

Ocean View Neuropsychiatry

NEUROPSYCHOLOGICAL ASSESSMENT IS DESIGNED TO PROVIDE INSIGHT INTO HOW A CHILD:

- solves problems,
- can remember information both in the short and long-term,
- uses and understands language,
- processes information both visually and orally, and
- is able to use cognitive ability in a flexible manner.

It is designed to provide parents, educators, and medical personnel not only with what the child knows, but how the child thinks and arrives at solutions. It encompasses cognitive ability as well as emotional and behavioral regulation assessment. Children can have difficulty for many different reasons and a neuropsychological evaluation provides a window into understanding what is problematic, what is a strength, and also treatment recommendations. In addition, discussions about typical development, prognosis, and possible referrals (i.e. neurology, genetics, metabolism) are also appropriate as part of the assessment. **Costs will range from \$1,200 to \$5,000 depending on the scope of the assessment,**

DESCRIPTION

What is a neuropsychological assessment?

A pediatric neuropsychologist is a professional with a doctorate in psychology. He/she has additional specialized training in working with children and adolescents who have difficulties. The neuropsychologist is a licensed psychologist who has completed additional study in how learning and behavior are related to the developing brain and neural networks. Children and adolescents are different from adults in that their brain is still developing. For example, one would not expect the same type of skills and learning of a 6-year-old as a 16-year-old. The reason for this difference is that the brain changes throughout childhood and adolescence. Basic brain areas that mature early are 'hard-wired.' This means that they are genetically programmed. These areas include visual acuity, auditory processing, and motor control. Other brain areas continue to develop throughout childhood and involve the ability to learn, remember, pay attention, and manage behavior. Some parts of the brain (the frontal lobes) do not fully mature until the person is in his/her mid-twenties. The frontal lobes are important for controlling impulses, learning from past mistakes and having insight into one's own behavior and its effect on others.

Pediatric neuropsychologists see children of all ages up through late adolescence/early adulthood. Infants as young as a few days old can be evaluated to determine their level of progress. The evaluation of these children is fairly short and focuses on where the child is developmentally, particularly in the areas of motor and alertness. For example,

- the evaluation of preschoolers focuses on language and cognitive development
- school-age children are evaluated for academic progress, emotional control, social functioning, and attention

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- adolescents are also evaluated for academic progress, emotional and behavioral control, and social functioning

Assessments of infants and preschoolers are around 2 hours of time while those with adolescents can take longer.

For some children, the pediatric neuropsychologist may see them over time to determine progress. Most frequently these repeated evaluations are for children who have concussions, who have genetic and neurological disorders, or whose emotional and behavioral control issues are such that the neuropsychologist wants to make sure they are being provided sufficient support.

A pediatric neuropsychological evaluation differs from a school psychological assessment in emphasis. Most school psychologists evaluate a child's need for special education as well as to determine what is the most appropriate educationally. The focus is on education achievement and the skills to succeed in school.

A pediatric neuropsychological evaluation differs from a general psychological assessment. A psychological assessment looks at how the child is functioning intellectually, academically, socially, and emotionally. This type of assessment compares the child to other children the same age and looks for differences that will assist with psychological interventions such as psychotherapy and/or parent training. At times children have completed a psychological assessment prior to being referred for a neuropsychological assessment. Many of the same measures are used but interpreted differentially based on the neuropsychologist's view of the developing brain.

Why is a child/adolescent referred for a neuropsychological assessment?

Children are often referred for an evaluation to determine why they are experiencing difficulties. These difficulties can be problems with learning, with behavior, or with emotional control. They are also referred because a medical issue has been newly diagnosed. These issues may be genetic in origin, can include concussions or brain injury, be the result of cancer or brain tumor treatment, or be related to diagnoses such as epilepsy, neurofibromatosis, or movement disorders such as Tourette syndrome. In addition, children may be referred for evaluation if they have been exposed to alcohol during the pregnancy or ingested or breathed in lead. Neuropsychologists also see children who have significant problems with controlling their behavior and emotions. Diagnoses such as autism, attention deficit hyperactivity disorder (ADHD), and dyslexia are also reasons for a child to be evaluated.

