

**The Role of
Neuropsychological Testing
in Concussion Management**

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**Neuropsychological
Assessment Model**

- Goal: To pinpoint specific cognitive deficits in order to target remediation
- Cognitive functioning is assessed in the context of developmental and medical history, educational history, and medical and psychiatric conditions
- Included in evaluation
 - Background review (medical and developmental histories, medical records, school records, standardized testing)
 - Clinical and collateral interviews (typically parents)
 - Behavioral observation (subjective interview, objective testing)

**Considerations of
Neuropsychological Evaluation**

- Are scores “normal?”
 - What is the extent of the deficit?
- What is the pattern that emerges within the neurocognitive profile?
 - Are findings consistent with concussive symptomatology?
 - Are there focal findings?
- Are our athletes engaged in the evaluation?

Advantages of Neuropsychological Evaluation

- Neuropsychological testing has become the standard objective mean by which to determine subtle cognitive changes associated with concussion
- Benefits include:
 - Objective assessment
 - Noninvasive, safe
 - Often more sensitive than neuroimaging
 - Relevant to functional integrity of the brain

Computerized Neurocognitive Assessment

- Immediate Post-Concussion Assessment and Cognitive Testing (ImPACT)
- The program measures multiple aspects of functioning in athletes, including:
 - Symptomatology
 - Verbal and visual memory
 - Processing speed
 - Attention span
 - Working memory
 - Sustained and selective attention time
 - Response variability
 - Non-verbal problem solving
 - Reaction time

www.impacttest.com

When to refer for comprehensive neuropsychological testing

- Failure of ImPACT testing to return to baseline within 10 days to a month post-injury
- Failure of concussive symptoms to ameliorate within 10 days to a month post-injury
 - Typical symptoms include mild impairments in attention, vigilance, divided attention, working memory, processing speed, retrieval/learning and/or memory.
 - Early symptoms (onset may be at time of initial insult or in the hours following): headache, dizziness, nausea/vomiting, drowsiness, blurred vision
 - Late symptoms (onset may be days or weeks after TBI): irritability; anxiety; depression; poor memory, imp. concentration; insomnia; fatigue; visual and auditory complaints

When to refer for comprehensive neuropsychological testing, con't

- Question of permanent cognitive impairment
- Need for objective data estimating individual skill sets
 - Most typically relating to academics
- History of multiple concussions
- Question of Malingering

Neuropsychological Assessment Battery

- Intellectual Functioning
 - Wechsler Abbreviated Scale of Intelligence - Second Ed.
- Academic Achievement
 - Woodcock-Johnson Tests of Achievement - Third Edition, NU
 - Forms A, B
- Visual Processing and Motor Functioning
 - Lafayette Grooved Pegboard
 - Delis-Kaplan Executive Functioning System
 - Beery-Buktenica Test of Visual-Motor Integration
- Attention and Executive Functioning
 - Test of Everyday Attention/ Test of Everyday Attention for Children
- Social and Emotional
 - Behavior Assessment System for Children - 2nd Edition
- Attention and Executive Functioning, con't
 - Delis-Kaplan Executive Functioning System
 - Wisconsin Card Sorting Test - 64 Card
 - Tower of London, 2nd Edition
 - Rey-O, Copy
- Memory
 - Rey-Osterrith Complex Figure Test
 - Wide Range Assessment of Memory and Learning - Second Edition
- Effort
 - Green's Medical Symptoms Validity Test
 - Green's Non-Verbal Medical Symptoms Validity Test
 - Green's Word Memory Test

Measures of Effort

- Green's Medical Symptoms Validity Test (MSVT)
 - Measure of verbal memory impairment
- Green's Non-Verbal Medical Symptoms Validity Test (NV-MSVT)
 - Measure of impairment for visual images
- Green's Word Memory Test (WMT)
 - Measure of verbal memory impairment

Wechsler Abbreviated Scale of Intelligence - Second Edition

Verbal Abilities

- Vocabulary
 - Fund of information; acquired knowledge; long-term memory; verbal expression
 - What is a BEAR?
 - What is a DOOR?
- Similarities
 - Acquired knowledge; verbal concept formation; verbal reasoning; abstract thinking
 - How are FORK and SPOON alike?
 - How are GAME and TOY alike?

