Unraveling the Neuropsychological Assessment

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The most important first step toward treatment planning is gaining a full understanding of the individual child. This includes not only being aware of the challenges they face and why, but also the strengths that they possess and how these can be used to help them. The neuropsychological assessment is an integral part of this process. Diagnosis is often considered to be one of the goals of assessment and it certainly carries important information. But what is needed for programming is a consideration of the whole child – information related to their cognitive and academic profile, as well as behavioral and emotional functioning, that is understood both within a developmental framework and the environmental context.

In the traditional definition, the discipline of child neuropsychology is concerned with understanding brain-behavior relationships in the developing individual. Historically, the field evolved from a lesion localization model (e.g., trauma to a particular part of the brain leads to a particular kind of deficit) and from studies of the effects of neurological disease, primarily in adults, on cognitive functioning. At present, behaviors are further defined and linked to brain processes through the use of new technologies (e.g., neuroimaging or brain scans). The study of these processes in children and the effects of neurodevelopmental disorders is a growing field of research. In clinical settings, the neuropsychologist typically has a role in determining the functional impact of neurological diseases or damage to the brain (e.g., acquired in a car accident). More broadly, the neuropsychologist endeavors to assess different domains of functioning (e.g., attention, memory, problem solving) in order to generate a profile of strengths and weaknesses that can inform treatment planning and adaptation in daily life.

What is a neuropsychological assessment?

A neuropsychological assessment typically evaluates multiple areas of functioning. It is not restricted to measures of intelligence (e.g., IQ) and achievement but examines other areas of functioning that also have an impact on performance in the classroom, with peers, at home, or on the job. The following represents a set of cognitive functions that is likely to be assessed:

- Sensory perceptual and motor functions
- Attention
- Memory
- Auditory and visual processing
- Language
- Concept formation and problem solving
- Planning and organization
- Speed of Processing
- Intelligence
- Academic skills
- Behavior, emotions, and personality

The importance of sampling a range of functions is that most measures are not "pure" – that is, they do not assess one skill only. For example, on a timed task in which the child is asked to copy figures, poor performance could be related to a motor, visual perceptual, attentional and/or a speed of processing issue. Difficulty on a measure of math skills may reflect limits in understanding of numerical concepts, remembering math facts, understanding the language of mathematics, remembering which operations to apply when, visualizing concepts, sequencing (e.g., performing the right steps in the right order), and/or attending to visual details (e.g., operational sign, place, columns of numbers). The assessment is structured to investigate aspects or subcomponents of the child's performance that will clarify the nature of their detected weakness within a specific area.

The assessment process

Various tests can be used to assess the domains listed above. In this regard, the tests that are used by individual neuropsychologists are not fixed but may be selected according to: the referral questions, age of the child, clinician's preference, soundness of the measures, and issues pertinent to a particular child. One common assessment approach is to make use of a core battery of tests and then supplement with tests of specific skills in view of the results from the standard battery. Other considerations in this process include the child's developmental history, the clinical interview, observations of test behavior (e.g., during more or less structured situations), naturalistic observations (e.g., adjustment in the classroom), behavioral and emotional presentation, and interviews with selected individuals in the child's everyday environment (e.g., teachers, therapists). Exploring why the child is encountering difficulties involves examining converging lines of evidence from different tests, parent and teacher report, observations of behavior, and clinical judgment.

The testing situation is also typically set up to obtain the best possible performance from the child, under optimal conditions. An implicit question underlying many referrals is whether the behaviors that the child is displaying at home and school or with peers are due to, for example, compliance, motivation, or emotional factors, or because they are lacking some of the component skills necessary for success in these realms. As we isolate the child's individual strengths and weaknesses, we achieve a better understanding of where breakdowns may be occurring and what compensatory strategies are being used.

The distinction between testing and assessment

Tests are one of the tools the neuropsychologist uses during an assessment. Interpretation of the results of the testing is very important and relies on the clinical skill and experience. Tests are merely instruments, and they can lead or mislead depending upon how they are used. This raises the question: Why are we so interested in obtaining test scores? First, these instruments allow us to obtain a sample of the child's behavior in a standardized fashion and using normative data. In other words, the test is given in the same way under the same conditions to each child and we can compare the child's performance relative to their peers and to their own performance on other tests (or subtests). Measures are also chosen because they are reliable and valid. Test results should be consistent (e.g., if we test the child again, we should get the same result) and measure what they purport to measure – something meaningful and that has some predictive value. A final important point is that a distinction is made between testing a child and conducting an assessment. More than test administration and test scores, there is an evaluative component of this process that involves how the results are interpreted and assigning meaning to the results. As noted, this is based on analysis and synthesis of multiple lines of converging evidence and a dynamic process of hypothesis testing and information gathering.

