CNB Test Descriptions: NKLINE Battery

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Test: ADT36
Current Version: 2.07
Aliases: Age Differentiation Test, Shortened ADT, ADT
Cognitive Domain Tested: Visual Discrimination

Test Description:
The ADT measures the ability to perceive small visual differences. It is used as a control task for the Measured Emotion Differentiation Task (MEDF), which measures the ability to perceive differences in intensity of emotional expression. When administered together with the MEDF, the ADT is useful in determining to what extent poor performance on the task is attributable to the inability to perceive small facial differences, rather than a deficiency in emotion perception.
The ADT presents a pair of faces and asks the participant to click the button labeled "This face," below the face that appears older, or the central button, labeled "Same Age," if both faces appear to be the same age. The stimuli are created using software to morph two similar looking faces, one young and one old. A 30 percent stimulus for example, is a morph that is 30% of the age difference from the young face toward the old face. There are 36 trials, with 18 male and 18 female stimuli. In four trials, the two faces are identical; in the remaining 32 trials, the age differential ranges from 10% to 60%, distributed more heavily toward the harder items (10%-40% morphs). Trials are presented in random order. The test is a forced-choice task with no time limit per trial. After the subject answers one trial, the test automatically moves to the next trial. Response time is recorded for each trial.

Rules & Variables:
The test is scored based on the total number of correct responses and the number of correct responses per category, along with their related response time measures.

Scores Variables List:

Score Name	Score Range
ScorVers (Current Programming Version of Scoring Code for ADT36)	2.06
ADT36_PCT10_CR (Correct Responses for Age Differentiation Test 10 Percent Difference Trials)	0-6
ADT36_PCT20_CR (Correct Responses for Age Differentiation Test 20 Percent Difference Trials)	0-8
ADT36_PCT30_CR (Correct Responses for Age Differentiation Test 30 Percent Difference Trials)	0-6
ADT36_PCT40_CR (Correct Responses for Age Differentiation Test 40 Percent Difference Trials)	0-7
ADT36_PCT50_CR (Correct Responses for Age Differentiation Test 50 Percent Difference Trials)	0-2
ADT36_PCT60_CR (Correct Responses for Age Differentiation Test 60 Percent Difference Trials)	0-3
ADT36_SAME_CR (Correct Responses for Age Differentiation Test No Difference Trials)	0-4
ADT36_PCT10_RTCR(Median Response Time for Correct Age Differentiation Test 10 Percent Difference Trials)	time-variant
ADT36_PCT20_RTCR (Median Response Time for Correct Age Differentiation Test 20 Percent Difference Trials)	time-variant
ADT36_PCT30_RTCR (Median Response Time for Correct Age Differentiation Test 30 Percent Difference Trials)	time-variant
ADT36_PCT40_RTCR (Median Response Time for Correct Age Differentiation Test 40 Percent Difference Trials)	time-variant
ADT36_PCT50_RTCR (Median Response Time for Correct Age Differentiation Test 50 Percent Difference Trials)	time-variant
ADT36_PCT60_RTCR (Median Response Time for Correct Age Differentiation	time-variant

Test 60 Percent Difference Trials)	
ADT36_SAME_RTCR (Median Response Time for Correct Age Differentiation Test No Difference Trials)	time-variant
ADT36_CA_CR (Correct Responses for Age Differentiation Test for Caucasian Stimuli)	0-17
ADT36_NONCA_CR (Correct Responses for Age Differentiation Test for Non-Caucasian Stimuli)	0-19
ADT36_CA_RTCR (Median Response Time for Correct Age Differentiation Test Caucasian Trials)	time-variant
ADT36_CA_RTER(Median Response Time for Incorrect Age Differentiation Test Caucasian Trials)	time-variant
ADT36_NONCA_RTCR(Median Response Time for Correct Age Differentiation Test Non-Caucasian Trials)	time-variant
ADT36_NONCA_RTER(Median Response Time for Incorrect Age Differentiation Test Non-Caucasian Trials)	time-variant
ADT36_NS_CR (Total Correct Age Differentiation Test Trials, Excluding Same Trials)	0-32
ADT36_NS_RTCR (Median Response Time for All Age Differentiation Test Trials, Excluding Same Trials)	time-variant

