

UNDERSTANDING THE OVERLAP: Differentiation, Assessment and Intervention in Children with Learning Challenges

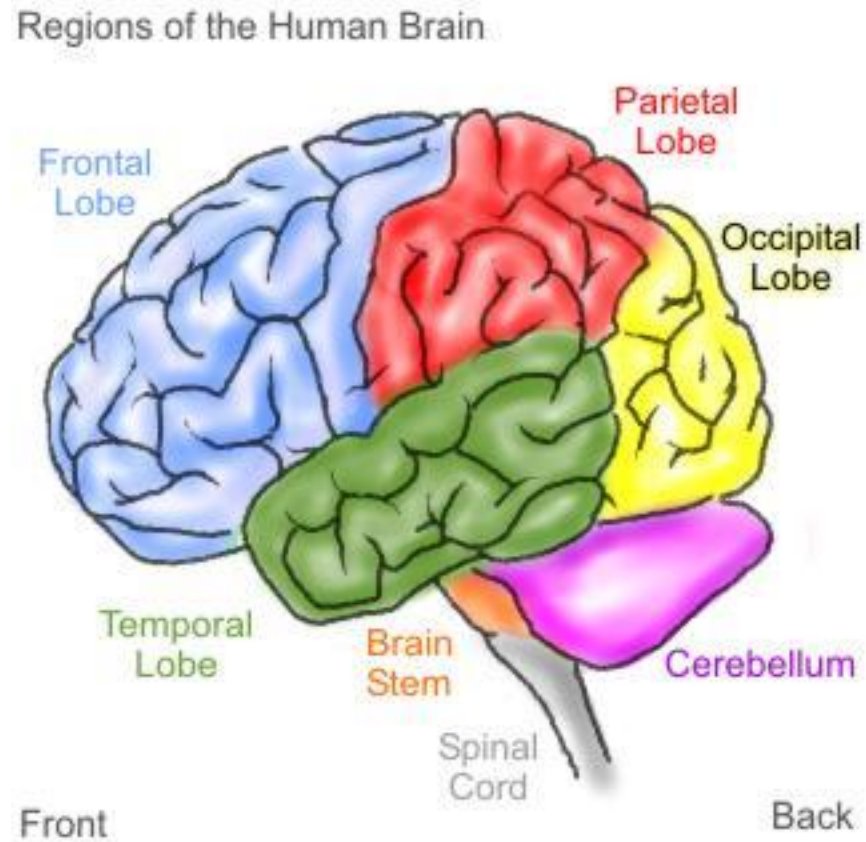
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Questions to consider:

- ▶ What are the challenges that children in your classroom have that are likely to effect their learning/performance.
- ▶ Is there a difference between a *Learning Disability* and a *Learning Difference*?
- ▶ Is a *language* disability and *learning* disability the same?
- ▶ Are learning disabilities *static*?
- ▶ How early can you identify a learning disability?
- ▶ Are learning disabilities always present (from birth) or can they “develop” later, in adolescence?

