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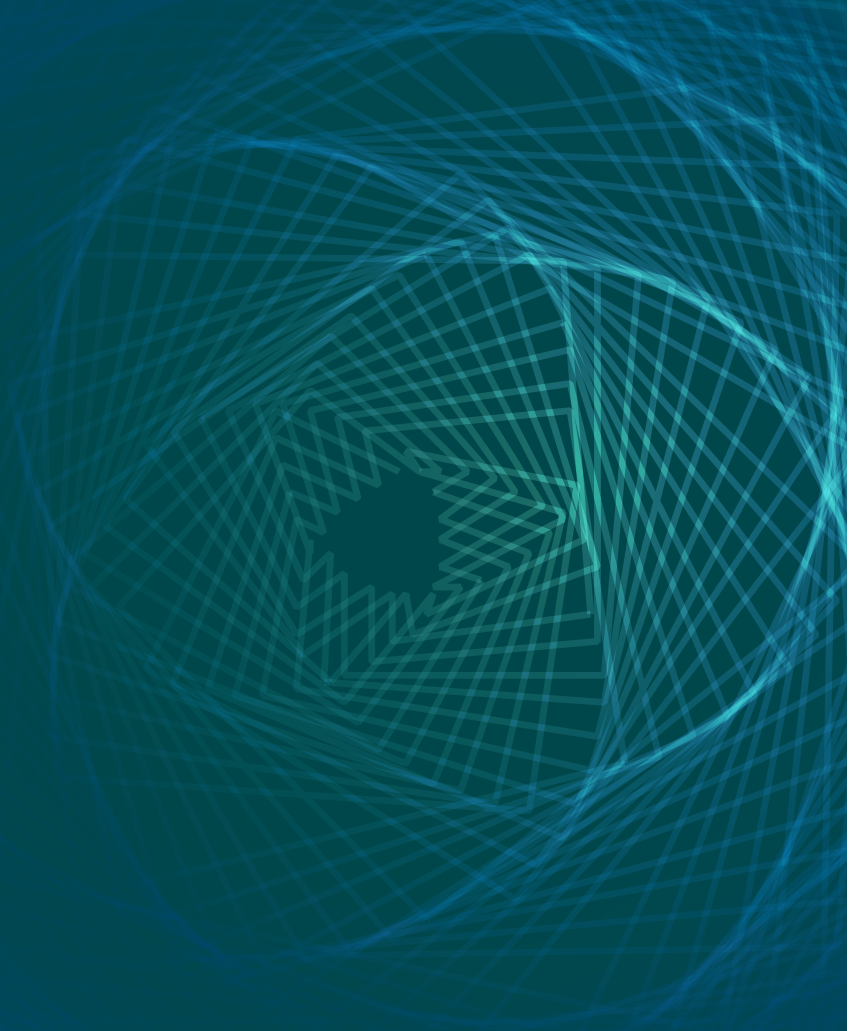

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Interpreting School Neuropsychology Reports for Educators

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Abstract

School neuropsychology is a field of study that is seeing rapid growth in institutions of higher learning, and subsequently in public and private schools. School neuropsychology assessments are substantially more extensive than traditional psychoeducational assessments reports. The reports are discussed at the student's Individual Educational Plan (IEP) meeting and school educators need to be present at the meeting. Educators have often expressed that it is extremely difficult to understand the complicated reports. It is often viewed as too complex to grasp and too overwhelming. The purposes of this paper are to help educators understand and interpret the information that comes from a school neuropsychology assessment report, and to apply that knowledge to assist in planning appropriate supports for the student.

Keywords: education, psychology, school neuropsychology

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Introduction

School neuropsychology is a field of study that is seeing rapid growth in institutions of higher learning, and subsequently in public and private schools. Neuropsychology examines the possible relationships between behavior and the brain. (Korkman, Kirk, & Kemp, 2007; Hebben & Milberg, 2002). The goal of school neuropsychology is to use the principles of neuropsychology with students in the school setting. The research in this discipline is scant (Decker, 2008; Feifer, 2008; Goldstein & Naglieri, 2008; Martin, Block & Olvera, 2012; Pennington, 2009). Educators have often expressed that it is extremely difficult to understand the complicated reports. Common views are that it is too complex to grasp and too overwhelming. Hale and Fiorello (2004) mention that the material is difficult for the following four reasons: (a) the terminology in the reports often incorporates words that may not be familiar to the reader; (b) an extensive background in physiology and anatomy is needed; (c) the research methods used may be foreign to the educator; and (d) the application of the interventions to children in the classroom may be difficult to discern.

