Dean-Woodcock Sensory Motor Battery

KIDS, Inc.
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Presentation Outline

• Test Overview
  • Sensory-Motor Battery
  • Scoring the DWSMB
  • Interpreting the DWSMB
  • Structured Neuropsychological Interview
  • Emotional Status Examination

The Dean-Woodcock Sensory Motor Battery

• A comprehensive assessment of sensory-motor functioning that includes a structured interview and mental status exam. The DW expands the psychologist's range of assessment and provides standardized procedures and normative information to typically unstandardized measures used in neuropsychology.

• The test is published by Riverside Publishing Company.
The Dean-Woodcock Sensory Motor Battery

Ages
- 4.0-adult, including the geriatric population

Administration Time
- The DW is portable and time efficient —administration time is approximately 40 to 45 minutes.

Clinical Use of the DWSMB

- The measures have been a part of traditional neuropsychological batteries for a long time; however, few measures have been standardized using objective scoring criteria.

- The DWSMB is a restandardization of the Halstead-Reitan Sensory-Motor Exam, just as the Delis-Kaplan Executive Functions System (D-KEFS) is a restandardization of many of the older neuropsychological tests.
The Dean-Woodcock
Sensory Motor Battery

The Dean-Woodcock Neuropsychological Battery is comprised of three parts:
- Structured Interview
- Mental Status Exam

During the Structure Interview, clinicians ask questions to determine an individual’s medical and family background. The Mental Status Exam includes psychiatric signs and symptoms—covering most major disorders found in the DSM-IV—as well as clinical impressions.

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Dean-Woodcock Sensory-Motor Battery

Sensory Tests:
- Near-Point Visual Acuity
- Visual Confrontation
- Naming Pictures of Objects
- Auditory Acuity
- Tactile Examination:
  - Palm Writing
  - Object Examination
  - Finger Identification
  - Simultaneous Localization

Motor Tests:
- Lateral Preference Scale
- Gait and Station
- Romberg
- Construction
- Coordination
- Mime Movements
- Left-right Movements
- Finger Tapping
- Expressive Speech
- Grip Strength

The sensory assessment section of the test consists of 8 tests that assess auditory, visual, and tactile acuity.
### Dean-Woodcock Sensory-Motor Battery

The motor assessment section consists of ten tests. The Lateral Preference Scale is an indicator of laterality and handedness. Three other tests measure subcortical functioning and the remaining tests measure motor functions at the cortical level.

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Test 1: Lateral Preference Scale

- Originally developed by Dean (1988).
- The scale reflects left-right motor preference for 17 visually guided fine-motor activities.
- The scale is scored on a 5-point Likert Scale ranging from Left Always to Right Always.
- Scores may be evaluated by the degree to which laterality deviates from perfect symmetry - most items are answered as “Both equivalently” (approximately equivalent to a raw score of 51. W score = 490)

Test 1: Lateral Preference Scale

- W scores > 490 = right of midline preference
- W scores < 490 = left of midline preference
- The Lateral Preference Scale allows a subject to be placed on a continuum from entirely left-handed to entirely right-handed.
- These results have considerable clinical significance for a number of motor tests.
Test 1: Lateral Preference Scale

- If has been estimated that between 90-95% of the general population is right-handed (Dean, 1988).
- Right-handed preference has been associated with contralateral (left) hemisphere dominance for complex motor activities and language.
- In contrast, visual-spatial skills for most right-handed individuals are primarily a function of the right hemisphere.
- 70% of left-handers also have left-hemispheric dominance for language.

Test 1: Lateral Preference Scale

Administration Procedures:
- The first page of the stimulus book is laid in front of the examinee. The page has the printed 5-point Likert scale for the examinee’s response to each item.
- Examiner says: “I am going to ask you some questions about which hand or arm you would use to perform a specific task. Answer each question by telling me which of the following is correct”.
- Directions are available in English or Spanish.

Scoring:
Sum the Likert scale responses across items for a total score.
**Dean-Woodcock Sensory-Motor Battery**

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**Test 2: Near-Point Visual Acuity**

- Many neurologists and other physicians screen visual acuity using a vision screener presented at a distance of 14 inches from the examinee.
- This test measures near-point vision in each eye using a Snellen stimulus page.
- Some tests on the DWSMB rely on visual acuity so these baseline results are important.
- Roberts and Ludford (1977) indicated that 75% of individuals ages 12 to 74 had at least 20/20 vision in the better eye with correction. With 20/30 as a cutoff, this percentage increased to 93%. 