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Children are most often referred for a neuropsychological assessment by their pediatrician, teacher, school psychologist, or by their parent. The most common reasons are:

- 1) learning problems, behavior, difficulty, social difficulty, emotional control problems;
- 2) a disease or a genetic problem that affects the brain; or
- 3) a brain injury (this may be from birth, an accident, or fetal alcohol/lead exposure).

Areas such as memory, attention, processing of visual and auditory information, motor coordination, language, and emotional functioning are evaluated. These assessments are designed to provide useful interventions and treatments for the child. In addition, neuropsychological assessments can also help the parent, teacher, and other professionals to understand the child and his/her behavior better and to provide needed support.

DIAGNOSTIC STANDARDS

What types of measures are used in this assessment?

A good neuropsychological assessment tailors the evaluation to the child's needs as well as being comprehensive. Thus, not all children will be administered the same measures. A detailed developmental and medical history is gathered as well as information from the main people in the child's life (parent, teacher). This data provides a beginning point from which the neuropsychologist can determine possible areas of difficulty for the child, what measures are most appropriate, and what possible diagnoses need to be explored. In addition, the neuropsychologist will observe the child's behavior toward the examiner as well as toward the measures utilized. Areas that are evaluated include the child's motivation, how he/she manages frustration, level of cooperation, social interaction, and behavior.

The main areas that are evaluated in a neuropsychological assessment include the following:

- a measure of general cognitive functioning
- attention
- executive functions
 - planning, organization,
 - cognitive flexibility,
 - working memory (ability to keep information in mind while solving a problem)
- learning and memory
- language
- visual-spatial skills
- adaptive behavior (how a child performs independently in everyday life)
- behavior and emotional abilities
- social skills
- sometimes academic ability

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DOMAINS ASSESSED

General Cognitive Ability

Measures of general cognitive ability, also known as IQ tests, evaluate the child's ability to:

- solve visual problems,
- understand and use language,
- answer questions,
- construct block designs,
- compare visual patterns,
- evaluate how fast a child/adolescent can process visual information, and
- evaluate working memory.

IQ measures provide an overall score of ability. Most measures also provide scores as to the child's verbal skills and visual-spatial ability. Some provide additional scores in working memory, processing speed, and learning ability.

IQ can vary over time for children who have experienced a medical difficulty. Typically, IQ is stable after the age of 8 in healthy children. Children who have had concussions, traumatic brain injuries (TBI), cancer treatment, and transplants often will show lowering of overall ability. For this reason, serial evaluations are important in order to determine the child's functioning and continuing intervention needs.

IQ tests are developed for different ages.

- **The Wechsler tests** are developed for 3 different ages:
 1. preschool and primary (ages 3-7)
 2. school-age (ages 6-16)
 3. adult (ages 16-89)
- **The Differential Abilities Scale-2 (DAS-2)** has 2 forms; one for children aged 2 years 6 months to 5 and another for ages 5-17.
- **The Wechsler and DAS scales** also have scales that can be computed that measure solely nonverbal ability.
- The **Kaufman Assessment Battery for Children-2 (K-ABC2)** is a measure for a child that is meant to be administered with less emphasis on timing and language. The KABC2 also provide a nonverbal scale as well as general ability scales. These are the main measures of IQ that are used in general practice.
- The **Stanford-Binet Intelligence Scale 5** can be used but is weighted on language for school-age children.
- The **Comprehensive Test of Nonverbal Intelligence (C-TONI)**, the **Leiter International Scale of Intelligence**, and the **Universal Nonverbal Test of**

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Intelligence (UNIT) are measures that do not rely on language and are used with children whose first language is not English.

Attention

Attention is an important area for evaluation because if a child has attentional problems, he/she may struggle on all of the other measures. Attention is often evaluated through clinical interviews with parents and teachers as well as the completion of behavior rating scales. There are many behavior rating scales that are used. Some scales ask questions about attention as well as other aspects of behavior and emotional adjustments (**Behavior Assessment System for Children-2; Child Behavior Checklist**). Others solely ask about attention (**Connors-3; Vanderbilt scales; Brown ADHD** scales). Most of these measures are available for parent and teacher completion and some have self-report versions.