Who can benefit from this kind of evaluation?

A comprehensive neuropsychological assessment is recommended for a range of childhood disorders. More generally, if an individual is failing to adapt to their learning, social, or work environment, an evaluation can assess different functional domains in order to better understand what is contributing to their difficulty. It is especially valuable for pervasive developmental disorders (e.g., autism, Asperger syndrome) where there is usually considerable scatter in the child's profile. In this case, when skills are widely divergent, an overall IQ score can be misleading as the child shows areas of notable strength as well as areas of deficit. Neuropsychological evaluations and research are conducted in (but not limited to) the following areas:

- Learning disabilities
- Attention deficit disorders
- Neuropsychiatric disorders (e.g., pervasive development disorders, Tourette syndrome, anxiety and depression)
- Closed head injury
- Seizure disorders
- Brain tumors
- Strokes

- Effects of toxic substances (e.g., lead poisoning)
- Genetic disorders (e.g., Turner syndrome, Williams syndrome)

What information does the neuropsychological assessment provide?

The neuropsychological assessment provides information that is important for diagnosis and program planning. Concerning diagnosis, specific developmental patterns and profiles of cognitive functioning are associated with particular disorders. A comprehensive assessment can yield information to assist in distinguishing one disorder from another as well as better clarifying its nature. The diagnostic referral question may also involve discriminating between neurological and psychiatric disorders, which is addressed in collaboration with other professionals. The issue then becomes one of whether the pattern of abilities and deficits displayed by the child is due to compromised brain functioning or related to some known developmental disorder versus some other set of factors. In addition, based on knowledge of brain-behavior relationships, evidence for dysfunction in one region of the brain may tell us something about other difficulties that might present. Finally, given a range of experience with childhood disorders, the neuropsychologist can say something about the developmental progression of a particular disorder, what the child's future challenges might be, and what treatment strategies will be helpful.

In this regard, knowing more about the child's strengths and weaknesses can assist in interpreting their behaviors and guiding program/treatment planning. For example, a parent or teacher may observe: 'It feels like I have to teach Sara everything, everytime.' Underlying this behavior may be deficits in identifying the rules for more abstract concepts, identifying or discovering the common (or "unwritten") principle, discriminating relevant versus irrelevant information, or memory. An understanding of the child's profile of functioning suggests what areas are likely to be problematic for them and what compensatory strategies might help. The child who has a deficit in planning and organization may also have difficulty completing assignments, expressing their ideas orally or in writing, adapting to novel circumstances, and/or coming up with alternate responses for a specific problem or situation. If the child has strong visual perceptual skills, visual cues such as graphic organizers (e.g., charts, visual schedules, semantic maps) may be useful. From this perspective, a basic tenet is to enhance the child's strengths and use them to compensate for their weaknesses.

The neuropsychological assessment is undertaken in the context of knowledge about different disorders that affect children at different ages, and knowledge about development. Findings that are framed within this context permit an evaluation of whether a child is at risk for a disorder or showing a developmental delay. In addition, tests are developmentally referenced and can tell us something about the child compared to peers of the same age (versus relying on subjective observations alone). These instruments further provide a measure of change over time, revealing whether there has been deterioration in performance or gains. Reassessment is especially important for children who are by their nature dynamic and naturally variable in their development. Changes in the child's cognitive and behavioral repertoire can be gauged over time.

Finally, a written report should be provided following completion of the assessment that can be shared with those involved in the child's care. Typically, sections will comment on:

- Reasons for referral
- Background information (history and current concerns)
- Tests administered
- Behavioral observations
- Test results and interpretation
- Summary of impressions
- Recommendations and need for referrals to other specialists

The neuropsychological assessment is typically a comprehensive endeavor and is not finished once a child has been assigned to a diagnostic category. Information is also gathered to identify the child's strengths and areas of need, to promote a more complete understanding of the child and develop treatment strategies. In addition to the immediate goals, long-term aims such as to promote adaptability, independence, and fulfillment, should be borne in mind.

Who is qualified to conduct a neuropsychological assessment?

A neuropsychological assessment is usually conducted by a psychologist specially trained in neuropsychology. This person will hold a Ph.D. and have predoctoral and postdoctoral training working with children who have acquired brain injury or neurodevelopmental disorders. In addition, a neuropsychologist has specialized training through additional coursework in neuropsychological assessment, neuroanatomy, and brain function. This individual will have worked closely with senior neuropsychologists as part of their specialized clinical training. All neuropsychologists should be licensed and some will also be recognized by the professional board in this discipline (e.g., ABCN, ABPN). Child neuropsychologists may be found in medical settings, rehabilitation centers, educational contexts, and private practice. Individuals interested in obtaining a neuropsychological assessment should inquire about specific training that the professional has had in this area.