Yesterday's brain imaging: how it shaped our thinking

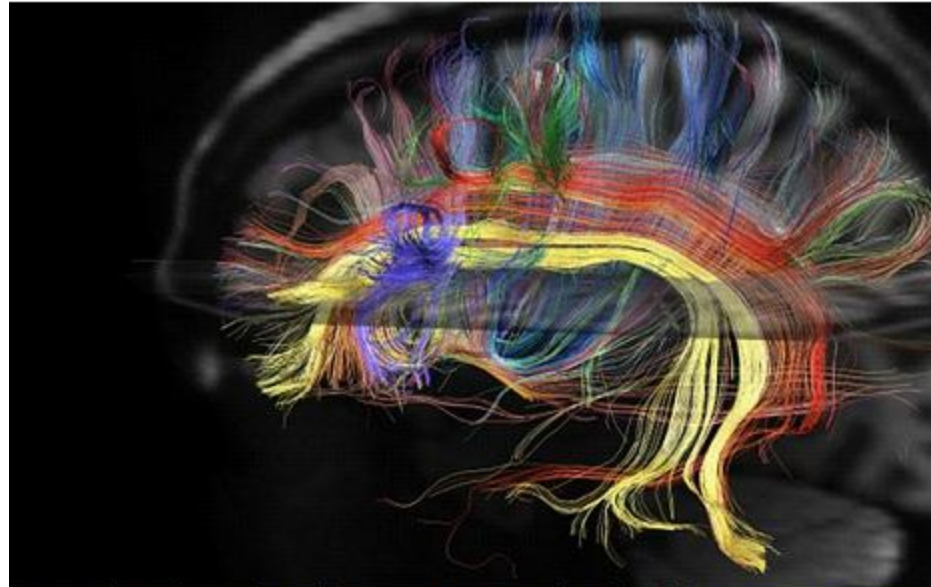


Today's brain Imaging: how it shapes our thinking

Image of the Day: Brain Wiring

Neural pathways form a mesh, with yellow representing language and connecting the frontal lobe on the left to the temporal lobe on the right, and the purple curlicue representing Broca's area, which coordinates speech.

By *The Scientist Staff* | February 20, 2013



Courtesy of VJ Weeden and LL Wald, Martins Center, Harvard Medical School, [Human Connectome Project](#)

A highly connected system



The problem with labels and diagnosing is that learning deficits are not usually singular but involve many skill sets.

Critical to treatment is dissociating these compromised skill processes.

Diagnoses and Labels

- ▶ Many diagnoses overlap and coexist
- ▶ The tests administered and the training of the evaluator can often determine the “diagnosis.”

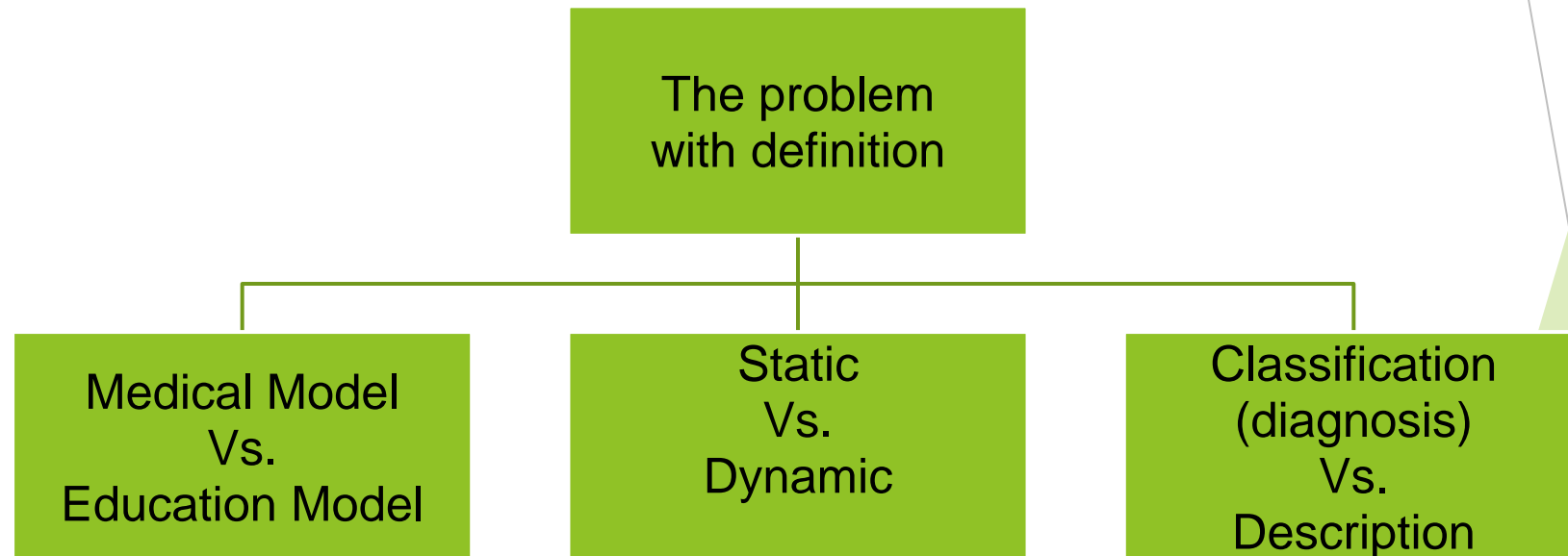
The same child could be diagnosed with:

- Asperger's by a psychiatrist
- Sensory Integration Deficit by an OT
- Social Communication Disorder or Auditory Processing Disorder by an SLP
- Nonverbal Learning Disorder by a Neuropsychologist

What is a Learning Disability?

- ▶ What we call it or how we define it determines how we deal with the child
- ▶ LD's are *dynamic* not *static*, just as learning is dynamic. (The effect of the environment and neurobiology changes the wiring.)
- ▶ Initial diagnosis is often by teachers, parents or the child. Experts help to define the strengths and weaknesses.

Defining Learning Disabilities



LABELS ARE SINGULAR AND STATIC. LEARNING DIFFERENCES ARE FLUID AND MULTIFACETED.

- ▶ Behavioral characteristics are often “shared” by different developmental disorders
- ▶ Auditory Processing Disorders vs. ESL
- ▶ Autism vs. Auditory Processing vs. Anxiety Disorder vs. OCD, ADHD vs. EFD
- ▶ Attention Deficits vs. Language Deficits vs. Memory Deficits

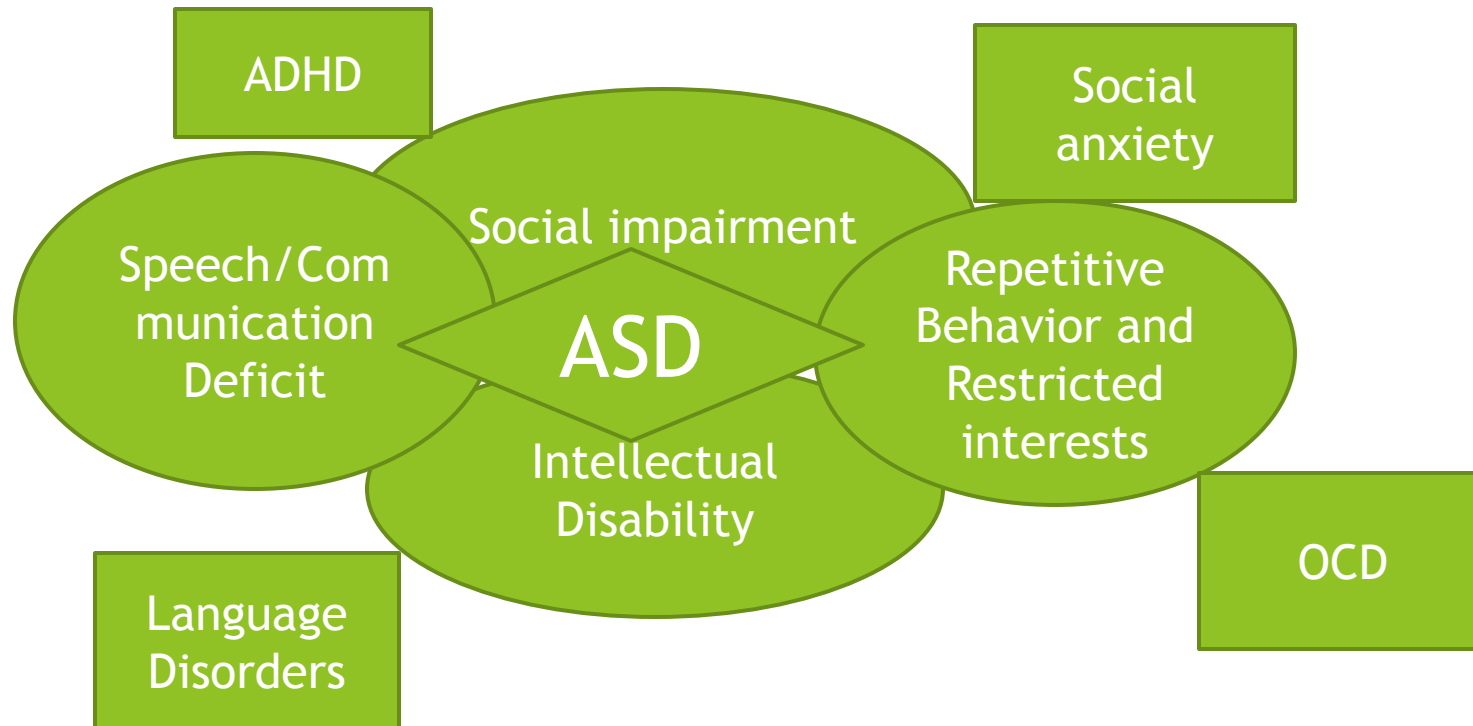
Causal vs. Coexisting

- ▶ Attention and Processing
- ▶ Attention and Memory
- ▶ Attention and Executive Function Deficit
- ▶ Processing and Reading Comprehension
