Appendices

Appendix A. Neurobehavioral Tests

1-The **Match-to-Sample** test measures visual memory. Participants are shown a 10x10 matrix with certain squares filled in, after a variable delay (1, 8 or 16 seconds) they are instructed to choose the correct pattern from among 3 choices. The number correct as well as the latency required to make a correct response is recorded.

2- The **Serial Digit Learning Test** sequentially presents a nine-digit number on the screen, and the participant is instructed to reproduce the sequence by pressing the nine numbered buttons in the same order. The test terminates after twelve trials or when the participants correctly reproduced the sequence twice in a row.

3- **BVRT (Benton Visual Retention test)**: It is a test of immediate (short term) visual memory which utilizes geometric patterns as well as motor response. The Benton Visual Retention Test, form C, consists of ten cards. The participant had 10 seconds to look at a card on which there were one or more figures, then after 15 second interval he is asked to draw all that he has seen. The same thing is repeated for each of the remaining cards.[1] Scoring is one point for correct reproduction.

4- **Digit Span test:** This test studies immediate (short term) auditory memory of new material and recall of previously learned material, the ability to concentrate, focusing attention and resisting distraction. It consists of the presentation of sets of three to nine digits (increasing from three to nine), the participant is instructed to repeat them back to the examiner or print them to the computer in either the same or reverse order. The longest string of digits repeated both forward and backward serve as the two measures on this test.[2]

5- The **Continuous Performance Test** measures attention.[3] The A-X version of the task can be used. In the A-X version, stimuli are sequentially presented on the screen every 50 ms. When the target stimulus (plus sign followed by a circle) is presented, the participant responds by pressing a button. Three hundred stimuli are presented; 20% of them are target stimuli. The percent correct, incorrect (false alarms and omissions), and response latencies are recorded.

6- The **Selective Attention Task** is a test of sustained attention. Two squares are shown on the

screen and a dot is presented for a very short period of time. Differential responses are required when the dot appears in one of the squares and no response is appropriate if the dot appears outside the squares. The inter-stimulus interval between the presentation of the dot is titrated: correct responses shorten the interval and incorrect responses lengthen the interval. The purpose of the task is to maintain an optimal inter-stimulus interval for the presentation of the dots. The total number of trials completed and the response latency for each trial is recorded.

7- The **Finger Tapping** test instructs the participant to press a button as many times as they can for a period of time (e.g., twenty seconds). Performance using each hand can be tested, as well as an alternation trial in which participants are instructed to tap sequentially with the left and then the right hand (then left, then right, and so on) for a period of time. The number of taps is recorded for all trials.

8- The **Progressive Ratio Test** is a test of motivation that was adapted from the animal literature.[4] During the test a participant earned "reinforcers" (smiling faces) by pressing a button multiple times. The criterion required for earning a smiling face increases on each successive trial. The total number of button presses or taps in a period of time (e.g., two minutes) is recorded.

9- In the **Simple Reaction Time Test**, participants are asked to press a button as fast as they can when a square appears on the screen. Latencies for each button press are recorded.

10- Digit Symbol test: It is a test a test of perceptual motor speed which also requires learning of associations. It also measures the ability to concentrate and resist distraction.[5] The worksheet contains a list of numbers that are associated with certain simple symbols and a list of random digits from one through nine with blank square below each digit. The participant's task is to fill the blank squares with the symbols paired to their corresponding digit in 90 seconds.[2] Scoring is 1, 1/2 and 0 for correct, improper correct and false filling symbol respectively.

11- The **Symbol-Digit** test,[6] presents a matrix at the top of the screen that pairs nine unique symbols with the numbers one through nine. A second matrix that contains only the symbols is shown below. Participants are asked to press the corresponding number button for each symbol. Latencies for each button press are recorded.

12- **Trail making part A and B:** It measures attention, visual conception and psychomotor function. The worksheet contains 2 pages, the first page contains numbers only and the second one contains numbers and letters inside circles. The participant task is to draw a line connecting numbers to numbers in the first page and letters to numbers in the correct order in the second page from the number 1 to the letter A, to number 2 to the letter B and so on. The examiner measures the time in seconds to complete the test.[7] The score is the time (seconds) which is taken by the examinee to complete the correct form.

13- **Similarities test:** It measures the ability to concentrate, the abstract thinking and intelligence. This consists of 12 pairs of words between which the participant is asked to find a similarity. The participant is given 2 scores if he gives a primary similarity, 1 if less important similarity and 0 if unimportant similarity or no similarity at all.[2]

14- **Block Design test:** It is a test of complex intellectual function and spatial relations.[8] It measures the ability of perception and analysis of objects, visual level of abstraction, visual motor coordination and psychomotor function. The participant is shown a design formed of red, white, or red and white squares and is asked to construct that design using blocks that had red, white or red and white sides.[2] Scoring is 4 points for each correct pattern at the given time. There are extra points if the trial is finished before the time.

15- **Santa Ana dexterity test:** In the Santa Ana dexterity test a plastic base plate with pegs fitted in rows of 12 was used. Each peg was to be removed, turned 180 degrees and replaced in its slot. The objective is to turn as many pegs as possible in 30 s. The test is repeated twice with the dominant hand and twice with the nondominant hand. The number of pegs successfully turned is recorded as the test score.[9]

16- **Pursuit aiming test:** The pursuit aiming test requires the subject use a pencil to place one dot inside each circle following the pattern given on the printed pursuit aiming test sheet. This task is to be performed as quickly as possible for 60 s.[9]

References

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Appendix B. The Modified Scale from The Newcastle - Ottawa Quality Assessment Scale

The NEWCASTLE - OTTAWA QUALITY ASSESSMENT SCALE was modified to be appropriate for the occupational cohort studies. Each study was rated according to its degree from the following items:

Selection

A) Representativeness of the exposed cohort
1. representative
2. untypical
3. no description

B) Selection of the non exposed cohort
1. drawn from the same community as the exposed cohort
2. drawn from a different source
3. no description of the derivation of the non exposed cohort

C) Ascertainment of exposure
1. secure record (e.g. surgical records)/Structured interview
2. written self report
3. no description

Comparability

A) Comparability of cohorts on the basis of the design or analysis
1. standardized in the design or analysis
2. not standardized
3. no description

Outcome

A) Assessment of outcome
1. independent blind assessment
2. no description

B) Assessment tool

1- The same for the exposed and controls

2- Not the same