

## Neuropsychological Perspectives of Specific Learning Disabilities, NVLD, and Autism Spectrum Disorder

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## Agenda

- Morning
  - Specific Learning Disabilities (SLD)
    - DSM-5 Criteria vs. IDEA
    - Linking brain functioning to reading processes in typical and atypical development
  - Nonverbal Learning Disability (NVLD)
    - Definition
    - Neurocognitive processes associated with NVLD
    - Assessment and Intervention
- Afternoon
  - Autism Spectrum Disorder
    - DSM-5 Criteria
    - Neuropsychological functioning
    - Assessment and Intervention



- Specific Learning Disorders/ Disabilities (SLD)

- Is there a difference between how DSM-5 determines SLD vs. IDEA?

## Changes from DSM-IV to DSM-5

- **Neurodevelopmental disorder.** Disorder with heritable features of neurocognitive underpinnings
- **Dimensional disorder.** One overarching category of SLD with "specifiers" to characterize particular manifestations of learning problems
  - SLD "with impairment in reading"
  - Emphasizes developmental changes in manifestation of SLD partly triggered by the learning demands of the curriculum (e.g., word-reading difficulties => math learning problems => math reasoning difficulties)
  - Diagnosis of particular SLD to intervention
- Elimination of the IQ-achievement discrepancy

## Pitfalls of discrepancy model

- No universal agreement of discrepancy (e.g., arbitrary cut-off points)
- IQ is a strong predictor to school success rather than reading (e.g., twice exceptional)
- Little evidence to suggest that poor readers or "slow learners" differ significantly from those who have dyslexia.
- IQ-achievement discrepancy formulas often do not detect subtle neurological variations such as organization and attention problems, poor memory and retrieval skills, and language skills (i.e. too simplistic)
- Too many false positives and false negatives.

## DSM-5 criteria

- **Criteria A - Persistence**
  - At least one of 6 symptoms of learning problems that have persisted despite provision of targeted instruction
    - E.G., Sight word reading/decoding (*Dyslexia*), fluency/comprehension, computation/fluency (*Dyscalculia*), math reasoning, written expression/spelling
- **Criteria B - Low achievement**
  - Measurement of academic skills are substantially and quantifiably below those expected for age and cause impairment in academic or daily living as confirmed by individualized administered standardized achievement measures and comprehensive clinical assessment.
- **Criteria C - Age of onset**
  - Age of onset of problem occurring at school-age although may not occur until young adulthood.
- **Criteria D - A lot of rule-outs**
  - Exclusions: ID, Uncorrected visual/auditory acuity, other mental/neurological disorders, psychosocial adversity, lack of proficiency in language of instruction, inadequate educational instruction, economic or environmental disadvantage (e.g., SES)

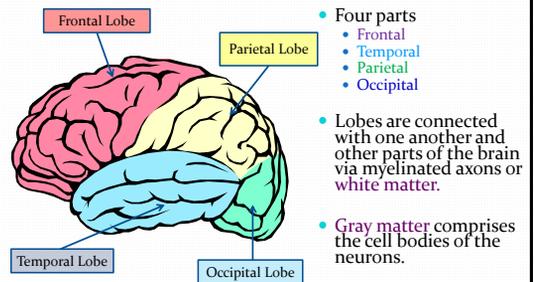
## Comprehensive assessment

- What does it look like?
  - Individual's medical, developmental, educational, family history
  - Impact of difficulty in academic or daily functioning
  - School reports
  - Standardized tests of achievement (at 1.5 SD below mean or varies between 1.0-2.5, depending on tests)
  - Curriculum-based assessments
  - IQ testing (to rule out ID) BUT what about gifted?
- Comprehensive assessment will involve professionals "expertise in SLD and psychological/cognitive assessment" **YET** "assessment of cognitive processing deficits is not required...."
- Nevertheless, this requires closer collaboration with parents, educators, practitioners to provide access to formal and informal record, portfolios, academic history, and psycho-educational assessments.

## SLD

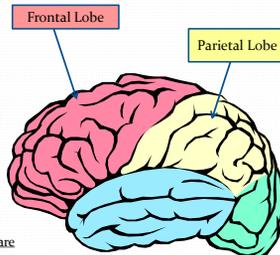
- So is SLD more of an:
  - Achievement disorder?
  - Processing disorder?
  - Mismatch between learner and environmental expectations?