- ▶ Processing and Memory
- ▶ Language and Reading
- ▶ Expressive Language and Written Language

And what about anxiety?? etc. etc. etc.

Conceptual Framework for ASD

- ▶ Treatment and prognosis varies



Differences start early

Males	Females
2x as many conceptions as births	25 % lower mortality rate
99% of speech comprehensible by 4yrs	99% of speech comprehensible by 3yrs
Play rough, competitive and aggressive	Play quieter more cooperative
Slower to acquire reading and writing skills	Reads better and sooner
More likely to ignore voices, even parents	Hears equally well with either ear

What is Language?

- ▶ Language is the basis for learning
- ▶ Reading and writing are forms of language, as is ASL (sign)
- ▶ Language components include: **phonology = speech sounds**, grammar, syntax, vocabulary, pragmatics

How critical is early language experience for learning?

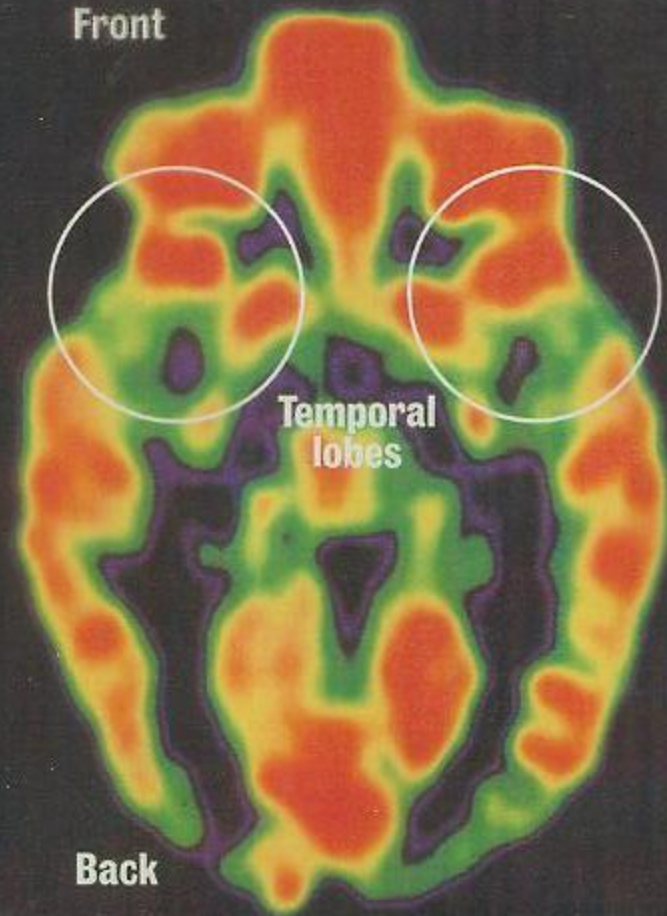
- ▶ The most important difference among families was in the *amount of talking*

Average welfare child had half as much language experience per hour, and less than one third of the language experience than the professional family.