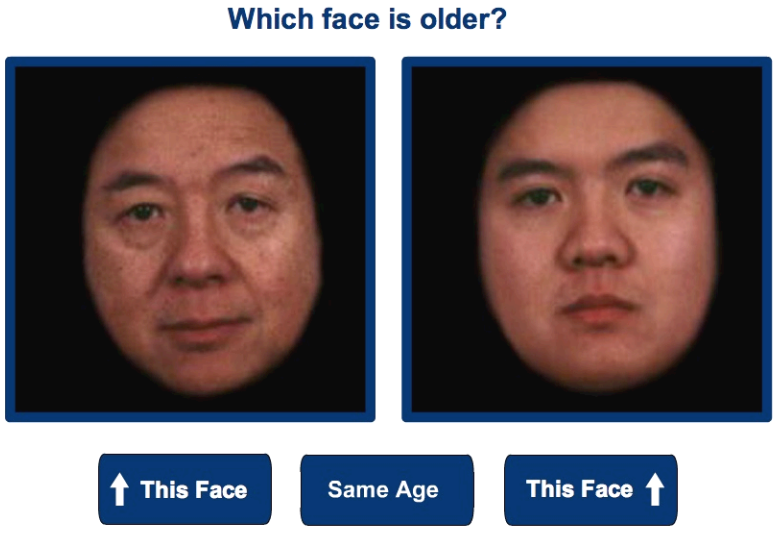
ScorVers = scoring-code version - particularly important when analyzing data as we periodically update the scoring code with additional scores or necessary adjustments.

Practice Trials:

Summary:

Three practice trials provide feedback; the participant must complete all three successfully before proceeding.

Practice Trial Screenshot:



Correct Response: Left face, subject would click on the left button to record correct response.

Test Trials

Summary:

The test has 36 trials total, all of which present the same format question within 7 categories of stimuli groups.

Presentation: the test is formatted such that subjects go through a set of 36 randomized pairs of stimuli, one pair at a time.
Time: Because the test is forced-choice, there is no time limit per question.
Response Time is recorded.
Feedback: Test trials have no feedback.

Test Trial Screenshots: same as practice trial screenshot.

Test Title: CPF
Current Version: 2.05
Aliases: Penn Face Memory Test, PFMT
Cognitive Domain Tested: Face Memory
The CPF has two tables for "estimated duration" time because the data collected is from a previous version of the task in which the CPF was divided in two parts: one in which the 20 target faces were presented and one in which the questions were asked. Therefore, the rough median test duration estimate for the CPF (study stimuli presentation and test trial) is ~ 4.7 min ((2.3 + 2.4) min).

Test Description:
The CPF is a measure of face memory. In the first part of this test, participants are shown 20 faces that they will be asked to identify later during both immediate and delayed recalls (delayed recall = CPFdelay). During the immediate recall (CPF), participants are shown a series, one at a time, of 40 faces - the 20 faces they were asked to memorize mixed with 20 novel faces. The participants' task is to decide whether they have seen the face before by clicking with the mouse on one of four buttons, presented in a 4-point scale: "definitely yes", "probably yes", "probably no" and "definitely no."

There is one alternate form of the CPF: the CPF-b.

Note: All facial stimuli are black and white photographs of faces rated as having neutral expressions, balanced for gender and age [1]. Faces are pasted on a black background with hair blending into it as to remove the hair's identifying characteristic.

Rules & Variables:
The test is scored based on the number of correct or incorrect responses, divided into true/false positives/negatives and the median response time for each category.

Scoring Variables List:

Score Name	Score Range
ScorVers (Current Programming Version of the Scoring Code)	1.05
CPFTP (CPF True Positives)	0-20
CPFTN (CPF True Negatives)	0-20
CPFFP (CPF False Positives)	0-20
CPFFN (CPF False Negatives)	0-20
CPFTPRT (CPF True Positives Median Response Time (ms))	time-variant
CPFTNRT (CPF True Negatives Median Response Time (ms))	time-variant
CPFFPRT (CPF False Positives Median Response Time (ms))	time-variant
CPFFNRT (CPF False Negatives Median Response Time (ms))	time-variant
IFAC_TOT (CPF Total Correct Responses)	time-variant
IFAC_RTC (CPF Median Total Correct Response Time (ms))	time-variant
CPF_DY (CPF Definitely Yes Responses)	0-40
CPF_DN (CPF Definitely No Responses)	0-40
CPF_PY (CPF Probably Yes Responses)	0-40
CPF_PN (CPF Probably No Responses)	0-40
CPFTP_DEF (CPF True Positives - Definitely)	0-20
CPFTP_PROB (CPF True Positives - Probably)	0-20
CPFTN_DEF (CPF True Negatives - Definitely)	0-20
CPFTN_PROB (CPF True Negatives - Probably)	0-20
CPFFP_DEF (CPF False Positives - Definitely)	0-20
CPFFP_PROB (CPF False Positives - Probably)	0-20

CPFFN_DEF (CPF False Negatives - Definitely)	0-20
CPFFN_PROB (CPF False Negatives - Probably)	0-20
CPF_LRSR (CPF Longest Run of Same Responses)	0-40
CPF_EFF (CPF Efficiency = IFAC_TOT/log(IFAC_RTC))	-

Scoring Variable Notes:
* The scores presented on WebCNP are raw scores. Normative data for your project is not accounted for in the scores presented by the variables above.
* All time-based scores (e.g. Response Time) are given in millisecond units (ms).