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Test 2: Near-Point Visual Acuity

Administration Procedures:
• Use the Snellen chart in the Stimulus Booklet.
• All subjects begin at the 20/20 line.
• Subjects should wear corrective lenses if they have them.
• If this test is administered to a child and he/she does not know their numbers, have them use the middle “E” symbols and indicate by pointing which directions the E is turned.

Test 2: Near-Point Visual Acuity

Administration Procedures:
• The examiner holds the Snellen chart 14 inches away from the examinee and says: “Please use this card to cover your left eye. Read these numbers for me.”
• If the examinee makes two or more errors on line 1 (20/20 line) move to line 2 (20/25) and say: “Try reading this line of numbers.”
• Repeat until the examinee can read a line with one or fewer errors.
• Repeat the task with the other eye.
### Dean-Woodcock Sensory-Motor Battery

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### Test 3: Visual Confrontation

- The purpose of this test is to detect defects or inattention in the examinee’s visual fields and to make left-right comparisons.
- Visual field defects have been variously referred to as suppressions, extinction, neglect, repression, sensory eclipse, and perceptual rivalry.
- The examiner sits straight across from the examinee at a distance of 3 feet.
- The examinee is asked to look at the examiner’s nose and indicate, either verbally or by gesture, when he or she detects and movements of the examiner’s fingers.
Test 3: Visual Confrontation

The stimulus items are administered in the following order:

- **Above eye level**
  - Right
  - Left
  - Both
  - Left

- **At eye level**
  - Both
  - Right
  - Right
  - Both

- **Below eye level**
  - Left
  - Both
  - Right
  - Left
Visual Confrontation Scores

- Total right & left simultaneous
- Total Right
- Total Left
- Visual field map of errors

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Test 4: Naming Pictures of Objects

- This test requires the examinee to provide semantic labels for pictures of common objects (e.g., a fish).
- Impaired performance may relate to difficulty finding a label (dysnomia) or problems in recognizing pictured objects (i.e., visual dysnosia).
- Multiple visuoperceptual disturbances have been associated with impaired perception for drawings and are more often related to right-hemisphere dysfunction.

Subjects with dysnomia may speak fluently but demonstrate paraphasic errors and circumlocutions (Weiner & Levitt, 1994).
- Dysnomia may be seen alone but is often observed in combination with other language deficits, including difficulty with reception, comprehension, reading, and written expression.
- According to Kirshner (1991), when a subject presents with a naming problem as the principle deficit, it is pathognomonic of either diffuse or left-hemispheric dysfunction.
Test 4: Naming Pictures of Objects

- The task consists of naming 21 pictures from the stimulus book.
- Early items are quite easy but the items become increasingly more difficult.
- Errors and poor performance on Naming Pictures of Objects should be compared to other measures of receptive and expressive language from the WJIII Cog & Ach tests (e.g., Picture Vocabulary).

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Test 5: Auditory Acuity

- Most individuals with hearing impairments are unaware of their problem, and a number of those who are aware may be too embarrassed to inform the examiner (Lezak, 1995).
- Examiners should screen auditory acuity early on in the sensory examination to avoid attributing a examinee’s poor performance on auditory discrimination or language comprehension tests to an attentional or intellectual deficit.
- Poor performance on this test can be influenced by inattention.

Test 5: Auditory Acuity

- This is an informal screening test not designed to replace formal audiometrics.
- The examinee is seated with the examiner standing behind him or her. The examinee should not be able to see the examiner’s hands.
- The examiner places his or her hands approximately 3 inches from the subject’s ears and gently rubs his or her index fingers with thumbs together.
Test 5: Auditory Acuity

- The examinee is instructed to raise their hand which corresponds to the ear in which he or she heard the sound.
- If the examinee hears sounds in both ears, he or she should raise both hands.
- Scores are obtained for the right side auditory acuity, left side, and simultaneous.

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Test 6: Tactile Examination - Palm Writing

- Palm writing is a measure of sensory discrimination that is administered first to the right hand then to the left hand with the subject’s vision completed occluded (the examinee is blindfolded).
- **Part A: Letters** - the examiner uses a stylus to trace a series of X’s or O’s on the examinee’s palm.
- **Part B: Numbers** - the examiner uses a stylus to trace a series of numerals on the examinee’s palm.

In the absence of peripheral sensory impairment and dysphasia, errors suggest a tactile perceptual deficit (graphestheia).