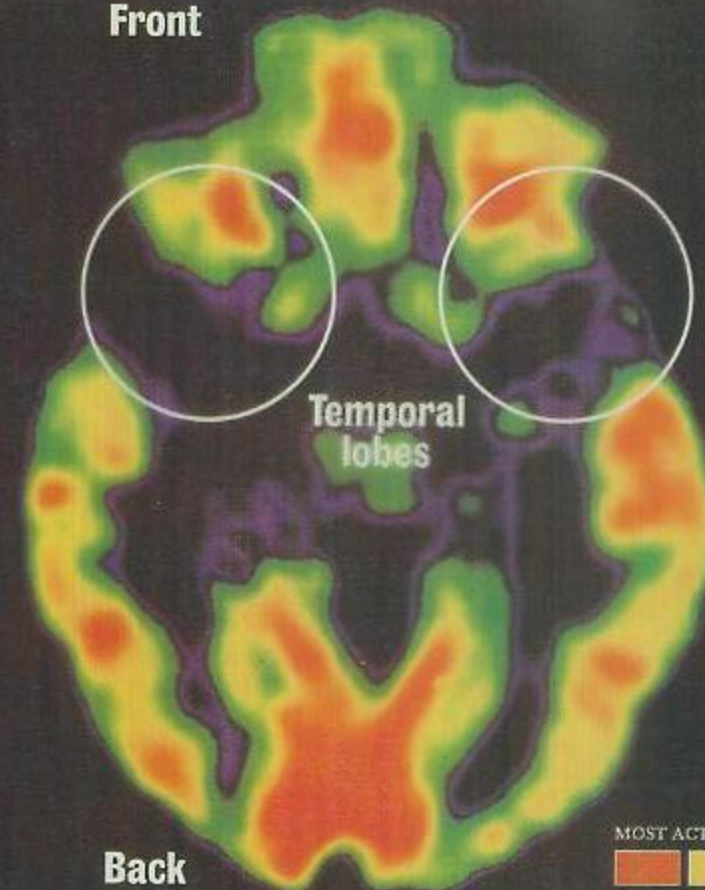
By age of 4 the average welfare family child has 13 million fewer word experience than professional family child

Healthy Brain

This PET scan of the brain of a normal child shows regions of high (red) and low (blue and black) activity. At birth, only primitive structures such as the brain stem (center) are fully functional; in regions like the temporal lobes (top), early childhood experiences wire the circuits.



Front



An Abused Brain

This PET scan of the brain of a Romanian orphan, who was institutionalized shortly after birth, shows the effect of extreme deprivation in infancy. The temporal lobes (top), which regulate emotions and receive input from the senses, are nearly quiescent. Such children suffer emotional and cognitive problems.



WIRED TO TALK

- ▶ Born with the innate capacity to acquire language
- ▶ Neurological differences between males and females by as early as 28 weeks gestational age
- ▶ Language universals are independent of culture
- ▶ Critically sensitive periods for different aspects of language
- ▶ Language plasticity and neurological growth

As we get more sophisticated in our ability to study the brain we are refining past generalizations

1. "Critical period".

now know that different aspects of language have different critical periods

2. "gender difference"

Statistically boys develop language slower than girls
different skills develop at different rates

Neuroplasticity and Critically Sensitive Periods in neurodevelopment

- ❑ Some systems are determined very early:
 - ❑ **Phonology:** tight early critical period for some aspects of language like accent (first 12 months of life)
- ❑ Some systems are highly modifiable and dependent on early experience:
 - ❑ **Grammar:** By 3 years plasticity is already diminished, and fixed by 4 -6 yrs.
- ❑ Some systems retain the ability to change for life:
 - ❑ **Semantic** (vocabulary or word knowledge):