ScorVers = scoring-code version - particularly important when analyzing data as we update the scoring code with corrections or necessary adjustments.
CPFTP = "definitely yes" or "probably yes" answers for faces that belong to the 20 faces the participant was asked to study.
CPFTN = "definitely no" or "probably no" answers for faces that do not belong to the 20 faces the participant was asked to study.
CPFFP = "definitely yes" or "probably yes" answers for faces that do not belong to the 20 faces the participant was asked to study.
CPFFN = "definitely no" or "probably no" answers for faces that belong to the 20 faces the participant was asked to study.

Test Screenshot:

Correct Responses: Definitely Yes, Probably Yes

References:
[1] Gur RC, Ragland JD, Moberg PJ, Turner TH, Bilker WB, Kohler C, Siegel SJ, Gur RE: Computerized neurocognitive scanning: I. Methodology and validation in healthy people. *Neuropsychopharmacology* 2001; 25(5):766-776.

[2] Gur RC, Ragland JD, Moberg PJ, Bilker WB, Kohler C, Siegel SJ, Gur RE: Computerized neurocognitive scanning: II. The Profile of schizophrenia. *Neuropsychopharmacology* 2001; 25(5):777-788.

[3] Gur RC, Jaggi JL, Ragland JD, Resnick SM, Shtasel D, Muenz L, Gur RE. Effects of memory processing on regional brain activation: cerebral blood flow in normal subjects. *Int J Neurosci*. 1993; 72:31-44.

Test Title: k-CPW
Current Version: 3.01
Aliases: Children's Penn Word Memory Test
Cognitive Domain Tested: Word Memory

Test Description:
The CPW is a measure of word memory. In the first part of this test, participants are shown 20 words that they will be asked to identify later during both immediate and delayed recalls (delayed recall = k-CPWd). During the immediate recall (k-CPW), participants are shown a series, one at a time, of 40 words: the 20 stimuli they were asked to memorize and 20 novel stimuli, referred to as distracters. The participants' task is to decide whether they have seen the word before by clicking one of four buttons, presented in a 4-point scale: "definitely yes", "probably yes", "probably no" and "definitely no," using the mouse.
NOTE: The children's version of the task uses different stimuli than the adult version.

There is one alternate form of the k-CPW: the k-CPW-b.

Note: All distracter/novel stimuli are equated for frequency, length, concreteness and imageability using Pavio's norms [4].

Rules & Variables:
The test is scored based on the number of correct or incorrect responses, divided into true/false positives/negatives and the median response time for each category.

Scoring Variables List:

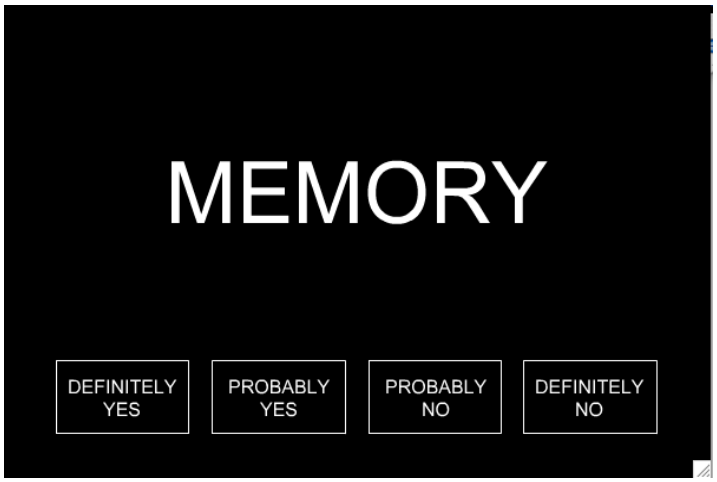
Score Name	Score Range
ScorVers (Current Programming Version of the Scoring Code)	1.00
KCPWTP (k-CPW True Positive Responses)	0-20
KCPWTN (k-CPW True Negative Responses)	0-20
KCPWFP (k-CPW False Positive Responses)	0-20
KCPWFN (k-CPW False Negative Responses)	0-20
KCPWTPRT (Median Response Time for k-CPW True Positive Responses)	time variant
KCPWTNRT (Median Response Time for k-CPW True Negative Responses)	time variant
KCPWFPRT (Median Response Time for k-CPW False Positive Responses)	time variant
KCPWFNRT (Median Response Time for k-CPW False Negative Responses)	time variant
KIWRD_TOT (k-CPW Total Correct Responses)	0-40
KIWRD_RTC (Median Response Time for k-CPW Total Correct Responses)	time variant