Wechsler Abbreviated Scale of Intelligence - Second Edition, con't

- Performance Abilities
 - Block Design
 - Visual-perceptual organization; visual problem-solving; motor-coordination; fluid reasoning; processing speed
 - Respondent is given four blocks that have one color on two sides, a second color on two sides, and two split sides. The respondent is then presented with a block design and asked to replicate the design with his blocks. Performance is timed.
 - Matrix Reasoning
 - Visual-perceptual organization; abstract reasoning; fluid reasoning
 - Respondent is presented with a puzzle that has a missing piece as well as five options, one of which completes the puzzle. Performance is untimed.

Woodcock-Johnson Tests of Achievement - Third Edition, NU

- Alternate Forms
 - Form A & Form B
- Reading
- Writing
- Mathematics
- Fluency
- Single word vocabulary/confrontational naming

WJ-III Reading

- Letter-Word Identification
 - Single-word reading
 - ABSTAIN RUMINATE RECTIFY APPEAL
- Word Attack
 - Phonological decoding
 - GROUSS LECHSTER BLAFTAH RELANTS
- Reading Comprehension
 - Cloze Method
 - As I was walking down the street I ran into a famous _____ who told me to expect rain later that afternoon.

WJ-III Writing

- Spelling
 - Spell the following words:
 - Arrow, The archer shot an *arrow*, arrow.
- Written Expression
 - The second sentence is missing from the paragraph, write a good sentence that will fit:
 - When I first graduated college I was unsure about the direction of my life. _____
_____ At that time my calling became clear and I continued along the path I saw for myself.

WJ-III Mathematics

- Calculations
 - Complete the following problems:
 - $2x - 4y = 49$ $32/467$ 0.05×19.7 14 is x% of 94
- Applied Problems
 - Using pencil and paper if needed, answer these questions:
 - If a car traveling at 47 mph travels for four hours, how far would the car have traveled?
 - If the base of a triangle is five times and 4 inches less than the height, and the area is 56 square inches, what are the base and the height?

WJ-III Fluency

- Reading Fluency
 - Ability to read simple sentences for meaning quickly and accurately.
 - Clouds are in the sky. Y N
- Writing Fluency
 - Ability to write simple sentences quickly based on picture and word prompts.
 - Picture & Three words
- Math Fluency
 - Ability to read simple sentences for meaning quickly and accurately (stimuli are presented vertically).
 - 2 + 3 9 - 5 4 x 8 6 / 2 10 - 9

Single-word expressive vocabulary/ confrontational naming













Visual Processing and Motor Functioning

- Delis-Kaplan Executive Functioning System
 - Trail Making Test
- Lafayette Grooved Pegboard
- Beery-Buktenica Test of Visual-Motor Integration

Delis-Kaplan Executive Functioning System

- Trail Making Test
- Visual Scanning
 - Target Identification
- Motor Speed
 - Path Tracing
- Directions state that it is more important to be fast than to be neat.

Lafayette Grooved Pegboard Test

- The Grooved Pegboard is a manipulative dexterity test. This unit consists of 25 holes with randomly positioned slots. Pegs, which have a key along one side, must be rotated to match the hole before they can be inserted. This test requires more complex visual-motor coordination than most pegboards.



Beery-Buktenica Test of Visual-Motor Integration

- Visual-Motor Integration
 - Copy Trial
- Visual Perception
 - Figure Matching
 - 3-minute time limit
- Motor Coordination
 - Figure Copy within lines
 - 5-minute time limit

Attention and Executive Functioning

- Test of Everyday Attention/Test of Everyday Attention for Children
- Delis-Kaplan Executive Functioning System
- Wisconsin Card Sorting Test - 64 Card
- Tower of London, 2nd Edition
- Rey-Osterrith Complex Figure Test, Copy

Test of Everyday Attention/Test of Everyday Attention - For Children

<ul style="list-style-type: none">• Simple visual attention<ul style="list-style-type: none">• Target selection• Sustained visual attention<ul style="list-style-type: none">• Attention measured at one and two minutes• Divided visual attention<ul style="list-style-type: none">• Target selection while attending to auditory information as well• Inhibition/Switching<ul style="list-style-type: none">• Follow a visual path while engaging in a switching task	<ul style="list-style-type: none">• Simple auditory attention<ul style="list-style-type: none">• Sound counting• Sustained auditory attention<ul style="list-style-type: none">• Selective attention to extended strings of information• Divided auditory attention<ul style="list-style-type: none">• Sound counting while listening for a target word within an auditory vignette as well• Inhibition/Switching<ul style="list-style-type: none">• Sound counting while engaging in a switching task
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Delis-Kaplan Executive Functioning System

- Trail Making Test
 - Simple attention is the ability to attend to one type of stimulus at a time, for example numbers or letters
- Verbal Fluency
 - Verbal fluency is an executive function that may be important for generating possible solutions when trying to solve a task
- Design Fluency
 - Analogous to verbal fluency is design fluency, which is also an executive function that may be important for generating possible solutions when trying to solve a task
- Color-Word Interference
 - Another type of executive function is interference control, which is the ability to inhibit automatic responses.

