining it if necessary

Attune yourself to language development
Add much oral language

• Area of curriculum
• Practical life-label, attribute, category, function
• Assess—what is this? What do you think we will do with it?
• Accept child’s language, use it as reference point
• Categories of focus
• “unpack” books
• Talk to kids, listen too (observation)
• Repetition

• Know levels of development
• Provide vestibular stimulation
• Recommend testing
Word Blending- Oral, Auditory

• Ta-ble
• Fi-re-cra-cker
• Thun-der
• Wa-shing
Sound Finding

Finding Beginning Sound
Last and Medial Sound

• Elkonin Charts
Hand Strengthening

Hinged pitchers
Bee’s wax
Clay/ putty of different hardnesses
Paper crumpling
Paper tearing
Cutting
Pushpinning
Elastic bands

Snippets
2 stroke snippets
2 stroke on lines
3 stroke on lines
Diagonal lines, various strokes
Changing directions, straight
Changing, continuous curves
Various other patterns
Word Families

at
ap
an
ab
ag
am...
Helping These Children Learn More Easily

• Observe more, and more carefully
• Reduce tasks to smaller segments
• Design segments based upon observation of motor, perceptual, and attentional development
• Teach patterns
• Teach transitions, better relate new information to previous learning
• Call special attention to attributes, and encourage multi-sensory exploration

Helping Learning Different Children Learn More Easily

Emphasize Oral Language
make sure that hand movements match words
label, categorize, tell function and attributes
use short repeated phrases
use rhythm and intonation
ask more and better questions
have them verbalize as part of certain lessons

• Teach Organization
  use matrices
teach sequencing – time, space and language of
• Monitor attention and take as much responsibility for it as is needed
• Balance direct teaching with discovery learning based upon observation of individuals
• Don’t assume they can or can’t discover, once determined, don’t wait
• Direct teach good choices socially and academically as needed
• Direct teach cause and effect and consequences of actions as needed

J. McVicker Hunt has written that Montessori has come the closest to solving the problem of “match” in education. (Hunt 1968). He explains the “match” concept as placing the level of presentation to the child at the child’s developmental and skill level for optimal learning and success. This problem of “match” is critical to teaching the at risk child.
What do the Montessori philosophy and curriculum give us that helps the at-risk or learning different student?

• **Individualization and personalization** of instruction through the child’s interaction with the didactic materials proceeding at his own rate for mastery
✓ Specific procedures / techniques for training attention

✓ A classroom structure, clear in limits and privileges, which assists the child with faulty inhibition control to develop those skills

✓ An emphasis on work organization which gives a child a model for learning how to set up and go about work tasks, the result of which can be a lifelong habit of investigation

Manipulative materials which provide the child with multisensory perceptions which help concretize abstract concepts
Specific techniques for increasing gross motor skill development, eye-hand coordination and fine motor skill facility

A concentration on the specific labels for people, objects, and ideas and their attributes and functions that foster oral language development

An environment based upon the concept of community which fosters social and emotional development, and this community, and other things about the structure, foster oral language development as well, which forms, in part, the foundation for social and emotional development

Presentations of academics in small sequential steps with scientifically researched materials to further skill development in language, math, geography, history, physical and biological sciences, art and music
The integration of subject/curriculum areas that encourages “big picture” thinking, “connected” learning, that highlights the connectedness of ideas and facts, that is more a reflection of real life. It heightens interest as well.

✓ An environment of encouragement to try, a de-emphasis of failure, which encourages the child’s desire for independence, an emphasis on respecting the teacher and classmates that fosters consideration for others.