When the number of errors differs between hands, a lateralized lesion of the parietal cortex is suggested, specifically within the sensory strip area.

For example, impairment on the left hand would suggest dysfunction in the right parietal area.

Such impairments could impair everyday functioning and may manifest as clumsiness and problems with dexterity.
Disorders of Touch

- Tactile localization disorder - characterized by inability to localize a stimulus on the skin.
- Two-point discrimination disorder - characterized by inability to discriminate between the sensations arising from a single touch stimulus and those arising from two simultaneous nearby touch stimuli.

Disorders of Touch

- Double Simultaneous Discrimination Disorder - a child is unable to appreciate the sensations arising from one of two stimuli simultaneously applied to the skin on corresponding body sides.
- Agraphesthesia - characterized by inability to recognize the shape, size, or letter that is “written” on the hand.
Disorders of Touch

- Haptic imperception - characterized by inability to recognize the shape, size, or texture of an object touching the skin.
- Asterognosis - a child is unable to recognize an object on the basis of its three-dimensionality through palpation.

Signs of Touch Disturbance by Site of Dysfunction

- Receptor or Peripheral Nerve
  - Partial to total loss of sensitivity of touch
- Spinal Cord
  - Partial to total loss of sensitivity of touch
- Subcortical Pathway
  - Partial to total loss of ability to detect touch
**Signs of Touch Disturbance by Site of Dysfunction**

- **Cortex**
  - Partial to total loss of ability to detect touch
  - Defect in tactile localization
  - Defect in two-point discrimination.
  - Defect in double simultaneous discrimination.
  - Agraphesthesia
  - Haptic imperception
  - Asterognosis

**Diagnosis of Touch Disorders**

- Based upon quantitative and qualitative data.
- Quantitative data are obtained from a parent (guardian) interview, a school report, and clinical observation.
- Clinical observation provides information about the quality of a child’s performance on standardized tests that depend upon tactile processes, age-appropriate tasks, and spontaneous behavior and verbalizations.
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Test 7: Tactile Examination: Object Identification

- Object Identification assesses an examinee’s ability to identify common objects by touch and without the aid of vision.
- Difficulty in recognizing common objects is called asterognosis or tactile dysnosia and carries the same implications as impaired performance on the Palm Writing test.
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Test 8: Tactile Examination: Finger Identification

- Finger Identification assesses an examinee’s ability to make fine discriminations. With vision not used, the examiner first touches the fingers of the examinee’s right hand and then those of the left hand in a set, random order.
- The task requires the examinee to identify the finger that is touched, either by name or by number, whichever the examinee prefers.
Test 8: Tactile Examination: Finger Identification

- Impaired performance on the Finger Identification test, whether bilateral or unilateral, is termed finger agnosia.
- Same as the supplemental NEPSY Finger Discrimination test.

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Test 9: Simultaneous Localization

- The Simultaneous Localization test, like the Visual Confrontation and Auditory Acuity tests, provides a stimulus to each hand individually and then to both simultaneously (double simultaneous stimulation).
- The logic of the double simultaneous stimulation, regardless of the sensory mode, is that presenting stimuli simultaneously (or bilaterally) maximizes the likelihood of discovering a sensory defect.
- Although gross sensory ability may appear normal, subtle lesions in the sensory cortical areas can be detected more clearly with double simultaneous stimulation.

Test 9: Simultaneous Localization

- Part A of the test uses the hands only.
- Part B of the test uses the subject’s cheek and one of both hands.
- The face and hands are selected for this test because of their massive representation in the postcentral gyrus relative to other body parts and because the stimulus can be easily administered to these locations.
10 minute break

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Test 10: Gait and Station

• This is the first motor test that is administered.
• Historically used in neurologic/medical examinations, the Gait and Station portion of the test assesses motor functioning/ambulation, strength, coordination, and speed.
• The test requires the examinee to walk using three gaits: Free Walking, Heel-to-Toe, and Hopping.

Abnormal gait terms include:
- Slapping, spastic hemiplegic, ataxia, sensory ataxia, flaccid hemiplegic, spastic, Parkinsonian, broad-based, marching, apraxic, and limping.
- Right or left sided weaknesses should be noted by the examiner.
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**Test 11: Romberg**

- This test requires the examinee to maintain balance without visual cues, thereby increasing the complexity of the task.
- The three tasks include: standing with feet together, standing toe-to-heel, and standing on one foot.
- The Romberg test has an extensive history in neurologic screening with the standing with feet together version typically used.
Test 11: Romberg

- Assuming no peripheral abnormalities, the Romberg test measures subcortical functioning.
- In historic terminology a Romberg test is considered positive when an examinee’s swaying increases significantly when his or her eyes are closed.

