

Module 6:Neuropsychological Evaluation

Lecture 32-40:Neuropsychological Evaluation

The Lecture Contains:



Neuropsychological Evaluation

- Wechsler Scales
- Halstead-Reitan Neuropsychology Test Battery
- Trail-making Test
- Luria-Nebraska Neuropsychological Test Battery
- Rey-Osterrieth Complex Figure Test
- Delis-Kaplan Executive Functions System (D-KEFS)

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Neuropsychological Evaluation

You have come across various types of tests used in psychology during the lectures of 'Basic Psychological Processes' course. Here the focus would be on neuropsychological evaluation, but before we go through it let us first understand the nature of difference between tests, assessments and neuropsychological evaluation. For details you can refer to books on psychological testing.

Tests are instruments specially designed to measure unobservable psychological constructs such as cognitive functions. It could have a set of activities (tasks) or even comprise of a series of tasks measuring the same construct. Psychological tests measure optimal performance on the given task. Psychological evaluation is a comprehensive assessment of an individual wherein data from multiple sources are integrated to provide a holistic picture of the client/patient. It entails an in-depth process of putting together test scores, personal history, medical history, and other relevant information, interview records of significant others in life such as parents, spouse, and so on. Psychological tests are also used during assessment. Usually more than one test is administered during assessment. In the clinical setting psychological assessments are helpful in indicating the current level of functional capability of the individual. Hence, it becomes helpful in diagnosis. It is often helpful in assessing brain functions. In the clinical as well as experimental set-up these assessments help determine the level of neurocognitive functioning. It has been used in the school settings also. In terms of brain-behaviour association, these assessments can help derive link between brain structure or pathway and psychological function.

With the advancement in technology now we have computerized neuropsychological assessment tools besides the traditional ones that involve paper-pencil and other artifacts. The table given below lists some of the common neuropsychological tests and their domains.

Domain	Tests
Intellectual functions	Wechsler Scales (WAIS-R, WAIS-III, WISC-IV)
Language functions	Multilingual Aphasia Examination Boston Diagnostic Aphasia Examination
Sensory-perceptual functions	Halstead-Reitan Neuropsychological Battery Tactual Performance Test and Sensory Perceptual Examination
Executive functions	Wisconsin Card Sorting Test Stroop Test Trail Making Test Block Design Subtests
Visuospatial processing	Hooper Visual Organization Test Rey-Osterrieth Complex Figure-Copy condition Block Design Tests
Motor speed and strength	Finger Tapping Task Pegboard Task Thurstone Uni- and Bimanual Coordination Test

As these tests and batteries are supposed to be administered and interpreted by trained psychologists, we shall look at the details of selected few from the table given above.

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Wechsler Scales

Wechsler developed scales for assessing intellectual functions in children (WISC) as well as adults (WAIS). WAIS got revised and came in the form of WAIS-R and thereafter as WAIS-III. The total IQ comprises of the scores of Verbal and Performance IQs. Verbal IQ has two indices— verbal comprehension index and working memory index. Similarly Performance IQ includes Perceptual Organization Index and Processing Speed Index. The tests constituting these indices are listed in the table below.

Verbal IQ		Performance IQ	
Verbal Index	Comprehension Working Memory Index	Perceptual Organization Index	Processing Speed Index
Vocabulary	Arithmetic	Block Design	Digit Symbol-Coding
Similarities	Digit span	Matrix Reasoning	Symbol Search
Information	Letter-Number	Picture Completion	
Comprehension	Sequencing		

Having little familiarity with WAIS, look at the video below to understand WISC.

[See video on web](#)

The two popular tests for assessing intellectual functions are shown below. View these videos to understand Bhatia's Battery of Performance Test of Intelligence and Stanford-Binet Intelligence Test, respectively.

[See video on web](#)

Halstead-Reitan Neuropsychology Test Battery

Halstead-Reitan Neuropsychological Test Battery assesses sensory-perceptual functions that are affected due to brain injury. This test enjoys the credit of facilitating conceptual models of brain-behaviour relationship. It comprises of the tests listed below.

Tests	Description
Speech-sounds Perception Test	60 spoken nonsense words presented through audio player. The participant/ client/ patient have to relate these words to correct configuration presented on the test form.
Rhythm Test	30 pairs of rhythmic beats presented through audio player. The participant/ client/ patient have to perceive and compare different rhythmic sequences.