## Gross Anatomy



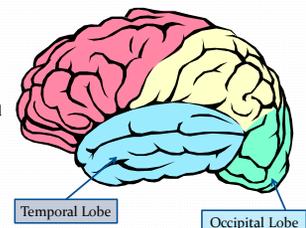
## Functional Anatomy

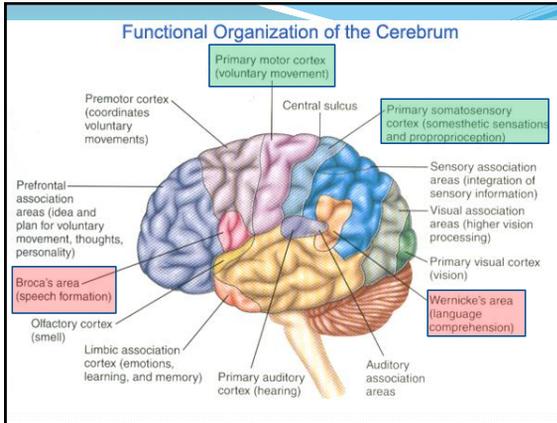
- **Frontal**
  - Executive Functioning
  - Reasoning, planning, judgment
  - Emotional behavior
  - Prefrontal cortex associated with Broca's area (expressive language)
  - Motor cortex or strip
- **Parietal**
  - Tactile, sensory information
  - Pain, pressure, touch, proprioception, kinesthetic sense
  - Tertiary or higher level functions are **localized**.
  - Somatosensory strip



## Functional Anatomy

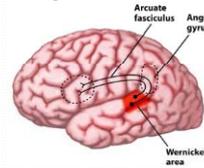
- **Occipital**
  - Visual system
- **Temporal**
  - Language, emotional and auditory processing (Wernicke's area - receptive language)
  - Hearing, taste, smell
  - Memory functions
  - Facial and object recognition





## Language processing

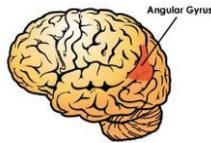
- How do these areas communicate?
  - Long axonal fibers connect them.



The **arcuate fasciculus** originates in Wernicke's area, passes through the angular gyrus and terminates in Broca's area.

## Language processing

- The **angular gyrus** (inferior parietal) is a tertiary processing area where sensory, visual and auditory systems converge.
- Damage may lead to deficits including **letter and number recognition**, as well as deficits in overlearned movements such as **handwriting**.
- Inferior parietal gyrus initially and then recruiting areas (DLPFC) responsible for **learning and switching from L1 and L2**. Increased grey matter (cell bodies).



## Language processing

- Hemispheric specialization
  - In general, the **left hemisphere** temporal system is wired for the **lexical aspects of language**
  - The **right hemisphere** attends more to the **nonverbal aspects of communication**

## Reading processes

- There are two reading routes:
  - Phonological (beginners, unfamiliar, slow)
  - Lexical/Orthographic/Word-Form (skilled, fast)
- What processes are involved in reading?
  - For the skilled reader:
    - whole-word pattern recognition
    - learning irregular word variations
    - selective attention to important words
    - assembling strings of words into ideas

Fluency → Comprehension

## RD defined

- **Reading disorder** is present when reading fails despite adequate education, environment, and lack of other medical/psychological problems in the presence of adequate cognitive ability.
- **Reading disorder is presumed to be neurologically based.**
  - It is familial and heritable
  - Presumed to be polygenetic
  - Chromosome 6 implicated

## RD defined

- Some healthy children will fail to read because of
  - impoverished print exposure
  - lack of education
  - low ability
- Some fail to read despite good education, environment and ability
  - **Specific learning disability (or disorder) in reading**  
AKA developmental dyslexia

## RD defined

- Reading problems occur when there is a breakdown in any part of the process.
  - Does every poor reader have a reading disability?

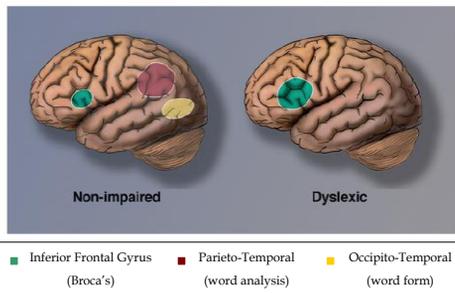
## Theoretical Models

- Models for RD
  - **Phonological awareness deficit** (Goswami, Snowling, Torgeson)
    - poor detection of phonemes and phonological processing
  - **Rapid Automatized Naming** (Bowers and Wolf)
    - Slow retrieval of sound to symbol
  - **Double deficit** (Wolf)
    - children who have both phonological and RAN deficits

## Theoretical models

- Multiple deficit model: Pennington
  - **at the etiological level**
    - polygenetic interactions and gene-environment interactions
  - **at the neurological level**
    - a single genetic or environment risk factor affects *multiple systems* or produces *downstream effects*
  - **at the cognitive level**
    - developmental pathways overlap because cognition is interactive and multi-systemic
  - **at the symptom level**
    - all of the above produce complex patterns of strengths and weaknesses