The purpose of this article is to help educators obtain a basic understanding of the valuable data and information that is included in a school neuropsychology report. The school neuropsychology assessment is most often conducted with a child that has special needs, who for one reason or another is in need of a more extensive and in-depth assessment than the usual school psycho-educational assessment. This extensive assessment is usually conducted by a clinical psychologist with training in school psychology or by a school psychologist with advanced training in school neuropsychology.

In interpreting an assessment report, it is helpful for the educator to understand the assessment process and what the school neuropsychologist is attempting to measure. An assessment battery is conducted and the data is scored and interpreted. The examiner may be looking for the student's strengths and weaknesses.

A few examples of tests that could possibly be used in the assessment battery include: (a) WMS-IV (Wechsler Memory Scale – Fourth Edition), (b) WRAML-3 (Wide Range Assessment of Memory and Learning – Third Edition), (c) WISC-V (Wechsler Intelligence Scale for Children – Fifth Edition), (d), CMS (Children's Memory Scale), (e) VMI (Beery-Buktenica Developmental Test of Visual-Motor Integration – Sixth Edition), (f) Conners 3, (g) CTONI-2 (Comprehensive Test of Nonverbal Intelligence – Second Edition), (h) MVPT-4 (Motor-Free Visual Perception Test – Fourth Edition), (i) CTMT-2 (Comprehensive Trail Making Test – Second Edition), (j) Vineland Adaptive Behavior Scales – Third Edition, (k) BASC -3 (Behavior Assessment System for Children - Third Edition), (l) WIAT-IV (Wechsler Individual Achievement Test – Fourth Edition, (m) WJ-IV (Woodcock-Johnson Tests of Achievement and Tests of Cognitive Abilities, (n) CAS-2 (Cognitive Assessment System – Second Edition), and (o) NEPSY-II (Martin, Block & Olvera, 2012).

One of the more interesting instruments used in neuropsychological assessments is the BASC-3. It is a multidimensional, multimethod approach to assessing child and adolescent social skills, emotional disabilities, study skills, leadership, aggression, depression, and anxiety. It includes the following clinical and adaptive scales: aggression, externalizing problems, depression, internalizing problems, learning problems, atypicality, attention problems, hyperactivity, behavioral symptoms index, conduct problems, school problems, hyperactivity, internalizing problems, leadership, adaptability, somatization, anxiety, study skills, withdrawal, anxiety, functional communication, social skills, atypicality, and adaptive skills. Some of the content and index scales include the following: emotional self-control, social disorders, emotional behavior disorder probability, anger control, Autism probability, ADHD probability, negative emotionality, bullying, developmental executive functioning, functional impairment, and resiliency (Reynolds & Kamphaus, 2015).

On the BASC-3, conduct problems could involve rule-breaking behaviors. Somatization involves health related concerns that may or may not be present. Learning problems involves unusual difficulty comprehending and completing schoolwork. Withdrawal can include avoiding social situations and maintaining friendships. Adaptability is the ability to adapt to different situations. Social skills looks to see if the child has adequate social skills, and generally does not experience abnormal or debilitating social difficulties. Leadership examines creative levels, achieving in pressure situations, and/or an ability to lead others in the completion of a work assignment. Study skills looks to see if the child demonstrates sufficient organizational and study skills, and is able to finish homework assignments when they are due. Functional communication focuses on receptive and expressive language communication skills, and if the child has the skills to seek out and find new information when necessary (Reynolds & Kamphaus, 2015).