D-KEFS Trail Making Test

- Letter Sequencing
 - Connect randomly placed letters A - P (think connect the dots)
- Number Sequencing
 - Connect randomly placed numbers 1 - 16 (again connecting dots)
- Letter-Number Switching
 - Switch between randomly placed letters and numbers (also connecting dots)

D-KEFS Verbal Fluency

- Letter Fluency
 - Number of words provided in one minute in response to three letter prompts: D, E, T
- Category Fluency
 - Number of words provided in one minute in response to two category prompts: colors, types of jobs
- Category Switching
 - Number of words provided in one minute while switching between two categories: foods & animals

D-KEFS Design Fluency

- Empty Dots
 - Number of different designs provided in one minute by connecting empty dots in pre-drawn boxes
- Filled Dots
 - Number of different designs provided in one minute by connecting filled dots in pre-drawn boxes
- Switching
 - Number of different designs provided in one minute while switching between filled and empty dots in pre-drawn boxes

D-KEFS Color-Word Interference

- Color Reading
 - Identify patches of color
- Word reading
 - Reading color words
 - Black Print
- Inhibition
 - Identifying the color of the ink in which a word is printed
- Inhibition/Switching
 - Switching between identifying the color of the ink in which a word is printed and reading the word should the word be in a small box

ImPACT Module 5: Color Match

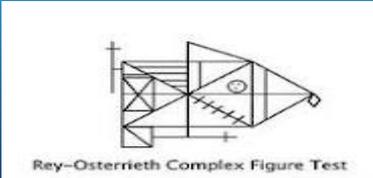
- Module 5: Color Match This module represents a choice reaction time task and also measures impulse control and response inhibition. First, the athlete is required to respond by clicking a red, blue or green button as they are presented on the screen. This procedure is completed to assure that subsequent trials would not be affected by color blindness. Next, a word is displayed on the screen in the same colored ink as the word (e.g. RED), or in a different colored ink (GREEN or BLUE). The athlete is instructed to click in the box as quickly as possible only if the word is presented in the matching ink. In addition to providing a reaction time score, this task also provides an error score.

Wisconsin Card Sorting Test - 64 Card Version

- The WCST-64 is a measure of executive skill that requires concentration, planning, organization, cognitive flexibility in set shifting, working memory, and the ability to inhibit impulsive responding. The WCST also requires the ability to develop and maintain an appropriate problem solving strategy across changing stimulus conditions in order to achieve a future goal, and evaluates for abstract reasoning ability and the ability to shift cognitive set.
- Respondents are presented with four key cards and must match stimulus cards in an attempt to ascertain the underlying principles of the task; feedback is provided

Rey-Osterrith Complex Figure Test, Copy

- The respondent is presented with a complex figure and told to copy. Respondents are not permitted to rotate the figure or the copy page.
- This targets organization of novel, complex visual information and sets the expectation for encoding, recall, and recognition.



Rey-Osterrith Complex Figure Test

Memory and Learning

- Wide Range Assessment of Memory and Learning - Second Edition
- Rey-Osterrith Complex Figure Test

Wide Range Assessment of Memory and Learning - Second Edition

<ul style="list-style-type: none">• Verbal Memory<ul style="list-style-type: none">• Contextual Memory• Immediate Memory• Delayed memory• Recognition• Noncontextual Memory<ul style="list-style-type: none">• Immediate Memory• Delayed memory• Recognition• Auditory Attention• Verbal Working Memory	<ul style="list-style-type: none">• Visual Memory<ul style="list-style-type: none">• Contextual Memory• Immediate Memory• Delayed memory• Recognition• Noncontextual Memory<ul style="list-style-type: none">• Immediate Memory• Delayed memory• Recognition• Visual Attention• Symbolic Working Memory
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WRAML2 Auditory/Verbal Memory

