



Sponsors and Affiliates:



How Cognitive Processes Affect Instruction and Intervention (Supplemental Handout Slides)

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Brain Areas and Functions

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Brain Functions in the Classroom

Brain Area	Possible Effects of Left Hemisphere Damage?	Possible Effects of Right Hemisphere Damage?
Occipital Lobe	Slow reading, poor spelling with letter substitutions, difficulty with visual discrimination of details	Limited comprehension and writing when visual imagery required, object recognition limited
Dorsal Stream	Poor left/right orientation, sound-symbol association (i.e., alphabetic principle), and letter reversals	Poor handwriting and math from spatial deficits; poor awareness of self and environment during social
Ventral Stream	Difficulty recognizing sight words, poor reading fluency; object naming limited	Difficulty with sight words and perception of affect and faces*

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Brain Functions in the Classroom

Brain Area	Possible Effects of Left Hemisphere Damage?	Possible Effects of Right Hemisphere Damage?
Lateral/Medial Temporal Lobe	Can't remember facts and words due to difficulty with long-term memory, poor categorization	Limited understanding of context, metaphor, multiple word meanings, and humor*
Superior Temporal Lobe	Frequent requests for repetition, poor word reading, poor auditory and phonological processing	Poor perception of rate and pitch or prosody, difficulty with complex sentence processing*
Anterior Parietal Lobe	Poor right hand grasping, writing too light or dark, complains after writing that "hand hurts"	Poor left hand grasping and limited bimanual coordination skills

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Brain Functions in the Classroom

Brain Area	Possible Effects of Left Hemisphere Damage	Possible Effects of Right Hemisphere Damage
Occipital-temporal-parietal crossroads and Wernicke's Area	Difficulty connecting sounds (phonemes) with symbols (graphemes); difficulty connecting numbers with quantity and math algorithms, limited comprehension of explicit language	Poor math problem solving and comprehension of implicit language, complex language, poetry, difficulty with new learning and integrating different types of information; poor understanding of humor
Posterior Frontal Lobe	Difficulty with dressing, drawing, and handwriting; limited or no motor skill automaticity	Difficulty with learning new motor skills and sports requiring fine motor; difficulty with using both hand simultaneously
Broca's Area	Halting speech with little output and difficulty with articulation and syntax, even impulse control	Poor verbal prosody and word substitutions; verbose, but limited pragmatics

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Brain Functions in the Classroom

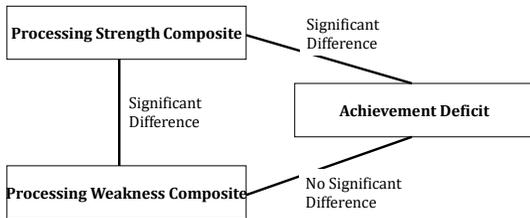
Brain Area	Possible Effects of Left Hemisphere Damage	Possible Effects of Right Hemisphere Damage
Dorsolateral-Dorsal Cingulate	Poor encoding for storage, limited decision making, rigid and inflexible thinking, difficulty with concordant and convergent thought	Poor retrieval from long term memory, sustained attention, and novel problem solving; difficulty with discordant/divergent thought
Orbital-Ventral Cingulate	Depressive symptoms and avoidance/withdrawal, excessive emotional control	Disinhibition and indifference, aggression and or conduct problems

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Concordance-Discordance Model Steps

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The Concordance-Discordance Model of SLD Identification
(WIAT-4 and KTEA-3 Endorse This Model!)



Source: Hale, J. B., & Fiorello, C. A. (2004). School Neuropsychology: A Practitioner's Handbook. New York, NY: Guilford Press.

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Step 1 in C-DM of LD Identification:

Step	Clinical Objective	Clinical Question/Decision Rules
1	Score standardized cognitive test and determine whether global composite score (e.g., IQ), factor scores, or subtest scores should be interpreted.	1a. Are all subtest scores consistent enough to interpret global composite score (e.g., IQ)? → YES, C-DM unlikely, probably not SLD; discontinue or consider other possible measure of processing deficits. → NO, C-DM possible; go to Step 1b. 1b. If not consistent across the entire test, are the subtest scores consistent within factors to interpret factor scores? → YES, C-DM possible; go to Step 2. → NO, Consider subtest combinations to form new factor score within cognitive measure, go to Step 1c.

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Step 1 in C-DM of LD Identification:

Step	Clinical Objective	Clinical Question/Decision Rules
1	Score standardized cognitive test and determine whether global composite score (e.g., IQ), factor scores, or subtest scores should be interpreted.	1c. If no subtest combinations appear to represent a new factor, can other standardized measures be added to cognitive measure to create new factor score? →YES, new subtest combination appropriate for use in C-DM model, go to Step 2. →NO, consider combining subsets from additional measure of at least two subtests to create new factor score for use in C-DM analyses, go to Step 2

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Step 2 in C-DM of LD Identification:

Step	Clinical Objective	Clinical Question/Decision Rules
2	Score standardized achievement test and examine to see if composites or subsets indicate achievement deficit	2a. Do standardized achievement scores indicate an academic deficit that is consistent with prior evaluation (e.g., nonresponse to intervention), classroom permanent products, and teacher reported achievement deficits? →YES, C-DM possible, go to Step 3. →NO, Explore other possible causes for poor test performance, or explanations for poor performance in the classroom; consider achievement retesting to verify/refute achievement deficit; return to Step 2 or discontinue.