The Cognitive Assessment System is a standardized test that yields scores in Attention, Planning, Simultaneous, and Successive cognitive processing scales. Following are some of the subtests and subtest explanations (Naglieri, Das, & Goldstein, 2014):

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- *Planned Codes* – Students have 60 seconds to write corresponding codes in boxes.
- *Planned Connections* – Under timed conditions, students connect a series of stimuli that is made up of letters and numbers.
- *Planned Number Matching* – Student is presented with a paper of eight rows with six numbers on each row. The child's goal is to locate and underline the two numbers in each row that are identical.
- *Matrices* – A multiple-choice format that incorporates geometric elements and shapes that are interrelated through logical or spatial organizations. Subjects are asked to examine the relationship among the parts of the item and solve for the missing part by selecting the best of five or six options.
- *Verbal-Spatial Relations* – This subtest is in multiple-choice format. Each question is made up of six drawings and a printed question is located below the drawings. The test administrator reads the question to the student, and the student selects the drawing that best matches the description.
- *Figure Memory* – This is a memory subtest. The child looks at a two- or three-dimensional geometric figure for 5 seconds. After the picture is extracted from the student's sight, the student is shown the original figure embedded in a large, more complex geometric pattern. The child is asked to trace the original figure in the Response Booklet.
- *Expressive Attention* – Students are shown three items consisting of eight rows of five words each. In item 1, the child is asked to read four black-and-white color words (RED, YELLOW, BLUE, and GREEN) that are presented in random order. In item 2, subjects are asked to name the colors of four colored rectangles (printed in red, yellow, green, and blue) that are presented in random order. In item 3, the four colored words are printed in a different-color ink than the color word name and are presented in random order. In this item, the child is asked to name the color of the ink in which the word in printed rather than read the word.
- *Number Detection* – Students are given a paper with approximately 200 numbers on it. They are asked to locate and underline specific numbers in a particular font on a paper with multiple distractors.
- *Receptive Attention* – The student is required to locate and underline pairs of letters of objects that either look the same appearance wise or are identical from a lexical perspective (i.e., they have the same name).
- *Word Series* – The student is required to listen to from two to nine high frequency words. The examiner reads one word per second. The student is then asked to repeat the words in the same order that the examiner presented them.
- *Sentence Questions* – The student listens to sentences that may not make a lot of sense, however, they are syntactically correct. The student must then answer a question about the sentence. An example of this item could be, the child is read the sentence "The blue is yellowing" and subsequently asked the following question: "Who is yellowing?"
- *Visual Digit Span* – The student is shown a series of numbers and must then say them in the order in which they were presented.

The CAS-2 subtests are utilized to attain five Extended Battery and Core scales (i.e., Full Scale, Planning, Attention, Successive, and Simultaneous) and five supplemental scales (i.e., Executive Function with Working Memory, Executive Function Without Working Memory, Working

Memory, Nonverbal Content and Verbal Content. The scaled scores from two or more subtests are combined to form the following separate scales:

- *Planning* – This scale describes a student's skills in forming a plan of action, carrying out the plan, evaluating the plan, and changing/adjusting the plan as needed. It is made up from the scores of the Planned Codes, Planned Connections, and Planned Number Matching subtests.
- *Simultaneous* – This scale describes a student's capacity to harmonize different elements into an interrelated group. It is formed by combining the results of the Verbal-Spatial Relations, Matrices, and Figure Memory subtests.
- *Attention* – This scale describes a student's capacity to pay attention while encountering particular stimuli and limiting the response to stimuli that is brought in to distract the student. It is formed by combining the results of the Number Detection, Expressive Attention, and Receptive Attention subtests.
- *Successive* – This scale describes a subjects' skills to remember or understand a serial organization of events. All of the Successive subtests ask the child to work with material that is conferred in a specific order. It is obtained by combining the data of the Visual Digit Span, Sentence Repetition or Sentence Questions, and Word Series subtests.
- *Full Scale* – The Full-Scale score yields an index of the over-all level of the child's cognitive functioning. It is calculated by combining the results of the Planning, Simultaneous, Attention, and Successive subtests.
- *Executive Function without Working Memory* – This composite provides a view of the student's capability to accomplish an objective by planning and organizing a project while focusing on a particular stimulus and opposing distractions in the surroundings. It is formed by combining the Expressive Attention and Planned Connections subtests.
- *Executive Function with Working Memory* – This composite provides a view of the student's capability to accomplish an objective by planning and organizing a project while focusing on a particular stimulus and opposing distractions in the surroundings; this also requires keeping data in memory while working on solving the problem. It is formed by combining the Planned Connections, Sentence Questions, Expressive Attention, and Verbal-Spatial Relations subtests.
- *Working Memory* – This composite is an index of the student's capacity to retain and mentally manipulate data for a short time period. It is formed by combining the Sentence Questions and Verbal-Spatial Relations subtests.
- *Verbal Content* – This composite examines the student's skill at solving difficult situations that require memory and/or understanding of words or verbal concepts. It is formed by combining the Receptive Attention, Sentence Questions, and Verbal-Spatial Relations subtests.
- *Nonverbal Content* – This composite examines the subjects' capability to problem solve with images. It is formed by combining the Figure Memory, Matrices, and Planned Codes subtests (Naglieri, Das, & Goldstein, 2014).