- Contextual Memory - Stories
 - Immediate
 - Delayed
 - Recognition
- Noncontextual Memory - Word Lists
 - Immediate
 - Delayed
 - Recognition

ImPACT Module 1: Word Discrimination

- This module evaluates attentional processes and verbal recognition memory utilizing a word discrimination paradigm. Twelve target words are presented for 750 milliseconds on the computer screen. This word list is presented twice to facilitate learning of the list. At the end of the second presentation of the list, the subject is tested for recall via the presentation of the 24-word list that is comprised of 12 target words and 12 non-target words that have been chosen from the same semantic category as the target word. For example, the word "ice" is a target word, while the word "snow" represents the non-target word. The subject responds by mouse-clicking the "yes" or "no" buttons on the screen. Individual scores are provided both for correct "yes" and "no" responses. In addition, a total percent correct score is provided. There are five different forms of the word list. Delay Condition: Following the administration of all other test modules (approximately 20 minutes), the athlete is again tested for recall via the same method described above. The same scores that are described above are provided for the delay condition.

WRAML2 Visual Memory

- Contextual Memory - Pictures
 - Immediate
 - Recognition
- Noncontextual Memory - Designs
 - Immediate
 - Recognition

ImPACT Module 2: Design Memory

- This module evaluates attentional processes and visual recognition memory utilizing a design discrimination paradigm. Twelve target designs are presented for 750 milliseconds on the computer screen. This sequence is presented twice to facilitate learning. At the end of the second presentation of the list, the subject is tested for recognition via the presentation of 24-designs comprised of 12 target designs and 12 non-target designs (target designs that have been rotated in space). Similar to the word recognition task, the subject responds by mouse-clicking the "yes" or "no" buttons on the screen. Individual scores are provided both for correct "yes" and "no" responses. In addition, a total percent correct score is provided. There are five different forms of this task. Delay Condition: Following the administration of all other test modules (approximately 20 minutes), the athlete is again tested for recall via the same method described above. The same scores that are described above are provided for the delay condition.

WRAML2 Attention

- Auditory Attention
 - Repetition of progressively longer strings of auditorily presented numbers and letters
 - 4
 - S - 6
 - D - 4 - 7
- Visual Attention
 - Replication of progressively longer strings of visually presented spatial locations
 - Presented on a board with circular cut-outs

WRAML2 Working Memory

- Verbal Working Memory
 - Respondent is presented with words, some of which are sea creatures and some of which are not.
 - In the first condition the sea creatures are to be repeated first, in size order, and then the other words in any order.
 - In the second condition the sea creatures are again to be repeated first, and again in size order, and then the other words are to be repeated, also in size order.

WRAML2 Working Memory, con't

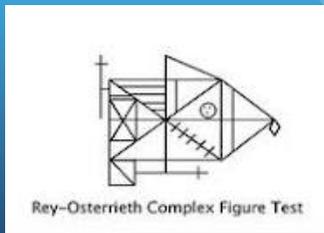
- Symbolic Working Memory
 - In the first condition numbers are presented verbally in a random order and the respondent taps them out in the correct numerical order on a page with printed numbers
 - In the second condition numbers and letters are presented verbally in a random order and the respondent taps them out, numbers first in the correct numerical order, and letters second in the correct alphabetical order, on a page with printed numbers and letters

ImPACT Module 3: X's and O's

- This module measures visual working memory as well as visual processing speed and consists of a visual memory paradigm with a distractor task. The athlete is allowed to practice the distractor task prior to presentation of the memory task. The distractor task is a choice reaction time test during which the athlete is asked to click the left mouse button if a blue square is presented and the right mouse button if a red circle is presented. Once the athlete has completed this task, the memory task is presented. For each of the trials of the memory task, a screen is displayed for 1.5 seconds that has a computer-generated random assortment of X's and O's. For each of the trials, three of the X's or O's are illuminated in YELLOW on the screen. The athlete is asked to remember the location of the illuminated objects. The X's and O's that are illuminated are randomized by the computer for each trial and for each administration of the test. Immediately after the presentation of the 3 X's or O's, the distractor task re-appears on the screen. Following the distractor task, the memory screen (X's and O's) re-appears and the athlete is asked to click on the previously illuminated X's and O's. Scores are provided for correct identification of the X's and O's (memory), reaction time for the distractor task, and number of errors on the distractor task. For each administration of the ImPACT test, the athlete completes four trials.