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Test 12: Construction

- This test involves two construction tasks that, on a basic level, require visual perception, spatial awareness, and feedback to complete a complex motor response.
- The examinee is asked to draw a Greek Cross and a clock.

Test 12: Construction

- Both tests are sensitive to visual attention and visuoconstructive deficits.
- These tests have proven to be important predictors of complex motor functioning with neuropsychological/neurological implications.
- Deficient performance is most often associated with a right cerebral dysfunction.
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### Test 13: Coordination

- Some form of Finger-to-Nose and Hand-to-Thigh tests have long been a part of neurological examinations.
- Whereas, Test 11: Gait and Station assess motor coordination of the lower extremities, this test assesses coordination of the upper extremities.
- Impaired performance, a sign of gross subcortical abnormalities, may also implicate dysfunction of cortical structures as well as other regions of the nervous system.
Test 13: Coordination

• The Finger-to-Nose test requires the examinee to first touch the end of his or her nose with the index finger and then to track and touch the examiner’s index finger as it moves across the subject’s field of vision.
• The examinee is seated with his or head stationary.
• The examiner stands in front of the examinee at a distance that requires the subject to fully extend his or her arm.

• The examiner moves his or her index finger to different positions between the examinee’s left and right visual fields as well as above and below the examinee’s eye level to adequately test all four visual quadrants (above right, above left, below right, below left).
• The examiner tests 20 different positions for each hand.
Test 13: Coordination

- In the Hand-to-Thigh test, the examinee must pat his or her thigh alternately with the palm and back side of the hand.
- The examinee is seated for this as well.
- The examiner records the completion times for two sets of 20 repetitions for each hand.
- Performance on this test is primarily related to subcortical function and is evaluated qualitatively for rhythm and qualitatively for ability to perform rapidly alternating movements.

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Test 14: Mime Movements

- This test assesses the subject’s ability to perform skilled motor acts in the absence of visual cues.
- Commands are given to the examinee (e.g., “Show me how you would brush your teeth”) and involved overlearned responses.
- The commands vary in complexity and assess the examinee’s use of his or her mouth, hands, and head.
- Problems in performance are often referred to as ideomotor dyspraxia; although like many neuropsychological measures that require oral instructions, receptive dyspraxia must be ruled out.

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Test 15: Left-Right Movements

- This test measures the examinee’s ability to make purposeful left-right motor movements upon command (e.g., “Put your left hand on your right knee”).
- Left-right confusion may be present for a number of reasons and can interfere with daily living.
- Typically these right-left commands are crystallized in children by ages 6 to 9. Difficulties with this task have been associated with a variety of brain anomalies including postcentral, right-hemisphere, and subcortical lesions.

Dean-Woodcock Sensory-Motor Battery

Sensory Tests:
- Near-Point Visual Acuity
- Visual Confrontation
- Naming Pictures of Objects
- Auditory Acuity
- Tactile Examination:
  - Palm Writing
  - Object Examination
  - Finger Identification
  - Simultaneous Localization

Motor Tests:
- Lateral Preference Scale
- Gait and Station
- Romberg
- Construction
- Coordination
- Mime Movements
- Left-right Movements
  - Finger Tapping
- Expressive Speech
- Grip Strength
**Test 16: Finger Tapping**

- This test measures the speed of fine-motor movement for the index finger of each hand over five trials.
- Examinee performance is evaluated for the rate of response for each hand and for a different hand and for a differential between the dominant and nondominant hands.
- This test is measuring the adequacy and intactness of the motor strip or precentral gyrus.
- Similar to the NEPSY Finger Tip Tapping test.

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**Dean-Woodcock Sensory-Motor Battery**

**Sensory Tests:**
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**Motor Tests:**
- Lateral Preference Scale
- Gait and Station
- Romberg
- Construction
- Coordination
- Mime Movements
- Left-right Movements
- Finger Tapping
  - Expressive Speech
  - Grip Strength
**Test 17: Expressive Speech**

- Expressive Speech requires the examinee to repeat groups of successively more difficult words and phrases to help identify speech production difficulties caused by lack of coordination or musculature defects (dysarthria).
- Dysarthria may be associated with a defect in either peripheral speech mechanisms, such as the larynx, pharynx, and tongue, or the central motor system.