## Neurobiological Origins (Shaywitz, 2003)



## Assessing RD

- Test reading AND reading processes
  - phonological awareness
  - rapid naming
  - Auditory/verbal working memory or sequencing
  - long-term auditory/verbal memory
  - alphabet automaticity
- single word reading (real/pseudo)
  - reading fluency
  - reading comprehension
- If older child, test writing processes too

## Assessing RD

- Look for attention issues
  - ADHD has high comorbidity with RD
- The compensated or very bright RD reader may show
  - good phonological awareness
  - good single word reading (untimed)
  - good auditory memory
- poor fluency (timed reading)
- poor accuracy for unfamiliar words
- poor comprehension under timed conditions

## Math Facts and Fluency

- **Math facts**
  - **Recall of facts** – retrieval fluency, working memory
  - **Fluency** – processing speed and automaticity
- Observations to note when assessing:
  - Do they use fingers for math facts?
  - Do they notice math signs?
  - Carrying or borrowing?
  - Multi-step for complex multiplication or division?
  - Do they use strategies? Verbal mediation? Drawing?
- Verbal mechanisms play a role in the retrieval of over-learned math facts that language influences our counting system (e.g., **angular gyrus**), comprehension of word problems, and number-sense.
- Multi-step or complex problem-solving require use of multiple networks (e.g., **frontal lobe** [EF], **temporal lobe** [memory]).

## Math Reasoning

- Potential challenge for some especially if children have language difficulties.
- Potential reasons for poor reasoning:
  - Multi-step problems
  - Irrelevant or extraneous information
  - Language difficulties
  - Nonverbal problem-solving (graphs and charts) can be difficult for NVLD children
- Supplemental visual information and meaningful problems make use and application of math concepts easier.

## Math Word Problems

- *John has four pencils. He gave three pencils to Julie. How many pencils does Julie have?*
- *John has four pencils. He has three more pencils than Julie. How many pencils does Julie have?*

## Math and Executive Functioning (EF)

- Five salient features of executive functioning were also presented as being linked to specific brain regions and math skills:
  - **selective attention** (anterior cingulate/subcortical structures-procedure knowledge impaired, poor attention to math operational signs, and place value misaligned),
  - **planning skills** (dorsolateral PFC-poor estimation skills, selection of operational processes impaired),
  - **organization skills** (dorsolateral PFC-inconsistent lining up math equations, frequent erasures, difficulty setting up problems),
  - **self-monitoring** (dorsolateral PFC- limited double-checking of work, unaware of plausibility to a response, and inability to transcode operations),
  - **retrieval fluency** (orbitofrontal PFC, anterior cingulate, dorsolateral PFC-slower retrieval of learned facts, and accuracy of recall of learned facts is inconsistent).

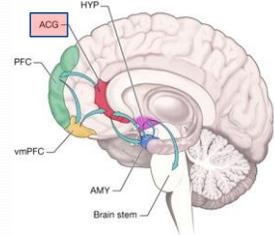
- *Although these features require a thorough knowledge of the cortical regions of the brain, the main point is to understand that a student's characteristics and behaviors can help a school psychologist target a student's specific difficulties.*

## Writing Development

- Writing as a “secretary”
  - Concerned with mechanics
    - Letter formation, spelling, punctuation, syntax, grammar, paragraph structure, etc.
- Writing as an “author”
  - Concerned with content and ideas
    - Planning, reviewing, revising, transcribing
- Direct instruction often emphasized since writing is a “process”

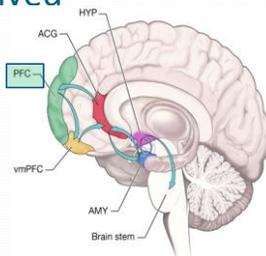
## Constructs involved

- Attention – **anterior cingulate**
  - Poor planning
  - Inconsistent Spelling
  - Poor Self-monitoring
- Spatial Production – right parietal lobe
  - Uneven spacing
  - Poor use of lines
  - Organization problems



## Constructs involved

- Sequential Production – Left **prefrontal cortex**
  - Poor connected writing
  - Letter reversals
  - Organizational deficits
- Memory – Frontal/temporal lobe
  - Poor word retrieval and spelling
  - Loss of train of thought



## EF and Written Language

Classification	Writing Dysfunction
1. Initiation	•Poor idea generation •Poor independence
2. Sustaining	•Lose track of thoughts •Difficulty finishing •Sentences disjointed
3. Inhibiting	•Impulsive/Distractible
4. Shifting	•“Stuck” on topic •Difficulty writing about multiple events.