Language components

- ▶ Phonology
 - ▶ Orthography
 - ▶ Morphology

 - ▶ Syntax
 - ▶ Semantics

 - ▶ Pragmatics
 - ▶ Discourse structure
- ▶ Speech sounds
 - ▶ Spelling patterns
 - ▶ Morphemes meaningful units
 - ▶ Sentence structure
 - ▶ Word and sentence meaning
 - ▶ Word choice; usage
 - ▶ Organization of connected language

Classroom signs of a Language Disability:

- ▶ Limited vocabulary and difficulty with word retrieval
- ▶ Difficulty understanding humor, jokes and making inferences
- ▶ Difficulty following directions
- ▶ Difficulty organizing spoken (or written) language
- ▶ Difficulty retelling an orally read story
- ▶ Difficulty with social conversational rules/conventions (turn taking, topic maintenance etc.)

(Will this differ for ESL students???????????)

Classroom symptoms of Auditory Processing Deficits

- ▶ Difficulty paying attention to and remembering information presented orally
- ▶ Difficulty following multi-step directions
- ▶ Poor listening skills
- ▶ Poor eye contact and pragmatic language skills (especially in preschool children)
- ▶ Slow processing speed
- ▶ Compromised academic performance (can be in reading, spelling, writing and math)
- ▶ Difficulty with learning vocabulary and syntax
- ▶ Frequent need to reread to aid comprehension
- ▶ Increased anxiety

(ARE THESE CHARACTERISTICS ALSO SEEN IN ESL and ASD?)

Central Auditory Processing Disorders (CAPD)

- ▶ Definition: Auditory Processing refers to the brain's ability to interpret and use information it hears. This is a complicated process that involves more than just "listening." CAPD is a deficit in processing the information in audible signals (sounds), that is not due to a hearing acuity deficit.
- ▶ CAPD results from one or more deficits in the ability to **analyze, synthesize, organize, store, retrieve, and use** information presented auditorily.

CASE STUDY: Simon 30mo.

HISTORY: Presents with delayed speech and language . Normal birth . Walked around 1 yr.; first words around 11mo. (*no, Mom, Dad*), but language did not progress.

BEHAVIORAL OBSERVATIONS: Self-directed, but does allow *intrusion* into his “play space”. Engaged with specific toys for longer periods of time, though typically on his own terms. Learns quickly, relying on visual demonstration, rather than verbal cues. Would tantrum when didn’t understand what was expected or didn’t get his way . Poorly regulated from a sensory standpoint, either *over focused* or at other times *under focused*. Inattentive to the speaker/listener; does not make eye contact or respond on a consistent basis to his name or any auditory cue. When he does make eye contact it is purposeful and engaging. In younger interactive games such as “peek-a-boo” and “tickle” games, notably more reciprocal, laughing and engaging appropriately with improved eye contact. Labeled the words *ball, key, shoe, baby, blocks*, and appropriately said *bye* . Better developed expressive abilities than receptive; not yet responding to his name or even inflected command such as “no”. Did not follow simple directions such as, “Give the ball to mommy”, without demonstration. Did not differentiate pronouns such as *me* or *you*. Can recognize many common body parts, and identify several colors.

Case Study: Robert

- ▶ 2/1999 4.9 yrs. Happy; difficulty with transitions; driven by own interests; overarching attention deficits; poor regulation of voice volume and prosody; hand flapping; poor sensory regulation (craves sensory stimulation); perseverative; uses language for needs but not for social pleasure; responds to factual yes/ no questions; struggles with casual and lengthier language; understands nouns and verbs but labels with over inflected “sing song” prosody.
- ▶ 4/2000 5.6 yrs. Happy; self directed ;over-focused; more responsive to language and speaker than seen in the past; responds to name, but not always with eye contact; appears to stop and listen to language; poorly regulated voice volume and prosody; uses sentences; disengages; self stims (oral or scripted talk); tolerating more imposed structure.

Now on Adderall for attention

Case Study: Robert 6.6yrs

- ▶ 4/2001 6.6 yrs. Continues to progress in overall level of compliance and tolerance for structure activities; structured work tasks are anxiety producing; happy; self directed; over-focused; poorly regulated sensory system; overarching attention deficit; improved conversational reciprocity when attending and engaged; does better with routines; play is restricted and repetitive; self stimulating behaviors are decreasing (especially when unstructured); poorly modulated voice volume and prosody; whispered speech; scripted, freely associative language.