In addition to behavior rating scales, there are continuous performance measures. These measures require the child to be in front of a computer and click a switch for a selected target and resist clicking to a nontarget. Some of these include:

- Test of Variables of Attention
- Gordon Diagnostic System
- Connors Continuous Performance Test
- Visual and Auditory Continuous Performance Test

All of these provide some information about the child's ability to pay attention to a long and boring measure. Most of these measures have auditory and visual versions.

These tests, by themselves, cannot diagnose an attention deficit hyperactivity disorder. Such a diagnosis requires careful interviewing and observation of the child in more than one setting. In addition, behavior rating scales from caregivers and teachers are an important part in these diagnoses.

Executive Functions

Executive functions are those abilities that illustrate how a person solves a problem rather than just what is solved. Executive functions include skills such as:

- planning and organization,
- working memory,
- the ability to inhibit responding,
- flexibility in thinking

Executive functions differ depending on age with younger children showing fewer executive abilities. By mid to late adolescence most of the skills should begin to be evident. Adolescents who have ADHD will often show difficulty with executive functioning. Organization and planning are areas of difficulty for many adolescents but are particularly present for those with

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ADHD or who have experienced a traumatic brain injury (TBI) or treatment for cancer and/or a brain tumor. These areas can also be difficult for children with seizure disorders. For that reason, it is important to not only evaluate these skills but to acquire information from parent and teachers.

Direct measures include the **Delis-Kaplan Tests of Executive Functioning (D-KEFS)**, the **Wisconsin Card Sorting Test**, and the **NEPSY-2**. These measures consist of several subtests that evaluate inhibition, organization, planning, and working memory.

A behavior rating scale that can be completed by parents and teachers is the **Behavior Rating Inventory of Executive Functions (BRIEF)**. This rating scale evaluates the same areas that the **D-KEFS** and **NEPSY** but from the point of view of what is observed in the child's everyday life. In many cases the child will be able to complete the tasks on the direct measures because he/she is in a quiet room with direct feedback being provided. It is not uncommon for the **BRIEF** to illustrate difficulties in application of skills. It is important to evaluate whether the child *has* the skills and can't apply them or whether he/she doesn't know how to complete these types of tasks. Interventions will differ depending on the answer to this question.

Learning and Memory

Learning and memory are important aspects of a child's life. In this case we are not referring to academic knowledge but rather how the child learns new material and then retains it. Memory tasks are impacted by attention so it is important to recognize that if something isn't paid attention to, it will not be recalled. The **California Verbal Learning Test-Children's revision, Test of Memory and Learning-3**, and the **Wide Range Assessment of Memory and Learning-2** for children as well as the **Wechsler Memory Scale IV** and others are commonly used measures.

Memory tasks are divided into auditory and visual modalities. For the auditory tasks a child is often asked to learn a list of words and repeat what they can recall. The list is read to the child more than one time so that it can be determined whether the child profits from repetition. Most of these types of list learning also have a break in time of about 20 minutes. After that time, the child is again asked to list what words he/she can recall. In many cases, there is a recognition component where the child is asked if certain words are on a list or not. Other types of auditory memory involve listening to a story and repeated it back or learning a pair of words and recalling them over time.

Visual memory tasks show pictures, dot arrays, and designs and ask the child to point to the pictures previously seen, touch the dots in the same sequence, or draw designs from memory. Visual memory tasks are not as reliant on language but are impacted by attentional problems. They can also be negatively affected by motor difficulties.

Language

Language abilities are often evaluated in a neuropsychological assessment but are more fully evaluated by a speech and language pathologist, either privately or through the school. Neuropsychologists may sample language abilities to screen whether there are areas of

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concern prior to referring to the appropriate specialist. Language skills are divided into two major areas: receptive language and expressive language. Receptive language develops first and is higher than expressive skills. Receptive language is the ability of the child to understand what is being said to him/her. Expressive language is the ability to tell or express one's thoughts. Within both of these types of language skills are also pragmatic language abilities. These are abilities to understand the abstract nature of what is being said as well as the intent.

