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Edinburgh Research Explorer

Factorial validity, measurement equivalence and cognitive performance of the Cambridge Neuropsychological Test Automated Battery (CANTAB) between patients with first-episode psychosis and healthy volunteers

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Supplementary Materials

Screening tests: *Motor Screening (MOT) and Big/Little Circle (BLC)* were not used in the further analysis.

Visual memory tests

Pattern recognition memory (PRM)

The test relies on cued memory functions. It is presented in two phases: in the presentation phase 12 abstract visual patterns are presented sequentially, in the centre of the screen. The patterns cannot easily be given verbal labels. In the recognition phase, the subjects are required to choose between a familiar stimulus and a novel pattern. The total number of correct responses was used as the outcome in the present analyses.

Spatial recognition memory (SRM)

Subjects were required to learn the special location of five identical squares, which are appearing one at time in different locations on the screen. In the recognition phase, two squares appeared simultaneously on the screen and the subject had to target the familiar one. The total number of correct responses was used as the outcome in the analyses.

Paired-associates learning (PAL)

The CANTAB PAL test assesses visual memory and new learning. The task requires subjects to learn and then replicate the matching of two complex pattern-location associations. The number of pattern-location pairs increase to three, to six and finally eight. For each stage, boxes are displayed on the screen and are opened in a randomized order. Two or more of them will contain a pattern. The patterns shown in the boxes are then displayed in the centre of the screen, one by one, and the subject should touch the box where the pattern was initially placed. If the subject makes an error, the patterns are represented again to remind the subject of their locations. The first trial memory score was used as the outcome for this test.

Executive function, planning, and working memory tests

Intra/extradimensional shift (IED)

This test comprises visual discrimination and selective attentional set formation and evaluating the maintenance, shifting, and flexibility of attention. Two dimensions are used in the test: color-filled shapes and white lines. Subjects are required to maintain attention to different examples within a reinforced stimulus dimension (intradimensional shift), and then to shift attention to a previously irrelevant stimulus dimension (extradimensional shift). The IED test is preceded by a BLC screening test. The total number of reverse errors was used as the outcome in the current analyses.

Stockings of Cambridge (SOC)

This is a spatial planning and special working memory test. The subjects must operate with the coloured balls in the lower display and match a goal arrangement pattern shown in the upper one by moving balls on the screen with minimum number of runs. The motor initiation and motor execution time to complete the arrangements and the number of moves required are taken as measures of the subject's planning ability. The total score of problems solved in minumum moves was the outcome measure.

Spatial Span (SSP)

This test gives a measure of the subject's visuo-spatial short term memory span. A set of squares is shown on the screen. Some of the squares change in colour, one at time, in a variable sequence increasing, in number. The subject should touch each of the boxes highlighted by the computer in the same order as they were originally presented. The task starts with a small number of blocks and gradually increases up to nine blocks. The test measures both the number of correct sequences and the longest sequence remembered. The total number of correct trials was used as the outcome in the current analyses.

Spatial Working Memory (SWM)

This test evaluates the subject's ability to retain spatial information and to manipulate remembered items in working memory. A trial begins with a number of coloured squares (boxes) being shown on the screen. The overall aim is that the subject should find a blue 'counter' in each of the boxes and use them to fill up an empty column on the right hand side of the screen. The subject must touch each box in turn until one opens with a blue 'counter' inside. Participants search array tokens without returning to previous token locations. Returning to an empty box already sampled on this search is an error. The test evaluates both efficiency (subjects might do two types of errors: to return to open a box in which a token has already been found 'between-error' or to return to a box already opened in the same search sequence 'within-error') and use of heuristic strategy (preferred strategy is to follow a search sequence, beginning with one box and returning to start each new search with that box after a token has been found). The total number of errors and strategy score were used as the outcomes for this test.

Speed of processing

Rapid visual information processing (RVP)

This test is a sustained vigilance task, and the subject must identify consecutive odd or sequences of digits from 2 to 9, which appear in a pseudo-random order, at the rate of 100 digits per minute. Participants are instructed to detect target sequences of digits (3-5-7, 2-4-6, and 4-6-8) and to register responses using the press pad. The test outcome measures are based on the signal detection theory and cover latency, sensitivity and specificity for detecting goal sequences. The probability of a correct hit (sensitivity for detecting sequences) was used as the outcome in the analyses.

The participants completed the tests in a fixed order: MOT, PRM, SRM, PAL, BLC, IED, SOC, SSP, SWM, RVP.