Scoring Variable Notes:
* The scores presented on WebCNP are raw scores. Normative data for your project is not accounted for in the scores presented by the variables above.
* All time-based scores (e.g. Response Time) are given in millisecond units (ms).

ScorVers = scoring-code version - particularly important when analyzing data as we update the scoring code with corrections or necessary adjustments.
KCPWTP = "definitely yes" or "probably yes" answers for words that belong to the 20 words the participant was asked to study.
KCPWTN = "definitely no" or "probably no" answers for words that do not belong to the 20 words the participant was asked to study.
KCPWFP = "definitely yes" or "probably yes" answers for words that do not belong to the 20 words the participant was asked to study.

KCPWFN = "definitely no" or "probably no" answers for words that belong to the 20 words the participant was asked to study.

Test Screenshot:



Correct Responses: Definitely Yes, Probably Yes.

References:

[1] Gur RC, Ragland JD, Moberg PJ, Turner TH, Bilker WB, Kohler C, Siegel SJ, Gur RE: Computerized neurocognitive scanning: I. Methodology and validation in healthy people. *Neuropsychopharmacology* 2001; 25(5):766-776.

[2] Gur RC, Ragland JD, Moberg PJ, Bilker WB, Kohler C, Siegel SJ, Gur RE: Computerized neurocognitive scanning: II. The Profile of schizophrenia. *Neuropsychopharmacology* 2001; 25(5):777-788.

[3] Gur RC, Jaggi JL, Ragland JD, Resnick SM, Shtasel D, Muenz L, Gur RE. Effects of memory processing on regional brain activation: cerebral blood flow in normal subjects. *Int J Neurosci*. 1993; 72:31-44.

[4] Pavio A, Yuille JC, Madigan SA (1968): Concreteness, imagery, and meaningfulness values for 925 nouns. *J Exp Psychol* 1968; 76:1-25.

[5] Clark JM, Pavio A. Extensions of the Pavio, Yuille, and Madigan (1968) norms. *Behav Res Methods Instrum Comput.* 2004; 36(3): 371-83.

Test Title: sCTAP
Current Version: 1.01
Aliases: Short Computerized Finger-Tapping Task, cTAP, c-TAP
Cognitive Domain Tested: Motor Speed

Test Description:
The Short CTAP is a measure of motor speed [1]. In this task, participants are asked to press the space bar with their index finger as many times as they can, alternately using both non-dominant and dominant hands, using a special hand position shown by the administrator. The task is composed of 6 trials: 3 trials for the dominant hand and 3 trials for the non-dominant hand. The set-time interval for each test trial is 10 seconds. The participant practices with each hand once before starting the task.

Rules & Variables:
The test is scored based on the number of taps the participant completes in each trial for each hand and their perseverations. Perseverations are defined as the number of spacebar presses during the "STOP" prompt after each test trial. Also, the mean number of taps per dominant and non-dominant hand trials is given along with their respective standard deviations.

Scoring Variables List:

Score Name	Score Range
ScorVers (Current Programming Version of the Scoring Code)	2.01
STAP_HAND (CTAP Dominant Hand)	R/L
STAP_DOM (Mean Taps for CTAP Dominant Hand)	0-number variant
STAP_NON (Mean Taps for CTAP Non-Dominant Hand)	0-number variant
STAP_DOMSD (Standard Deviation of TAP_DOM Responses)	0-number variant
STAP_NONSD (Standard Deviation of TAP_NON Responses)	0-number variant
STAP_TOT (Sum of TAP_DOM and TAP_NON)	0-number variant
STAP_D1 (Taps, 1st trial, Dominant Hand)	0-number variant
STAP_D2 (Taps, 2nd trial, Dominant Hand)	0-number variant
STAP_D3 (Taps, 3rd trial, Dominant Hand)	0-number variant
STAP_N1 (Taps, 1st trial, Non-Dominant Hand)	0-number variant
STAP_N2 (Taps, 2nd trial, Non-Dominant Hand)	0-number variant
STAP_N3 (Taps, 3rd trial, Non-Dominant Hand)	0-number variant
STAP_DP1 (Taps after STOP, 1st trial, Dominant Hand)	0-number variant
STAP_DP2 (Taps after STOP, 2nd trial, Dominant Hand)	0-number variant
STAP_DP3 (Taps after STOP, 3rd trial, Dominant Hand)	0-number variant
STAP_NP1 (Taps after STOP, 1st trial, Non-Dominant Hand)	0-number variant
STAP_NP2 (Taps after STOP, 2nd trial, Non-Dominant Hand)	0-number variant
STAP_NP3 (Taps after STOP, 3rd trial, Non-Dominant Hand)	0-number variant