An instrument commonly used in neuropsychological assessments is the NEPSY-II. Neuropsychologists like this assessment because it has subtests that measure executive functioning and attention. Executive functioning and attention contain self-regulatory skills. The NEPSY-II Manual describes the following concepts (Korkman, Kirk & Kemp, 2007):

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- *Executive Functions* – Refers to activities necessary for achieving a goal, including creating a plan, being flexible, and the adjustment of thought based on feedback from the environment. Many executive functioning tasks also require working memory – maintaining data actively in memory during cognitive assignments.
- *Inhibition* – Inhibitory control is the skill to defy the urge to engage in an alluring behavior, as well as the ability to resist oneself from performing automatic behaviors. Some behaviors have a high chance of occurring automatically. For example, a child in a candy store may want to grab a piece of candy and eat it. The capacity to stop one's behavior despite wanting to touch, eat, or grab is inhibitory control. Children with inhibitory deficits may grab things they are not supposed to touch, talk out of turn, say things without thinking first, or start working on an assignment without listening to the instructions.
- *Initiation, Cognitive Flexibility, and Planning* – The concepts of initiation, cognitive flexibility, and planning denote various dynamic aspects of behavior. The inability to initiate behavior is observed in students who appear unmotivated, cannot guide their own behavior, or need multiple prompts to start or continue working. Parents, counselors, and teachers can get frustrated with these students because they constantly have to be told how to start and continue their tasks. The capability to alter one's behavior; problem-solving strategy; or approach to a task, problem, or social situation is referred to as cognitive flexibility. Children that engage in repetitive, nonfunctional behaviors, repeat the same mistakes repeatedly despite receiving corrective feedback, or have difficulties changing social behaviors to meet the demands of the situation may have poor cognitive flexibility. The child is unable to change his or her approach or think about the problem in a different way, and so he or she keeps making the same mistakes. Children can have difficulty adapting to change if they have deficits in cognitive flexibility. Planning usually requires both flexibility and initiation. The student initiates an action or set of actions that is helpful for the achievement of a goal.
- *Selective, Sustained Attention and Distractibility* – Selective attention involves the capability to maintain attention on a specific activity or task, and to block out competing interference. Sustained attention is evident when the focus is maintained over a period of time. Distractibility is the inability to maintain selective attention with the presence of competing stimuli.
- *Phonological Processing* – The ability to decode sounds associated with language. It is necessary for the progression and development of basic reading skills.
- *Immediate and Delayed Memory* – Immediate memory refers to remembering auditory or visual information (names, phone number, address). Delayed memory is the capacity to remember data after a delay of 20-30 minutes.
- *Encoding* – The action of getting material into long-term memory.