## EF and Written Language

Classification	Writing Dysfunction
5. Organization	•Frequent Erasures •Forgets main idea •Lack of coherent structure
6. Planning	•Poor flow of ideas •Incorrect spacing •Lack of main idea and conclusion
7. Self-Monitoring	•Spelling miscues •Mechanics (punctuation, capitalization errors) •Sloppy work

## Neuropsychology and RTI

- False dichotomy
  - RTI vs. Neuropsychology particularly for assessing SLD
  - Neuropsychological assessment does not equate to the “IQ-achievement discrepancy” model.
- The main issue is **not** the tests, but rather the psychologists, administrators, and special educators interpreting these measures in a pseudoscientific context (Feifer, 2008).

## Neuropsychology and RTI

- The first step in fusing cognitive neuropsychology within an RTI:
  - Taking into account both *extrinsic and intrinsic factors* that may hinder the learning process particularly in RD
  - Feifer (2008) proposes a 4-factor model that combines both RTI procedures and cognitive neuropsychological assessment to determine presence of RD

## Neuropsychology and RTI

1. Data to document that a student's *RATE* of learning in one or more aspects of reading skill development is substantially slower than grade-level peers over a specified period of time.
2. Data to document that the student has not responded to evidence-based interventions when compared to grade-level peers over a specified period of time.
3. Data from standardized assessment indicating the presence or absence of specific processing deficits that are directly related to the reading process. These should include measures of *phonemic awareness, phonological processing, language skills, working memory skills, executive functioning skills, and rapid and automatic retrieval skills*.
4. Data ruling out other major sources of constraints on school success such as emotional, cultural, medical, or environmental factors.

- Nonverbal Learning Disability (NVLD)



- What do you know of NVLD?
- In your school, what is the most common confusion about when to determine NVLD?
- Is it a real disability?

## Nonverbal Learning Disability (NVLD)

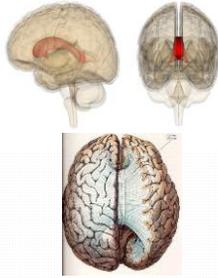
- The diagnosis of NVLD is controversial and officially unrecognized in the DSM-5 or IDEA, while ICD-9-CM does recognize it under the category of symbolic dysfunction unspecified.
- The core feature of NVLD is thought to be an initial deficit in visuospatial perception leading to difficulty with mathematics and subsequently social difficulties (Fine et al., 2013; Rourke, 1989).

## Framework of NVLD

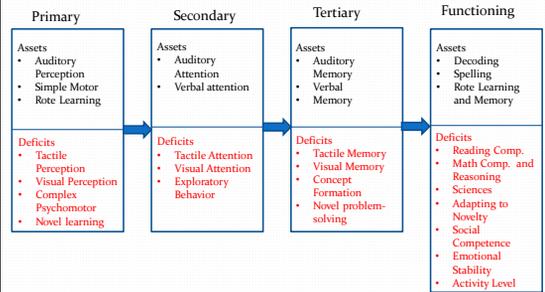
- Cascade of asset and deficits arising from white matter that is rendered dysfunctional
- Reduction in white matter integrity would lead to problems in functioning when extensive integration of systems for information processing is required:
  - **Mathematical learning**
  - **Adaptation to novel stimuli**
  - **Higher order processing**
  - **Nuanced social engagement**

## Framework of NVLD

- Symptoms of NVLD share commonality in agenesis of corpus callosum (CC), in which axons of the CC are absent.
- Global intellectual functioning is spared, but complex reasoning and social functioning are impaired.

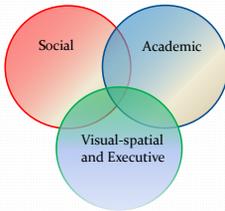


## Rourke's Developmental Progression Model (1995)

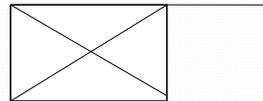


## Understanding NVLD

- Social and learning deficits are also core features



## What do you see?



## Neuropsychological Profile: NVLD (Dinklage, 2001)

- Typically normal IQ
- Visual spatial deficits are most pronounced: poor appreciation of gestalt, poor appreciation of body in space, sometimes left side inattention/neglect
- Motor and sensory weaknesses are common: usually poor fine and gross motor coordination, left side worse than right.

## Neuropsychological Profile: NVLD (Dinklage, 2001)

- Rote linguistic skills are normal (i.e. repetition, naming, fluency, syntactic comprehension), but pragmatic use of language is impaired: weak grasp of inference, little content, disorganized narrative despite good vocabulary and grammar.
- Rote recall of a story may be good, but the main point missed. Rhythm, volume, and prosody of speech are often disturbed.

## Social-emotional profile: NVLD (Dinklage, 2001)

- Peer relations are typically the greatest area of impairment; may play with much older or younger children than with same age peers
- They often lack basic social skills; may stand too close, stare inappropriately or not make eye contact, have marked lack of concern over appearance, be oblivious to other's reactions, change topics idiosyncratically.
- They may interact better with adults, where they act dependent and immature, but also may be seen as "odd."
- They may show poorly modulated affect, not matched to verbal content.
- Lack of empathy and social judgment may shield them from fully experiencing the hurt of peer rejection.