Reitan-Indiana Aphasia Screening Test	Evaluates language functions/ deficits such as reading, writing, enunciating, identifying individual numbers and letters, naming common objects, spelling simple words and performing simple arithmetic computations.
Tactual Performance Test	10 geometric blocks have to be fitted into matching spaces. Blindfolded participant/ client/ patient have to fit the blocks with their preferred hand. After this they do the same with their nonpreferred hand. They perform it third time using both the hands. Thereafter they are supposed to draw a diagram of the geometric space/ board along with the blocks after removal of the blindfold.
Category Test	It determines the ability to use both negative and positive experiences for altering and adapting the performance. One gets the idea of the participant's/ client's/ patient's ability to derive abstract principles from the stimuli.
Trail Making Test	It has two parts— A and B. Part A consists of 25 circles numbered 1 to 25 whereas part B consists of 25 circles with numbers 1 to 13 and letters A to L. The participant/ client/ patient have to connect the circles in part A. In part B, they have to connect the circles forming alternate sequence between numbers and letters such as 1-A-2-B and so forth.
Finger Tapping/ Oscillation Test	The participant/ client/ patient have to tap their index finger quickly keeping hand and arm stationary.

Beside the above listed tests Reitan-Klove Sensory-Perceptual Examination is also used for behavioural-neurologist examination (Reitan & Wolfson, 1993) wherein the two hemispheres of the brain can be compared for visual, auditory, and tactual stimuli.

One of the pioneering tests, Bender Visual Motor Gestalt Test, is used to assess visual-motor maturity. Popularly called Bender-Gestalt test, this test can help in screening developmental disorders and neurological functions. Look at the video shown below for better understanding of this test.

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See video on web

Trail-making Test

Trail-making test requires the participant/ client/ patient to connect 25 dots. Time and accuracy are important considerations in this test. This test is employed to measure visual attention and task switching and has been found helpful in identifying cognitive impairments.

Luria-Nebraska Neuropsychological Test Battery

This is a comprehensive measure of neuropsychological functions that has been widely used for diagnosing cognitive deficits in clients/ patients above 15 years of age. It is also helpful to diagnose lateralized and localized brain impairments and is considered sensitive enough to detect mild impairments that otherwise might remain undetected. The scales comprising this test battery can be classified into four domains. They are listed in the table given below.

Clinical Scales	Localization Scales	Summary Scales	Optional Scales
Motor Functions	Left Frontal	Pathognomonic	Spelling
Rhythm	Left Sensorimotor	Left Hemisphere	Motor Writing
Tactile Functions	Left Parietal-Occipital	Right Hemisphere	
Visual Functions	Left Temporal	Profile Elevation	
Receptive Speech	Right Frontal	Impairment	
Expressive Speech	Right Sensorimotor		
Writing	Right Parietal-Occipital		
Reading	Right Temporal		
Arithmetic			
Memory			
Intellectual Processes			
Intermediate Memory			

Rey-Osterrieth Complex Figure Test

In Rey-Osterrieth Complex Figure Test the participant/ client/ patient has to sketch total of 18 line drawing in two conditions— first by copying and then from memory. In the first condition the participant/ client/ patient is supposed to reproduce the stimulus figures presented to them. Thereafter, they are supposed to reproduce the figures after a short delay. Once again, they are supposed to draw the figures after a delay of 20-30 minutes. This test measures functions such as visuospatial ability, memory, attention, planning and working memory. It has also been found suitable for identifying dementia and brain injury.

Delis-Kaplan Executive Functions System (D-KEFS)

Delis-Kaplan Executive Functions System measures verbal and nonverbal executive functions. It can be administered on participant/ client/ patient between 8-89 years of age. The table given below gives the details of the nine subtests of D-KEFS. It has been used for identifying mild brain injuries also.

Trail Making Test
Verbal Fluency Test
Design Fluency Test

Color-Word Interference Test

Sorting Test

Twenty Questions Test

Word Context Test

Tower Test

Proverb Test

With evolving sophistication in terms of tools and techniques, we now have computerized batteries that are used to assess multiple neuropsychological functions. They assess a whole range of cognitive skills using multiple tests. The popular ones being used now a days are Cambridge Neuropsychological Test Automated Battery (CANTAB), Neurobehavioral

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Cognitive Status Examination (Cognistat), Cognitive Assessment Screening Instrument (CASI) and CNS Vital Signs (CNSVS).

The selected tests listed below are part of CNS Vital Signs and are administered to know the neurocognitive functional state of the participant/ client/ patient at a given point in time. It can be used to infer data pertaining to brain functions.

Alertness Rating Scale (ARS)
Sedation Scale Test (SST)
Verbal Memory Test
Visual Memory Test
Finger Tapping Test
Symbol Digit Coding
Stroop Test
Shifting Attention Test
Neuropsych Questionnaire (NPQ)
Epworth Sleepiness Scale (ESS)
Memory Questionnaire (MEMQ)
Dizziness Handicap Inventory (DHI)
Neurobehavioural Symptom Inventory (NSI)
Head Injury Questionnaire (HIQ)

Look at the videos shown below. They demonstrate CNS Vital Signs.

See video on web

As you can make out, neuropsychological evaluation helps us examine the functional state of an individual in certain domains. However, specialized training and certification is needed to administer these tests and batteries. Further, there are ethical and clinical issues that one should be aware of beforehand.

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