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Step 3 in C-DM of LD Identification:

Step	Clinical Objective	Clinical Question/Decision Rules
3	Review cognitive (e.g., CHC) and/or neuropsychological literature to ensure obtained cognitive deficit(s) is associated with achievement deficit(s)	3a. Could obtained cognitive deficits interfere with deficient academic achievement area? →YES, cognitive and/or neuropsychological deficits have been found to be related to deficit achievement area in the literature, go to Step 4 →NO, C-DM unlikely unless research not conducted, check for ecological validity of cognitive and achievement deficits; return to Step 2 or discontinue.

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Step 4 in C-DM of LD Identification:

Step	Clinical Objective	Clinical Question/Decision Rules
4	Obtain reliability coefficients for cognitive strengths, cognitive deficit(s) and achievement deficit(s)	<p>4a. Are factor/subtest reliability coefficients (e.g., coefficient alpha) available in the cognitive and achievement technical manuals? →YES, factor strengths and deficits, and achievement score reliabilities are in the manuals; go to Step 5. →NO, new factor scores and reliability coefficients must be computed; average factor scores and reliability coefficients for new factors (use Fisher's z-transformation for reliabilities, see Hale et al., 2008); go to Step 5.</p>

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Step 5 in C-DM of LD Identification:

Step	Clinical Objective	Clinical Question/Decision Rules
5	Calculate standard error of the difference (SED) formula to establish discordance between cognitive strength and cognitive deficit	<p>5a. Enter reliability coefficients for cognitive strength and deficit into SED formula, and solve for SED:</p> <p>5b. Multiple obtained SED value by 1.96 for $p < .05$, or 2.58 for $p < .01$.</p> <p>5c. Is obtained difference between cognitive strength and deficit greater than SED critical value? →YES, there is a significant difference between cognitive strength and deficit, child likely has a deficit in the basic psychological processes that is interfering with academic achievement; go to Step 6. →NO, consider other possible cognitive deficit responsible for achievement deficit, go to Step 1; or the child may have another disability interfering with achievement, consider further evaluation; or the child does not have a SLD, try to serve in intensive response-to-intervention model.</p>

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Step 6 in C-DM of LD Identification:

Step	Clinical Objective	Clinical Question/Decision Rules
6	Calculate SED formula to establish discordance between cognitive strength and achievement deficit	<p>6a. Enter reliability coefficients for cognitive strength and academic deficit into SED formula, and solve for SED:</p> <p>6b. Multiple obtained SED value by 1.96 for $p < .05$, or 2.58 for $p < .01$.</p> <p>5c. Is obtained difference between cognitive strength and academic deficit greater than SED critical value? →YES, there is a significant difference between cognitive strength and deficit, child likely has unexpected underachievement consistent with a specific learning disability; go to Step 7. →NO, consider other possible cognitive deficit and/or achievement deficit, go to Step 1; or the child may have another disability interfering with achievement, consider further evaluation; or discontinue, the child does not have a SLD, try to serve in intensive response-to-intervention model.</p>

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Step 7 in C-DM of LD Identification:

Step	Clinical Objective	Clinical Question/Decision Rules
7	Calculate SED formula to establish concordance between cognitive deficit and achievement deficit	<p>7a. Enter reliability coefficients for cognitive deficit and academic deficit into SED formula, and solve for SED:</p> <p>7b. Multiple obtained SED value by 1.96 for $p < .05$, or 2.58 for $p < .01$.</p> <p>5c. Is obtained difference between cognitive strength and academic deficit less than SED critical value?</p> <p>→YES, there is no significant difference between cognitive deficit and the achievement deficit, cognitive deficit plausible cause for achievement deficit, consider team determination of specific learning disability classification; begin individualized instruction in inclusive or more restrictive environment as necessary; go to Step 8.</p> <p>→NO, is the achievement deficit significantly below the cognitive deficit? If so, this could mean other factors are causing additional impairment, consider for specific learning disability classification and individualized service delivery, and additional evaluation to determine why achievement deficit is substantial; go to Step 8.</p> <p>→NO, is the achievement deficit significantly above the cognitive deficit? If so, this could mean the child is using a compensatory strategy to score better on the academic measure, determine if results still warrant specific learning disability classification and/or individualized service delivery; go to Step 8.</p>

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Step 8 in C-DM of LD Identification:

Step	Clinical Objective	Clinical Question/Decision Rules
8	Determine if C-DM findings have ecological validity and achieve team consensus for SLD or other disorder determination.	Re-examine empirical literature, RTI data, teacher reports, classroom permanent products, classroom observations, and other evaluation data (including C-DM results) to determine if child meets IDEA statutory and regulatory requirements of SLD or other disorder warranting special education services; consider within the context of other team evaluation data; consider SLD classification and service delivery in least restrictive environment.

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Brain Literate Approaches to Instruction

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Brain Literate Approaches to Behavior

Issue	Standard Education	Expected Outcome	Brain Literate Education Approach	Expected Outcome
Multicultural and Gender Differences in Problem Solving	Teacher prefers single approach to problem solving not recognizing cultural or gender differences	Culture or gender differences not recognized; group success or failure regardless of approach, solution, or timely completion	Collective vs. individualistic styles related to hemispheric preferences and integration; males better at quick solutions, females more sophisticated approach but more time consuming	Problem solving style understood and appreciated; recognize that difference is expected and different problems better solved doing different approaches

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THANK YOU!
QUESTIONS? COMMENTS?

Please feel free to contact me (aka, Brad :) with questions or interest in helping develop educator brain literacy!

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