---

**Test 17: Expressive Speech**

- Inferior postfrontal zones of the Broca region in the left hemisphere are essential for the logical organization of speech.
- Subjects with a lesion in this area are capable of hearing and comprehending auditory stimuli and have little difficulty identifying objects. However, when required to spontaneously produce speech, logically organize their thoughts, or produce speech verbatim, they are unable to do so. To compensate, they may provide circumlocutions or describe aspects of the task rather than perform the task as directed.
Dean-Woodcock Sensory-Motor Battery

Sensory Tests:
- Near-Point Visual Acuity
- Visual Confrontation
- Naming Pictures of Objects
- Auditory Acuity
- Tactile Examination:
  - Palm Writing
  - Object Examination
  - Finger Identification
  - Simultaneous Localization

Motor Tests:
- Lateral Preference Scale
- Gait and Station
- Romberg
- Construction
- Coordination
- Mime Movements
- Left-right Movements
- Finger Tapping
- Expressive Speech
  - Grip Strength

Test 18: Grip Strength

- This test measures the strength of the examinee’s upper extremities and is related to the functioning of the motor strip.
- In this test the examinee squeezes a hand dynamometer as hard as possible with each hand for three trials, alternating hands to prevent fatigue.
Presentation Outline

• Test Overview
• Sensory-Motor Battery
  • Scoring the DWSMB
  • Interpreting the DWSMB
  • Structured Neuropsychological Interview
• Emotional Status Examination

Scoring of the Dean-Woodcock

• Total Sensory and Total Motor Indices
  - Levels of impairment:
    • Within normal limits and above
    • Mildly impaired to within normal limits
    • Mildly impaired
    • Moderately impaired
    • Severely impaired
• Total Impairment Index
## Levels of Impairment

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<th>W Score</th>
<th>Ref W scale</th>
<th>W Diff</th>
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Dean-Woodcock SMB: Sensory Tests

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### Dean-Woodcock SMB: Sensory Tests

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### Dean-Woodcock SMB: Motor Tests

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Dean-Woodcock SMB: Motor Tests

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Presentation Outline

- Test Overview
- Sensory-Motor Battery
- Scoring the DWSMB
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- Structured Neuropsychological Interview
- Emotional Status Examination
Interpretation of the Dean-Woodcock

• Interpretative Technique 1: Functional Level of Performance
  - Evaluate the individual test’s strengths and weaknesses.
• Interpretative Technique 2: Right-Left Differences
• Interpretative Technique 3: Pattern Analysis
• Interpretative Technique 4: Pathognomonic Signs
  - Indicators that the examinee has some signs of neurologic impairment (e.g., left-side paralysis or left visual neglect).

Presentation Outline

• Test Overview
• Sensory-Motor Battery
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Structured Neuropsychological Interview

• Control for extraneous variables in the clinical setting is an impossible luxury.
• Interpretation of data resulting from a psychological, neurological, or neuropsychological examination must account for multiple factors that may have influenced the subject’s performance.
• For example, language disorders are often attributed to the left hemisphere of the brain, but lack of education may also account for deficits on language tests.

Structured Neuropsychological Interview

• Social status, premorid history, age at onset, and emotional functioning often interact to obscure diagnostic conclusions for subjects and have shown to affect the interpretation of psychological and neuropsychological measures (Dean, 1989).
Structured Neuropsychological Interview

Elements of the Dean-Woodcock Structured Neuropsychological Interview

I. Identifying/Biographic Information
II. Referral Information/Chief Compliant
III. Medical History
IV. History of Psychiatric/Psychological Evaluation and/or Treatment
V. Personal and Social History
VI. Psychiatric and Neurological Family History
VII. Birth and Development

Presentation Outline

- Test Overview
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- Emotional Status Examination
Dean-Woodcock Emotional Status Examination

The Dean-Woodcock Emotional Status Examination consists of three sections:

- Identifying Information
- Emotional Status Examination - a rating scale for a psychiatric interview.
- Clinical Observations and Impressions - a section where the examiner makes systematic clinical observations of the examinee’s functioning.

Clinical Observations and Impressions

- **Orientation**
  - Person, place, time situation
- **Physical Appearance**
  - Grooming, age/appearance, height, weight
- **Behavioral Observations**
  - Mannerisms, perceptual disturbances, agitation, task persistence, interaction, attention.
- **Emotional Status**
  - Anxiety, mood, affect, appropriate affect, and speech
- **Cognitive Status**
  - Comprehension, consciousness, flow of thought, mental content, insight, judgment
References