Rey-Osterrith Complex Figure Test, Copy

- Following the initial Copy, respondents are asked to draw the figure from memory. They are then asked to draw it a third time following a half an hour delay. Recognition trials are administered.



Social and Emotional Functioning
Behavior Assessment System for Children -
Second Edition (BASC-2)

- Atypicality
- Locus of Control
- Social Stress
- Anxiety
- Depression
- Sense of Inadequacy
- Somatization
- Internalizing Problems
- Attention Problems
- Hyperactivity
- Inattention/Hyperactivity
- Attitude to School
- Attitude to Teachers
- Sensation Seeking
- School Problems

Social and Emotional Functioning
Behavior Assessment System for Children -
Second Edition (BASC-2), con't

- ADAPTIVE SCALES
 - Relations with Parents
 - Interpersonal Relations
 - Self-Esteem
 - Self-Reliance
 - Personal Adjustment

Case Studies

- The patient with focal findings
- The patient who needs a psychiatric evaluation to be cleared for neuropsychological evaluation
- The patient who(se mother) begs for an AD/HD dx
- The patient with premorbid findings
- The patient with "typical" findings
 - Comprehensive Recommendations

**Case One:
The patient with focal findings**

- The patient demonstrates difficulties in the areas of reading comprehension, math fluency, visuomotor integration, attention, manual dexterity (impairment in the left hand > right hand), and slowed visual processing.
- Normal CT at the time of injury
- Within one week of neuropsychological evaluation, upon physical examination, this patient's vestibular symptoms were ~ 60-70% improved, and balance was ~ 60% improved. Otherwise she seemed to be doing well and began to return to school.

Recommendations

- In addition to the initial recommendation for neuropsychological testing, Vestibular Therapy and a Developmental Optometric Evaluation were recommended. These recommendations will target deficits in visuomotor integration, manual dexterity, and slowed visual processing.
- The patient has not been in school since her injury. It is recommended that she begin the transition back to school at half days. Support from the Guidance Counselor is recommended, as is the creation of a 504 Accommodations Plan. Accommodations may include those for:
 - Mathematics
 - Reading
 - Attention

Case Two: The patient whose psychiatric symptoms trump concussive symptoms

- The patient has a history of substance abuse including alcohol and both prescribed and nonprescribed substances. The patient's addiction began in 2007 and is something with which he continues to struggle; he has been in various treatment facilities. At the time of the interview the patient had not used drugs or alcohol in 70 days and was attending Narcotics Anonymous. The patient has a prescription history of Topamax, Seroquil, Adderall, Paxil, Prozac, and Symbiax and was medication noncompliant at the time of this interview. He was disorganized and agitated, with tangential and circumlocutory speech at the time of the interview.

Case Two: The patient whose psychiatric symptoms trump concussive symptoms, con't

- This patient was referred to psychiatry for a psychiatric and medication evaluation. Following psychiatric intervention and medical stabilization, the patient returned to neuropsychology; typical findings. He is currently followed by psychiatry.
- Not all patients referred to psychiatry come back to neuropsychology.

**Case Three:
The patient who(se mother) begs for an AD/HD diagnosis**

- AD/HD diagnosis = Football
- Concussion diagnosis ≠ Football

**Case Four:
Premorbid Findings**

- Typically when there are premorbid findings they relate to language processing or attention.
 - Language: How do we know?
 - Attention: Can we be sure?

Case Five: The patient with “typical” findings

- Typical findings include difficulties with attention, executive functioning, visual processing, academic functioning, memory, and motor functioning.
- Recommendations become very important because many of these are invisible disabilities that cannot be seen by the naked eye, which gives rise to difficulties in functional living and academics.

Typical Recommendations - Academic

- Reading
 - Encourage the patient to self-monitor while reading, using guiding questions such as: “Can I pull out the main idea?” “If I’m not understanding, have I re-read or asked for help?” “Does this make sense in the context of what I’ve read so far?” etc. This upper level critical thinking skill is essential to be self-monitoring and the deep internalization of learning.
 - Provide the patient both with the questions of the chapter prior to beginning reading as well as with specific reading “goals” (e.g. Read this chapter to find out why...). This is particularly important to the development of reading comprehension in classes where inferences must be drawn.