## Academic Profile: NVLD (Dinklage, 2001)

- Difficulties are often picked up late because **decoding** and **spelling** may be quite strong.
- Inferential **reading comprehension** is weak relative to decoding and spelling skills.
- **Math** is often the first academic subject to be viewed as problematic. Spatial and conceptual aspects of mathematics are a problem; math facts may be readily mastered.
- Due to spatial and fine motor problems, **handwriting** is usually poor.
- Organization skills are weak, particularly in written work.

## Differential Dx

- Are older children with symptoms of NVLD actually those with ASD whose symptoms have mitigated with intervention and time?



## Differential Dx (Fine et al., 2010)

High Functioning Autism (HFA)	Nonverbal Learning Disability
<ul style="list-style-type: none"> <li>• Intense interests, and repetitive or ritualistic behaviors</li> </ul>	<ul style="list-style-type: none"> <li>• Verbosity but more flexible interests and behaviors</li> </ul>
<ul style="list-style-type: none"> <li>• Compulsions and rituals</li> </ul>	<ul style="list-style-type: none"> <li>• Some social anxiety</li> </ul>
<ul style="list-style-type: none"> <li>• Inattention to / disinterest in social interaction at early ages</li> </ul>	<ul style="list-style-type: none"> <li>• Interest in social interaction , but often unsuccessful</li> </ul>
<ul style="list-style-type: none"> <li>• <b>Unsure if these kids are different because of etiology or simply a matter of degree of impairment (i.e. spectrum)</b></li> </ul>	

## NVLD Clinical Dx

- Rule out Autism Spectrum Disorder (HFA) (ADI-R and history)
- Normal range IQ
- Normal range verbal academic skills
- Poor visual-motor skills (Rey Complex Figure, VMI)
- Below average math skills (Computation)
- Poor social perception (Observations, Student interview)
- Poor social functioning (BASC-2, SCQ)
- Screen for symptoms of ADHD (CPT)

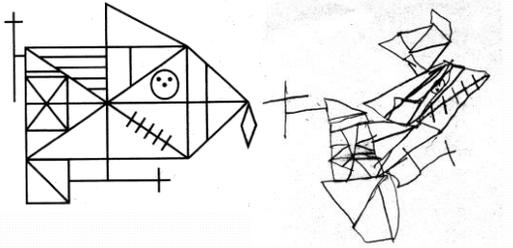
## Case Study: Beatriz – 10 years old

Cognitive/academic test results	Standard Scores
WISC-IV VCI	119
WISC-IV PRI	92
WIAT-III Math	80
WIAT-III Word Reading	122

ADI-R	Score
A. Social reciprocity (cutoff= 10)	9
B. Communication (cutoff = 8)	2
C. Restricted/repetitive behaviors (cutoff= 3)	1

"has few friends, difficulty reading facial expressions, but has typical language development"

## ROCF



Z-score -3.22  
Lack of gestalt, distortion errors

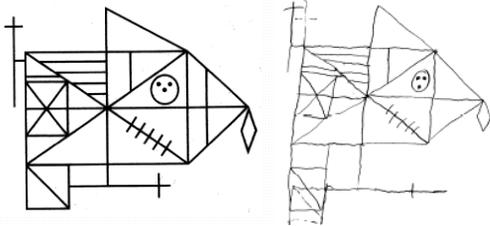
## Case Study: Brandon – 14 years old

Cognitive/academic test results	Standard Scores
WASI-II VIQ	114
WASI-II PIQ	97
WJ-III Math Calculation	118
WJ-III Letter Word ID	111

ADI-R	Score
A. Social reciprocity (cutoff= 10)	14
B. Communication (cutoff = 8)	11
C. Restricted/repetitive behaviors (cutoff= 3)	8

"longstanding difficulty with visual tasks in the classroom"

## ROCF

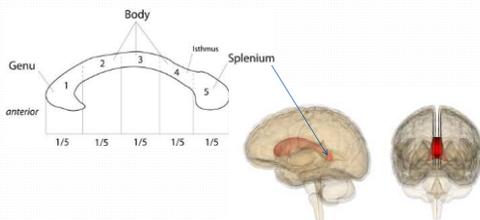


Z-score -2.05  
Some gestalt, perseveration errors and details

## Neuroanatomy

- Fine et al. (2013) conducted a neuroimaging study with children ages 8-18 from US and Canada with NVLD, HFA, ADHD: PI, and ADHD-C, and typicals.
- No group differences for total corpus callosum, but a smaller section of it.
- Children with HFA and NVLD who exhibit behavioral symptoms of ADHD indicate that this area is not related to these behaviors.