The Woodcock-Johnson IV Tests of Cognitive Abilities and the Woodcock-Johnson IV Tests of Achievement are frequent procedures that are utilized in an assessment battery. The Cognitive Clusters and Achievement Clusters have the following definitions in the Woodcock Johnson IV manuals:

Cognitive Clusters

- *Comprehension-Knowledge* – the depth and broadness of a child's knowledge base, the skill to express that knowledge (predominantly verbally), and the capacity to use logic based on knowledge acquired in the past.
- *Long-Term Retrieval* – the capacity to retain material and easily remember it when it is needed at a later date.
- *Visual-Spatial Thinking* – the capacity to observe, analyze, synthesize, and process using visual patterns, including the capacity to store and remember visual information.
- *Auditory Processing* – the capacity to listen, interpret, and discriminate auditory stimuli, including the capacity to synthesize and discriminate sounds from speech that may be given under unfavorable conditions.
- *Fluid Reasoning* – using logic and reasoning ability to solve new and unfamiliar tasks and problems.
- *Processing Speed* – timed subtests that look at speed in processing cognitive tasks. The student must maintain attention and focus.
- *Short-Term Memory* – the capacity to remember data that is presented and use it immediately (in a matter of seconds).
- *Working Memory* – the capacity to retain data in short-term memory, while performing a processing task on the data.
- *Broad Attention* – information processing is very dependent on the broad construct of attention. The broad construct can include sustained attention or vigilance, attentional capacity or working memory, focused or selective attention, and divided attention.
- *Cognitive Fluency* – examines the speed and fluency that the student has in the completion of school related tasks.
- *Executive Processes* – measures executive functioning in three different ways: (a) planning strategically, (b) the capacity to constantly modify one's mental set, and (c) proactive interference control.
- *Delayed Recall* – examines the capacity to both remember and relearn information that was learned in the past.
- *Knowledge* – examines the knowledge and information that the student has learned at home, in the environment, or in school. (Mather & Woodcock, 2014)

Achievement Clusters

- *Broad Reading* – measures multiple areas of reading including word decoding, reading fluency, and the skill to understand material while reading it.
- *Basic Reading Skills* – comprised of different composites of reading that include phonics, sight vocabulary, and structural analysis.
- *Reading Comprehension* – a composite analysis that could include vocabulary, passage comprehension, and reasoning.
- *Oral Language* – a combined cluster made up of memory, listening comprehension, expressive vocabulary, and reasoning.
- *Listening Comprehension* – a combined cluster of verbal comprehension and listening skills.

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- *Oral Expression* – a composite analysis of expressive vocabulary and linguistic competency.
- *Broad Math* – an extensive composite of achievement in math that could include number facility, reasoning, problem solving, and automaticity.
- *Math Calculation Skills* – a cluster that combines automaticity and computational skills with concepts that are essential in learning math basics. It gives information about basic mathematical skills.
- *Math Reasoning* – a cluster that looks at math reasoning and real-life math problems.
- *Broad Written Language* – a writing cluster that combines spelling of words, writing fluency, and the ability to express oneself with writing.
- *Basic Writing Skills* – a writing assessment that includes subtests in spelling; and error corrections in punctuation, grammar, spelling, and capitalization. It looks at skills in both contextually based and isolated formats
- *Written Expression* – an examination of the ability to express oneself with writing and writing fluency.
- *Academic Knowledge* – an aggregate examination of knowledge in science, culture, and social studies.
- *Academic Skills* – a comprehensive measure of academic achievement in math calculation, decoding of words, and spelling.
- *Academic Fluency* – examines the speed in which academic work can be completed.
- *Academic Applications* – measures the skill in applying learned academic skills to new academic problems.
- *Phoneme/Grapheme Knowledge* – this area examines the child's skills with both phonic (sound) generalizations, as well as common orthographic patterns (frequently occurring letter clusters) in both decoding (reading) and encoding (spelling).
- *Total Achievement* – this cluster looks at academic achievement in general (across many domains). (Mather & Welding, 2014)

The school neuropsychologist or clinical psychologist will write a School Neuropsychology Assessment Report. The report will include the scores from the clusters discussed in this article. The scores will be interpreted and discussed in the report. The strengths and weakness of the student will be discussed. The student's specific needs will be addressed. Possible interventions will most likely be linked to the student's specific needs. Eligibility for any special education categories will be discussed. The school neuropsychology assessment can be a very valuable tool in helping with the educational progress of a student with special needs.

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