Typical Recommendations - Academic

- Reading, con’t
 - Provide pre-reading skills to enhance comprehension, such as a clear presentation of the objective of an activity, pre-teaching vocabulary, providing study guides and motivational activities to build interest.
 - Provide experience before and after reading as a frame of reference for new concepts. Draw a parallel to a situation that the patient might have previously experienced in problem solving.
 - Directly and specifically point out relationships in the material.
 - Use color-coding or other means to mark text to show relationships between ideas.

Typical Recommendations - Academic

- Writing
 - It is recommended that the patient be allowed to submit typewritten work as opposed to handwritten work. A computer is recommended to assist in this pursuit, as is typing instruction.
 - If the use of a computer precluded, it is recommended that the patient be allowed to dictate his responses to an adult or into a tape-recorder. If necessary, he can recopy later. The goal is to allow the output process to occur without being stopped by the execution problem.
 - When composing a paper, it is recommended that the patient engage in prewriting activities such as webbing, verbalizing, or making an outline of the information to be included in the paper. The Inspiration software group puts out a program (Kidspiration K-5; Inspiration 6-12) that may be helpful in organizing written work (www.inspiration.com).

Typical Recommendations - Academic

- Math
 - The patient needs training in the basic concepts of math calculations and while effort should be directed toward ensuring that the patient understands how the mathematical procedures work, as well as how and when to use them in computation.
 - Using a “think-aloud technique” in reciting steps used during computation when in homework and tutoring is a potent form of self-cueing and can alert the tutor/teacher as to when the patient’s process has gone awry.

Typical Recommendations - Academic

- Math, con’t
 - Space problems far enough apart to allow room for calculations and to reduce distractibility.
 - Use computational aids - manipulatives, models, blocks, abacus, etc.
 - Score according to the number correct out of the number attempted to give slower working students credit for accuracy and effort.
 - Color code or underline important words or symbols in problems that afford clues.

Typical Recommendations - Academic

- General
 - Extra time is recommended, in the amount of time and a half, for all assignments, including but not limited to tests, quizzes, homework, classwork, and standardized assessments.
 - It is recommended that the amount of work that is expected of the patient be reduced, though certainly not the breadth. Quality over quantity will be important at this time. Options include presenting a reduced amount of information on the page and in a larger print. For example, as opposed to having 20 math questions on a page, a more appropriate amount is 10 problems, with the problems printed in a larger font than is used for the rest of the class.
 - Avoid transferring answers to an answer sheet.
 - Use consistent testing styles throughout the year.

Typical Recommendations - Academic

- General, con't
 - Consider using multiple choice test items that are unambiguous and limited in the number of choices, with response choices that are easily circled and placed vertically under the question.
 - Consider using matching items that have an equal number of choices in each column and have one correct answer for each item, with questions grouped in small sets of items and with a blank placed beside items in one column to avoid having Justin draw lines.
 - Consider using completion items that have blank spaces sized in relation to the size of the space needed for the answer that provide enough information in the question to facilitate recall and employ the use of word banks.
 - Consider essay items that require only brief responses or outline form, with appropriate space for anticipated answer length and an answer check sheet that lists the components expected.

Typical Recommendations - Academic

- Attention
 - Preferential seating is recommended, close to the teacher, away from the windows, doors, radiators, and other environmental distracters (this may include disruptive students as well).
 - It will be important for the patient's teachers to be aware that she may have gaps in attention that are outside of her control. To this end they should ensure that she understands what is being asked of her at all times. Ask the patient to explain the directions, not repeat but explain, as simple repetition does not ensure understanding.
 - When calling upon the patient in class, be aware of the above recommendation, ensure that her attention is focused, and that she understands what is being asked of her. Again, it may be necessary to alert her prior to the provision of the question that one is forthcoming.

Last Step:
When to refer and to whom

- Cognitive Rehabilitation
 - Executive Dysfunction
 - Memory Deficits
- Developmental Optometric Evaluation
 - Visual processing deficits
 - Visual-motor integration deficits
 - Visuoconstructional deficits
- Occupational Therapy Evaluation
 - Motor deficits
 - Visual-motor integration deficits
 - Visuoconstructional deficits

Last Step:
When to refer and to whom, con't

- Speech/Language Evaluation
 - Naming deficits
 - Difficulties with verbal expression
- Cognitive Behavioral Therapy
 - Pre-existing psychological issues
 - Psychosocial difficulties
 - Psychological issues adjusting to, or stemming from, concussion

Thank You

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