## Corpus callosum



## Dx criteria for NVLD (Fine et al., 2013)

- Required criteria:
  - WASI estimated FSIQ or VIQ  $\geq 85$
  - WJ-3 Letter Word  $\geq 85$
  - ADI-R total C  $\leq 4$
- Three (3) of the following six (6) criteria:
  - WASI Block Design T-score  $< 40$
  - ROCF, Z-score less than  $< -1.0$
  - WJ-3 Calculation  $< 85$ , or FSIQ - WJ-3 Calculation greater than 1.5 SD (22.5)
  - Purdue Pegboard, Z-score, left or right or both  $< -1.0$
  - Beery VMI  $< 85$
  - Vineland Social Skills  $< 85$

## Interventions

- Direct Training in
  - Psychomotor and perceptual-motor skills (e.g., OT)
    - Functional perceptual skills (e.g., reading facial expressions, gestural communication, maps and graphs)
    - Planning and organization in writing tasks
  - Social aspects:
    - Social cognition/social skills/pragmatics
    - Interpersonal communication
    - Body image
    - Psychosocial adjustment
    - Problem-solving skills

## Interventions

- Academics
  - Using verbal mediation to rehearse
  - Minimize distractors in math word problems
  - Graph paper to help with alignment
  - Simple matrices for math facts
  - Calculator for complex math problems
  - Compensatory strategies (e.g., oral or written input/output instead of interpretation of graphs and visual data)

- Autism Spectrum Disorder

## Autism

- Autism is a neurodevelopmental disorder that is behaviorally defined. Described as a retrospective diagnosis with behavioral symptoms that vary over time.
- Dynamic impairments are qualitative and include deficits in social interaction and communication with restricted, repetitive or stereotyped patterns of behavior.

## Components in Etiology

Abnormalities in Genetic Code for Brain Development



Abnormal Mechanisms of Brain Development



Structural and Functional Abnormalities



Cognitive and Psychological Abnormalities



Behavioral Syndrome

## Genetic Risk Factors and Characteristics (CDC, 2014)

- Prevalence 1 in 68 children has ASD.
- Studies have shown that among identical twins, if one child has ASD, then the other will be affected about 36-95% of the time. In non-identical twins, if one child has ASD, then the other is affected about 0-31% of the time.
- Parents who have a child with ASD have a 2%-18% chance of having a second child who is also affected.
- Children born to older parents are at a higher risk for having ASD.
- Children who are born prematurely/ low birth weight are at greater risk for having ASD.
- Almost half (46%) of children identified with ASD has average to above average intellectual ability

## Head circumference and brain volume

- Mixed findings on whether neonates/children with autism have larger head circumference than typical.
  - Some report 5% to 20% of children with ASD have larger head size than typical. (Courchesne et al., 2003; Raznahan et al., 2013)
- 90% of 2 to 4 year-olds with autism had larger than average brain volume, 35% had macrocephaly (2 SD above mean) using volumetric MRI
- Pediatric head growth records indicated accelerated and abnormal growth by 6 to 14 months

## Changes from DSM-IV

- The new classification system eliminates the previously separate subcategories (e.g., Asperger syndrome, PDD-NOS, childhood disintegrative disorder).
- In addition to the diagnosis, specifiers are included in terms of any known genetic cause (e.g. fragile X syndrome, Rett syndrome), level of language and intellectual impairment and presence of medical conditions such as seizures, or history of environmental exposure (e.g., FAS, very low birth weight)
- The work group added a new category called Social (Pragmatic) Communication Disorder (SCD). This will allow for a diagnosis of disabilities in social communication without the presence of repetitive behavior

## Changes from DSM-IV

- There are two domains where people with ASD must show persistent deficits.
  - Persistent social communication and interaction deficits (**exhibit all 3**)
    - Lack of social-emotional reciprocity
    - Deficits in nonverbal communicative behaviors (e.g., eye contact)
    - Deficits in developing relationships and social understanding (e.g., pretend play, making friends)
  - Restricted and repetitive patterns of behavior (**exhibit 2**).
    - Stereotypical or repetitive motor movements
    - Inflexible adherence to routine
    - Restrictive or fixed interests that are abnormal or intensity in focus (perseveration).
    - Hyper or hypersensitivity to environment or sensory input.