Significant qualitative improvement in Robert's ability to participate in highly structured activities.

CASE STUDY: Simon 5.7 yrs.

- ▶ **BEHAVIORAL OBSERVATIONS:** Presented as a happy, enthusiastic boy with a delightful sense of humor. Struggles with organization of expressive output, word selection and sentential ordering. Sociolinguistic and pragmatic skills are now appropriately developing ; communicative intent is clear. In structured testing, needs to work hard at processing and attending. He is perfectionistic, anxious and very concerned about his performance, and as a result can be hesitant if uncertain or sensing failure.
- ▶ *Examples include of spontaneous language: when trying to describe an ironing board : “that’s a cooler, it can warm your clothes”;*
when talking about a waterfall, “’cause it’s too down and I would get scared”.

Robert vs. Simon

- ▶ How would you describe their challenges?
- ▶ What label/diagnosis do you suspect?
- ▶ What treatments would you recommend?
- ▶ What are your long term expectations?

Intervention and Treatment Strategies

- ▶ Language therapy targeting: language processing, reciprocity, pragmatic/ sociolinguistic skills, pretend and representational play
- ▶ Medical management for anxiety, attention regulation
- ▶ Sensory integration therapy
- ▶ Behavioral therapy: ABA (Applied Behavioral Analysis), Discreet Trials etc.

Neurodevelopment in Elementary Years

- ▶ Brain is becoming highly efficient at skilled *practiced tasks* that changes the primary “integration” cortex in the parietal lobe.
- ▶ Reading and writing are “overlaid” functions that use the hard wired linguistic/phonological machinery
- ▶ Motor improvement in **distal muscles**
- ▶ Improved **attention**

Neurodevelopment in secondary years

- ▶ With basic skill efficiency neocortex is “available” for higher level conceptualization.
- ▶ Hormonal changes signaled neurologically are resulting in change physically and brain changes to the frontal lobes.
- ▶ Improved metacognition including planning and attention.

(Metacognition is a form of higher order thought processes, i.e. the act of knowing and regulating one’s thinking. Metacognitive development and executive functioning continues into 2nd to 3rd decade.)

(Should expectations for “sustaining attention” change over time? How do you decide what is “normal”?)

Classroom “signs” of a reading disability:

- ▶ Trouble with alphabetic learning; connecting sound to print; rhyming
- ▶ Difficulty remembering the letter names or “hearing” the sounds
- ▶ Difficulty with sound sequencing or sequencing in general (days of the week, months of the year etc.)
- ▶ Difficulty with any ideographic learning, such as number names; confuses math symbols
- ▶ Difficulty with spelling
- ▶ Difficulty with word retrieval
- ▶ Difficulty understanding what they read

What are the risk factors?

- ▶ Language processing difficulty
- ▶ Reading failure
- ▶ Written expression
- ▶ Environmental risks
- ▶ Attention
- ▶ Immature Executive Functions
- ▶ What other risk factors may effect learning in middle and high school students?

Language Processing Disorder (CAPD)

- **Definition:** Language Processing refers to the brain's ability to interpret and use information it hears.
- This is a complicated process that involves more than just “listening.” It involves higher order language learning, including **attention, memory, synthesizing** and **word knowledge**.
- It is a deficit in processing the information in audible signals (sounds), that is not due to a hearing acuity deficit.
- Language processing difficulty can result from one or more deficits in the ability to **analyze, synthesize, organize, store, retrieve, attend to** and use information presented auditorily.

Components of CAPD

- ▶ **Auditory Attention Problems:** This is the ability to maintain focus for listening long enough to complete a task especially as information becomes more linguistically or contextually complex, such as attending to a lecture.
This can be difficult to dissociate from ADD/ADHD and both CAN co-occur!