Test Trial Screenshot:

References:

[1] Lezak MD. Neuropsychological Assessment. New York: Oxford University Press.1995; pg 680.

[2] Halstead WC. Brain and Intelligence. Chicago: University of Chicago Press. 1947.

[3] Reintan RM, Wolfson D. The Halstead-Reintan Neuropsychological Test Battery: theory and clinical interpretation. Tucson, AZ: Neuropsychology Press. 1993.

[4] Spreen O, Strauss E. A compendium of neuropsychological tests. New York: Oxford University Press. 1991.

[5] Gur RC, Ragland JD, Moberg PJ, Turner TH, Bilker WB, Kohler C, Siegel SJ, Gur RE: Computerized neurocognitive scanning: I. Methodology and validation in healthy people. *Neuropsychopharmacology* 2001; 25(5):766-776.

[6] Gur RC, Ragland JD, Moberg PJ, Bilker WB, Kohler C, Siegel SJ, Gur RE: Computerized neurocognitive scanning: II. The Profile of schizophrenia. *Neuropsychopharmacology* 2001; 25(5):777-788.

Test Title: k-ER40
Current Version: 3.60
Aliases: Penn Emotion Recognition Task, Children's ER40.
Cognitive Domain Tested: Emotion Recognition

Test Description:
The ER40 is a measure of emotion recognition. Participants are shown a series of 40 faces, one at a time, and asked to determine what emotion the face is showing for each trial. There are 5 answer choices: *Happy*, *Sad*, *Angry*, *Scared* and *No Feeling*. Participants respond to each trial by clicking with the mouse on the word describing the emotion each faces expresses. There are 4 female faces for each emotion (4 x 5 = 20) and 4 male faces for each emotion (4 x 5 = 20).

The children's version uses the same stimuli as the adult version, but some of the emotion prompts are simplified: *Anger => Angry*, *Fear=>Scared*, *No Emotion=>No Feeling*. There are two forms: the *k-er40-a* and *k-er40-b*.

Note: The faces are colored pictures taken, analyzed and rated as described in [1, 2, 3]. They derive from the University of Pennsylvania Emotion Recognition Task, 96 faces version, balanced for equality and intensity of emotion, age, gender and ethnicity [2].

Rules & Variables:
The scores are based on the number of correct responses for female versus male faces; the number of correct happy, sad, angry, sad and no feeling faces; the number of false positives for happy, sad, angry, scared and no feeling faces; and the number of mild and intense emotion expressions correctly identified. Median response times are given for all categories.

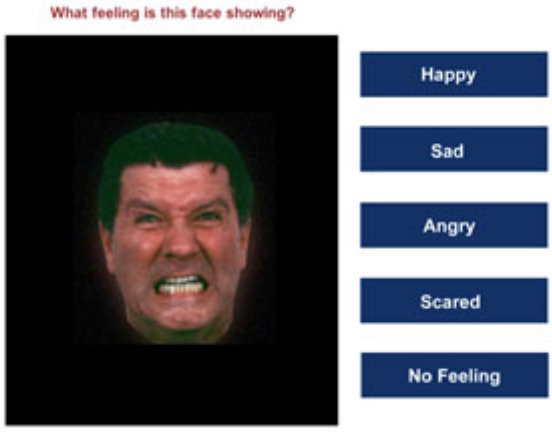
Scoring Variables List:

Score Name	Score Range
ScorVers = Current Programming Version of the Scoring Code	1.01
ER40_CR (ER40 Correct Responses)	0-40
ER40_CRT (ER40 Correct Responses Median Response Time)	time variant
ER40_FC (ER40 Correct Female Identifications)	0-20
ER40_MC (ER40 Correct Male Identifications)	0-20
ER40FCRT (ER40 Correct Female Identifications Median Response Time)	time variant
ER40MCRT (ER40 Correct Male Identifications Median Response Time)	time variant
ER40ANG (ER40 Correct Anger Identifications)	0-8
ER40FEAR (ER40 Correct Fear Identifications)	0-8
ER40HAP (ER40 Correct Happy Identifications)	0-8
ER40NOE (ER40 Correct Neutral Identifications)	0-8
ER40SAD (ER40 Correct Sad Identifications)	0-8
ER40ANGRT (Median Response Time for ER40 Correct Anger Identifications)	time variant
ER40FEARRT (Median Response Time for ER40 Correct Fear Identifications)	time variant
ER40HAPRT (Median Response Time for ER40 Correct Happy Identifications)	time variant
ER40NOERT (Median Response Time for ER40 Correct Neutral Identifications)	time variant
ER40SADRT (Median Response Time for ER40 Correct Sad Identifications)	time variant
ER40_FPA (ER40 False Positive Anger Responses)	0-32
ER40_FPF (ER40 False Positive Fear Responses)	0-32
ER40_FPH (ER40 False Positive Happy Responses)	0-32
ER40_FPN (ER40 False Positive Neutral Responses)	0-32
ER40_FPS (ER40 False Positive Sad Responses)	0-32
ER40_FPART (Median Response Time for ER40 False Positive Anger	time variant

Responses)	
ER40_FPFRT (Median Response Time for ER40 False Positive Fear Responses)	time variant
ER40_FPHRT (Median Response Time for ER40 False Positive Happy Responses)	time variant
ER40_FPNRT (Median Response Time for ER40 False Positive Neutral Responses)	time variant
ER40_FPSRT (Median Response Time for ER40 False Positive Sad Responses)	time variant
ER40MILD (ER40 Correct Mild Identifications)	0-20
ER40EXTR (ER40 Correct Extreme Identifications)	0-20
ER40MDRT (ER40 Correct Mild Identifications Median Response Time)	time variant
ER40EXRT (ER40 Correct Extreme Identifications Median Response Time)	time variant

Scoring Variable Notes:
* The scores presented on WebCNP are raw scores.
* All time-based scores (e.g. Response Time) are given in millisecond units (ms).

Test Screenshot:



Correct Response: Angry

References:
[1] Gur RC, Sara R, Hagendoorn M, Marom O, Hughett P, Macy L, Turner T, Bajcsy R, Posner A, Gur RE. A method for obtaining 3-dimensional facial expressions and its standardization for use in neurocognitive studies. *Journal of Neuroscience Methods* 2002; 115:137-143.

[2] Kohler CG, Turner TH, Gur RE, Gur RC. Recognition of facial emotions in neuropsychiatric disorders. *CNS Spectrums* 2004; 9(4): 267-274.

[3] Kohler CG, Turner T, Stolar NM, Bilker WB, Brensinger CM, Gur RE, Gur RC. Differences in facial expressions of four universal emotions. *Psychiatry Research* 2004; 128: 235-244.

[4] Silver H, Goodman C, Knoll G, Isakov V. Brief emotion training improves recognition of facial emotions in chronic schizophrenia. A pilot study. *Psychiatry Research* 2004; 128: 147-154.

Test Title: sLNB2
Current Version: 1.06
Aliases: Short Letter-N-Back; sLNB2, Short N-Back test, 2-Back test

Cognitive Domain Tested: attention and working memory

Test Description:
The sLNB2 is a measure of attention and working memory. In this task, participants are asked to pay attention to flashing letters on the computer screen, one at a time, and to press the spacebar according to three different principles or rules: the 0-back, the 1-back and the 2-back. During the 0-back, the participant must press the spacebar whenever the letter X appears on the screen. During the 1-back, the participant must press the spacebar whenever the letter on the screen is the same as the previous letter (i.e. in the series "T", "R", "R", the participant should press the spacebar on or immediately after the second "R"). During the 2-back, the participant must press the spacebar whenever the letter on the screen is the same as the letter before the previous letter (i.e. in the series "T", "G", "T", the participant should press the spacebar on or immediately after the second "T"). In all trials, the participant has 2.5 seconds to press the spacebar. The participant practices all three principles. During the actual test trials, the participant does two blocks each of the 0-back, 1-back and 2-back in a pre-arranged order.

There is no alternate form of the sLNB2.

Rules & Variables:
The sLNB2 is scored based on the total number of true/false positives, median reaction time for all correct responses, and number of true/false positives and median response times for each of the three conditions.