## Examples of criteria behaviors

- A1. Deficits in social emotional reciprocity ranging from:
  - **Abnormal social approach:**
    - Unusual social initiations (e.g., touching; licking of others)
  - **Failure of normal back and forth conversation:**
    - Poor pragmatic use of language, failure to respond to name, does not initiate conversation, one sided conversations.
  - **Reduced sharing of interests**
    - Lack of showing or pointing out objects of interest to others
    - Impairment in joint attention
  - **Reduced sharing of emotions or affect**
    - Failure to respond to praise
    - Failure to share enjoyment or excitement

## Examples of criteria behaviors

- A2. Deficits in nonverbal communication
  - **Impairments in social use of eye contact**
  - **Poorly integrated verbal and nonverbal communication**
    - Inability to coordinate eye contact or body language with words
    - Abnormal pitch, tone, prosody, or volume of speech
  - **Impairment in the use of gestures**
    - Pointing, waving, nodding/shaking head
  - **Lack of facial expressions**
    - Limited or exaggerated, or does not fit with current situation or context.

## Examples of criteria behaviors

- A3. Deficits in developing, maintaining, and understanding relationships, to difficulties in sharing imaginative play.
  - **Deficits in developing and maintaining relationships**
    - Lack "theory of mind"; or see other's perspective
  - **Difficulties adjusting behavior to suit social context**
    - Does not notice another person's lack of interest in activity
    - Limited recognition of social emotions (e.g., not noticed how behaviors affects others)
  - **Difficulties in sharing imaginative play**
    - Lack of pretend play with peers
  - **Difficulties making friends**
    - Does not have preferred friends
    - Lack of cooperative play

## Examples of criteria behaviors

- B1. Stereotyped or repetitive speech, motor movements, or use of objects
  - **Stereotyped or repetitive speech:**
    - Pedantic speech or unusually formal language (e.g., speaks like adult)
    - Echolalia
    - Pronoun reversals
  - **Stereotyped or repetitive movements:**
    - Hand movements (e.g., clapping, finger flicking, flapping)
  - **Stereotyped or repetitive used of objects**
    - Lines up toys/objects
    - Repeatedly opens and closes doors

## Examples of criteria behaviors

- B2. Inflexible adherence to routine and insistence on sameness
  - **Adherence to routine**
    - Need to eat same food every day
  - **Ritualized patterns of verbal/nonverbal behavior**
    - Has to say one or more things in a specific way
    - Compulsions (e.g., turning in circle before entering room)
  - **Excessive resistance to change**
    - Overreaction to trivial changes (e.g., moving items at the dinner table or driving a different route)
  - **Rigid thinking**
    - Difficulty understanding humor
    - Difficulty understanding nonliteral aspects of language (e.g., irony)

## Examples of criteria behaviors

- B3. Restrictive or fixed interests that are abnormal or intensity in focus (perseveration).
  - **Preoccupations**
    - Historic events, games, tv shows
  - **Attachment to unusual objects**
    - Piece of paper, rubber band
  - **Unusual fears**
    - Afraid of teachers who wear earrings

## Examples of criteria behaviors

- B4. Hyper- or hyposensitivity to sensory input or unusual interest in sensory aspects of environment
  - **Preoccupation with texture or touch**
    - Does not like having teeth brushed, nails cut, etc.
  - **Unusual visual exploration/activity**
    - Close visual inspection of toys
    - Looks at objects/people out of corner of eye
  - **Sensory exploration with objects**
    - Licks or sniffs objects/toys

## DSM-5: Asperger's

- The former DSM-IV-TR diagnosis of *Asperger's* can be described in this way for DSM-5:
  - **Autism Spectrum Disorder,**
    - Without Accompanying Intellectual Impairment and Without Accompanying Language Impairment;
    - Requiring Substantial Support with Social Communication and Social Interaction (Level 2)
    - Requiring Support with Restricted Repetitive Behaviors, Interests, and Activities (Level 1)

## Diagnostic Issues/Challenges

- ADHD symptoms very common in children HFA in early school years which may then evolve into depressive symptoms in adolescence
- Because of DSM-IV guidelines, ADHD often not diagnosed in AS because of admonition not to Dx ADHD in PDD
  - HOWEVER, Due to the high comorbidity of ADHD symptoms in children with Autism (About 18-33% found), the DSM-5 knows allows both diagnoses to be co-existent, but differential diagnoses should be still be considered.
- Language disorders, anxiety disorders, mood disorders and other psychiatric conditions were also common in these children.



## Academic Ability in AS

- Myles, et al. (2002) reports that children with Asperger's have wide range of achievement
  - Strengths in oral expression & reading recognition
  - Weaknesses in verbal comprehension, written language and often in mathematics

## Academic Ability in AS

- Myles & Simpson (2002) noted that students with AS have academic problems because:
  - Social communication difficulties
  - Concrete and literal thinking styles
  - Inflexibility and poor planning ability
  - Difficulty in distinguishing relevant from irrelevant

## Academic Ability in AS

- Ghaziuddin & Gerstein (1996) suggest teachers may have difficulty seeing deficits because
  - Seemingly advanced vocabularies
  - Word calling ability
  - Pedantic style
  - Parrot-like responses to questions