Characteristics of a Language Processing Disorder

- ▶ May appear to be inattentive.
- ▶ Will have difficulty following multistep directions.
- ▶ Will often remember or follow the part of the direction given first or last.
- ▶ Will frequently request repetition of directions.
- ▶ Will frequently need to reread.

Assessing Language Processing

Process

- ▶ Word knowledge- Receptive (recognition) and expressive (recall)
- ▶ Auditory Memory- rote and meaningful
- ▶ Language/ syntactic integration
- ▶ Attention

Assessment tool/test

- ▶ PPVT-4, WJ-3 Picture Vocabulary subtest
- ▶ TAPS-3, WRAML 2
- ▶ Token Test for Children (especially Parts 3,4 and 5), CELF-5 Concepts and Directions, WJ-3 Oral Comprehension subtest
- ▶ Observation and questionnaires (BASC-2, BRIEF)

TO DO LIST FOR LANGUAGE/AUDITORY PROCESSING DISORDER

Preschool and early elementary:

1. Simplify language and present information slowly.
2. Pair auditory information with gesture, pictures, objects or other visual information
3. Encourage eye contact and language reciprocity.
4. Teach “wh” questions (“what, who, where” and the “why, how come, when”).
5. Improve semantic knowledge by teaching word attributes and synonyms.
6. Develop categorizing skills, including likenesses and differences .
7. Develop story telling and story sequencing skills.
8. Directly teach math vocabulary including temporal- spatial concepts.
9. Restate more complex information and repeat shorter, but memory dependent directions.
10. Tell child to “turn their ears on” when it is important to listen.
11. Minimize background noise.
12. Encourage listening activities.
13. Use barrier games and other board games that encourage language reciprocity.
14. Emphasize the “syntactic glue” that strings high content words together.
15. Computer programs like Earobics (level1 and 2)

STRATEGIES: For CAPD/Language Processing Disorders

S.P.E.E.C.H

S = State the topic to be discussed

P = Pace your conversation with pauses for comprehension

E = Enunciate clearly

E = Enthusiastically communicate using gestures and appropriate body language

CH = Check comprehension before changing topics

Expressive Language Disorders

- ▶ *Expressive language disorders can have many different behavioral manifestations because expressive language has many different components.*

1. speech articulation (can effect spelling and phonics)

2. vocabulary knowledge and retrieval (can effect reading and listening comprehension)

3. language sequencing, usage and knowledge of grammar (can effect written language)

4. organization of thought

5. sociolinguistic and pragmatic skills (can effect peer/ social interactions)

6. visual motor coordination deficits (writing)

7. Speech **Apraxia** (motor planning deficit)

Reading

- ▶ Reading relies on brain circuits that are already wired for language, i.e., reading is an “overlaid function”
- ▶ fMRI shows 2 pathways for mapping reading:
 - 1 for beginning readers (Broca’s, parietal-temporal)
 - 1 for skilled readers (occipital- temporal)

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Neurological risk factors

- ▶ 40% of children with delayed speech and language onset are at risk for reading failure or associated learning disabilities
- ▶ 40- 50% genetic predisposition for dyslexia
- ▶ 30% of high school graduates in the USA are NOT reading at a proficient level

At-Risk behavioral manifestations for early diagnosis of reading disability (Dyslexia)

- ▶ Deficits in phonological awareness
- ▶ Deficits in phonological sequencing (transpositions)
- ▶ Deficits in immediate or short term auditory memory
- ▶ Deficits in word or phoneme retrieval
- ▶ Genetic history
- ▶ Delay onset of speech and language

Assessment tools for reading

Comprehension

- ▶ Word list reading
- ▶ Reading vocabulary
- ▶ Paragraph reading
- ▶ Story retelling (oral/ listening comprehension)

Assessment tools

- ▶ Word identification- WJ 4, KTEA-3, WIAT-3
- ▶ Word knowledge- PPVT-4, WJ-3 Reading Vocabulary subtest
- ▶ WJ-4, KTEA-3, GORT-5, WIAT-3 (Nelson Denny- for high school)
- ▶ WRAML-2, WJ-3 Story Recall subtest