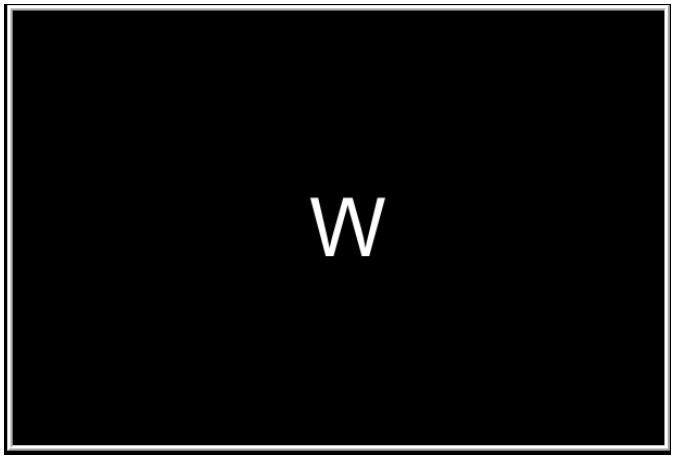
Scores Variables List:

Score Name	Score Range
ScorVers (Current Programming Version of the Scoring Code)	1
SLNB_TP (SLNB True Positive Responses)	0-30
SLNB_FP (SLNB False Positive Responses)	0-60
SLNB_RTC (SLNB Median Response Time for All Correct Responses (ms))	0-2500 ms
SLNB_TP0 (SLNB True Positive Responses for 0-Back Trials)	0-10
SLNB_FP0 (SLNB False Positive Responses for 0-Back Trials)	0-10
SLNB_RTC0 (SLNB Median Response Time for Correct 0-Back Trials (ms))	0-2500 ms
SLNB_TP1 (SLNB True Positive Responses for 1-Back Trials)	0-10
SLNB_FP1 (SLNB False Positive Responses for 1-Back Trials)	0-10
SLNB_RTC1 (SLNB Median Response Time for Correct 1-Back Trials (ms))	0-2500 ms
SLNB_TP2 (SLNB True Positive Responses for 2-Back Trials)	0-10
SLNB_FP2 (SLNB False Positive Responses for 2-Back Trials)	0-10
SLNB_RTC2 (SLNB Median Response Time for Correct 2-Back Trials (ms))	0-2500 ms
SLNB_MCR (SLNB True Positive Responses for 1-Back and 2-Back Trials)	0-20
SLNB_MRTC (SLNB Mean of Median RT for True Positive Responses for 1-Back and for 2-Back Trials (ms))	0-2500 ms
SLNB_MEFF (SLNB Efficiency for Correct 1-Back and 2-Back = SLNB_MCR/log(SLNB_MRTC))	-
SLNB_LRNR (SLNB2 Longest Run of Non-Responses))	0-90
SLNB_FRNR (SLNB2 Final Run of Non-Responses))	0-90

Scoring Variables Notes:
* All time-based scores (e.g. Response Time) are given in millisecond units (ms).

True Positives = spacebar press following the current condition (a correct response).
False Positives = spacebar press not following the current condition.

Test Screenshot:



References:

[1] Ragland, J.D., Turetsky, B.I., Gur, R.C., Gunning-Dixon, F., Turner, T., Schroeder, L., Chan, R., Gur, R.E. Working Memory for Complex Figures: An fMRI Comparison of Letter and Fractal N-Back Tasks. Neuropsychology, 16, 370-379, 2002.

[2] Cohen NJ, Ryan J, Hunt C, Romine L, Wszalek T, Nash C: Hippocampal system and declarative (relational) memory: summarizing the data from functional neuroimaging studies. Hippocampus 1999; 9:83–98.

Test Title: MEDF36
Current Version: 2.06
Aliases: Measured Emotion Differentiation Test, Measured EMODIFF, Morphed EMODIFF
Cognitive Domain Tested: Emotion Discrimination (when co-administered with ADT)

Test Description:
The MEDF measures the ability to detect emotion intensity. The subject is presented with pairs of faces. The MEDF presents a pair of faces and asks the participant to click the button labeled "This Face" below the face that is showing more emotion (anger, fear, happiness, sadness), or the central button labeled "Equal" if both faces are showing equal emotion. The stimuli are created using software to morph faces into differing intensities of emotion. For example, a 50% morph will be a 50% morph between a neutral face and the same identity expressing the target emotion. There are 36 trials in total, divided into happy, sad, angry, and fearful faces. Of the 36 trials, 4 show no emotional difference. The remaining 32 trials have emotion differentials in increments of 10% ranging from 10% - 60%, distributed more heavily toward 30% and 40% items. Trials are presented in random order, and the test is a forced-choice task with no time limit per trial. After the subject answers one trial, the test automatically moves to the next trial. Response time is recorded for each trial.