## Linguistic Characteristics in AS

- Understanding Pragmatic Language Involves
  - Communicative intentions – highly influenced by the (social) context
  - Presupposition – refers to the knowledge, expectations and beliefs we believe to be shared by the listener
  - Discourse – series of words that create the text of conversation (social discourse, narrative discourse)

## Behavioral Characteristics in AS

- Barnhill et al. (2000) cont.
  - Parents
    1. Greater behavioral concerns than teachers
    2. Conduct problems, aggression & hyperactivity
    3. Internalizing problems – withdrawal
  - Teachers
    1. Perceived fewer deficits than parents
    2. Did see children as at risk for anxiety, depression, attention & withdrawal
  - Students
    1. Did not perceive themselves having problems

## Behavioral Characteristics in AS

- Barnhill & Myles (2001) examined attributions and depression in Asperger's
  - By adolescence 80% of adolescents they studied had been prescribed anti-depressive medications
  - Depressive symptoms don't vary with age
  - Blamed themselves – learned helplessness

## School-Based Assessment

In addition to RIOT

Domain	Measures
Autism Screening	ADOS, ADI-R (gold standard)
Rating Scales	CARS-2, GARS-3, PDDBI, ASRS
Developmental History	Parent Interview
Intelligence	WISC-IV, WPPSI, KABC-II, (for highly verbal) KABC-2 DAS-II, Leiter-3, Stanford-Binet V, CTONI-2 (for nonverbal),
Adaptive	Vineland
Fine-Motor Skills	VMI, Rey-Osterrieth (ROCF)
Social-Emotional	Behavior Rating Scales, FBA
Language/Communication	Social Communication Questionnaire (SCQ) Speech-Language Evaluation

## Clinical Assessment

In addition to RIOT and Autism Screening

Domain	Measures
Intelligence	WISC-IV, WPPSI, WAIS-IV (for highly verbal) DAS-II, Leiter-3, Stanford-Binet V, CTONI-2 (for nonverbal)
Adaptive	Vineland
Fine-Motor Skills	VMI, ROCF, Purdue/Lafayette Pegboards
Attention	CPTs, Behavior Rating Scales
Visual/Verbal Memory	CVLT
Executive Functioning	Wisconsin Card Sort, BRIEF
Social-Emotional	Behavior Rating Scales, FBA
Language/Communication	CELF-IV, Test of Language Competence (TLC), Test of Pragmatic Language (TOPL), Social Communication Questionnaire (SCQ)

## Social (Pragmatic) Communication Disorder

- Developed partly due to the perceived pattern of overdiagnosis of Autism over the past decade
- Persistent difficulties in the social use of verbal and nonverbal communication as manifested by all of the following:
  - Deficits in using communication for social purposes, such as greeting and sharing information, in a manner that is appropriate for the social context.
  - Impairment of the ability to change communication to match context or the needs of the listener, such as speaking differently to a child than an adult and avoiding the use of overly formal language.
  - Difficulties following rules for conversation and story telling, such as taking turns in conversation, rephrasing when misunderstood and knowing how to use verbal and nonverbal signals to regulate interaction.
  - Difficulties understanding what is not explicitly stated (non-literal or ambiguous)
- Persistent difficulty with understanding social-language pragmatics and non-verbal (body language or context) cues
- Differentiated from autism due to the lack of ongoing "restricted and repetitive patterns of interest." In other words, motor mannerisms and obsessive or ritualistic tendencies are **not** noted for this condition

## Interventions for Autism

- Prioritize adaptive functioning
  - Behavior Intervention Plans
  - Social Stories
  - Picture Exchange Communication System (PECS)
  - Visual schedules
  - Applied behavioral analysis (e.g., discrete trial training)
  - OT, Speech therapy
  - Medication – not for autistic behaviors, but symptoms related to mood or high activity.
- Uncertain at this time
  - Neurofeedback or biofeedback
  - Working memory training programs (more for SLD and ADHD)

## Severity level spectrum

Deficits	Autism (including HFA)	Asperger's	NVLD	Social – pragmatic comm. disorder	Math LD
Social	X	X	X	X	-
Language/Communication	X	o	o	o	-
Repetitive or restrictive behavior	X	X	-	-	-
Math Skills	o	o	X	-	X

X = Most likely  
O = Variable/Sometimes  
- = Not likely

## Goals/Summary

- Review the current neuropsychological literature regarding SLD, Nonverbal Learning Disabilities, and Autism Spectrum Disorders
- Understand the changes of DSM-IV to DSM-5 as it relates to SLD and Autism.
- Discuss the neuropsychological correlates of NVLD, and the challenges as it pertains to diagnosis and educational planning.
- Examine where response to intervention (RTI) fits in, for early detection and intervention.

## Thank you!

- Questions?

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