Visual-Spatial Skills/Fine Motor

Visual spatial skills often require the child to copy more complex geometric figures. In some cases, the figures are presented in a grid (**Developmental Test of Visual-Motor Integration**) or on cards that the child copies onto a larger piece of paper (**Bender-Gestalt 16est**). One of the difficulties with these measures is the reliance on motor skills. In order to determine whether motor is the difficulty or whether there is a problem with visual-spatial reasoning, it is important to measure fine motor skills as well as tasks that are relatively motor-free.

The **Purdue Pegboard** requires the child to quickly place pegs in a pegboard first with the dominant hand, then with the non-dominant hand, and then with both hands together. Age norms are provided to determine how the child's fine motor skills are developing. The **Judgment of Line Orientation Task** requires the child to look at an array of lines and match two lines that are presented to the array. This task does not have a motor component. By utilizing these two types of tasks, it is possible to determine whether a motor difficulty underlies the child's difficulty in copying or writing. If so, a referral to an occupational therapist is appropriate.

Adaptive Behavior

Adaptive behavior skills are those that allow one to function in everyday life. To that end, most measures are completed by the parent with some also completed by the teacher and are normed for the child's age. The areas assessed include:

- communication (*answering the phone, using computers, getting one's needs met, ordering in a restaurant*),
- activities of daily living (*hygiene, household tasks, understanding how to manage money and time*),
- socialization (*the ability to make and keep friends, approach others, act in socially appropriate ways, and to attend social events*),
- gross and fine motor abilities (*for children under the age of 6*), and
- work ability (*for adolescents*).

Adaptive behavior involves executive functions as well as ability. Children and adolescents who have an intellectual disability will score poorly on these measures. A child cannot be diagnosed with an intellectual disability solely with an IQ below 70. Adaptive behavior must also be assessed at that level. **The Vineland Adaptive Behavior Scales-2** and the **Adaptive Behavior Assessment System** are examples of adaptive behavior measures. Both assessments can be completed by teacher and parents.

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Behavioral and Emotional Functioning

A clinical interview of the parents and child is the most appropriate method for evaluating a child's behavioral and emotional functioning. Questions may include:

- How is the child's mood most of the time?
- What is frustrating for the child?
- How does he/she handle frustration?
- What types of intervention have been attempted?
- What has been successful in working with the child?

Individual interviews with the child and adolescent can also center on these areas. In some cases, a child may be forthcoming, while others may be reluctant to share feelings and thoughts. Observation of the child is an important part in evaluating the child's emotional functioning. For example, how he/she reacts to the examiner is as important as the tasks that he/she is asked to perform.

Social Skills

Social skills are evaluated through parent and teacher questionnaires and observations. In addition, there are some rating scales that can provide insight into how the child relates to others. The **BASC-2** (discussed above) evaluates social skills as well as behavioral and emotional functioning. In addition, measures such as the **Social Communication Questionnaire** and the **Social Responsiveness Scale** can provide information as to the child's day to day social functioning.

Academic Ability

Academic skills are screened during a neuropsychological evaluation. This area of assessment is often accomplished by the school psychologist.

There are many academic measures that are used. Two examples include **The Woodcock-Johnson Achievement Battery-IV** and **The Wechsler Individual Achievement Test-II**. These measures evaluate overall reading skills, mathematics, and written language. Scores on these measures can be compared to that of the IQ tests. A significant discrepancy between ability and achievement is considered a possible sign of a learning problem such as dyslexia in reading and should be further evaluated through the school.

THERAPEUTIC INTERVENTION

Interpretation of the Results of the Evaluation

The neuropsychologist will compare a child's test scores to those of other children the same age. This procedure is accomplished with all measures and a profile is developed for the child. This profile has strengths and weaknesses for the particular profile. It is helpful because it can point to areas where a child is succeeding and those for which he/she may need assistance.