Rules and Variables
The test is scored based on the number of correct responses, divided into blocks of trials and the Median Response time for each category.

Scores Variables List:

Score Name	Score Range
ScorVers (Current Programming Version of Scoring Code for MEDF)	2.07
MEDF36_HAP_CR (Correct Responses for Measured Emodiff Happy Trials)	0-9
MEDF36_SAD_CR (Correct Responses for Measured Emodiff Sad Trials)	0-9
MEDF36_ANG_CR (Correct Responses for Measured Emodiff Angry Trials)	0-9
MEDF36_FEAR_CR (Correct Responses for Measured Emodiff Fearful Trials)	0-9
MEDF36_HAP_RTCR (Median Response Time for Correct Measured Emodiff Happy Trials (ms))	time variant
MEDF36_SAD_RTCR (Median Response Time for Correct Measured Emodiff Sad Trials (ms))	time variant
MEDF36_ANG_RTCR (Median Response Time for Correct Measured Emodiff Anger Trials (ms))	time variant
MEDF36_FEAR_RTCR (Median Response Time for Correct Measured Emodiff Fearful Trials (ms))	time variant
MEDF36_HAP_RTER (Median Response Time for Incorrect Measured Emodiff Happy Trials (ms))	time variant
MEDF36_SAD_RTER (Median Response Time for Incorrect Measured Emodiff Sad Trials (ms))	time variant
MEDF36_ANG_RTER (Median Response Time for Incorrect Measured Emodiff Anger Trials (ms))	time variant
MEDF36_FEAR_RTER (Median Response Time for Incorrect Measured Emodiff Fearful Trials (ms))	time variant
MEDF36_PCT10_CR (Correct Responses for Measured Emodiff 10 Percent Difference Trials)	0-5
MEDF36_PCT20_CR (Correct Responses for Measured Emodiff 20 Percent Difference Trials)	0-5
MEDF36_PCT30_CR (Correct Responses for Measured Emodiff 30 Percent Difference Trials)	0-8
MEDF36_PCT40_CR (Correct Responses for Measured Emodiff 40 Percent	0-7

Difference Trials)	
MEDF36_PCT50_CR (Correct Responses for Measured Emodiff 50 Percent Difference Trials)	0-5
MEDF36_PCT60_CR (Correct Responses for Measured Emodiff 60 Percent Difference Trials)	0-2
MEDF36_SAME_CR (Correct Responses for Measured Emodiff No Difference Trials)	0-4
MEDF36_PCT10_RTCR (Median Response Time for Correct Measured Emodiff 10 Percent Difference Trials)	time variant
MEDF36_PCT20_RTCR (Median Response Time for Correct Measured Emodiff 20 Percent Difference Trials)	time variant
MEDF36_PCT30_RTCR (Median Response Time for Correct Measured Emodiff 30 Percent Difference Trials)	time variant
MEDF36_PCT40_RTCR (Median Response Time for Correct Measured Emodiff 40 Percent Difference Trials)	time variant
MEDF36_PCT50_RTCR (Median Response Time for Correct Measured Emodiff 50 Percent Difference Trials)	time variant
MEDF36_PCT60_RTCR (Median Response Time for Correct Measured Emodiff 60 Percent Difference Trials)	time variant
MEDF36_SAME_RTCR (Median Response Time for Correct Measured Emodiff No Difference Trials)	time variant
MEDF36_NS_CR (Total Correct Emotion Differentiation Test Trials, Excluding Same Trials)	0-32
MEDF36_NS_RTCR (Median Response Time for Correct Emotion Differentiation Test Trials, Excluding Same Trials)	time variant
MEDF36_A (Total Correct Measured Emodiff Trials)	0-36
MEDF36_T (Median Response Time for All Measured Emodiff Trials)	time variant

ScorVers = scoring-code version - particularly important when analyzing data as we periodically update the scoring code with additional scores or necessary adjustments.

Practice Trials:

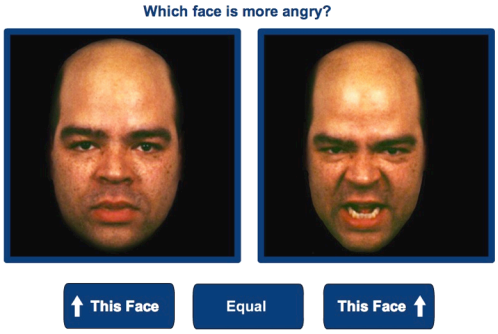
Summary:

The three practice trials provide feedback, and only allow one to continue if the trial is completed successfully.

Time: forced-choice participant-dependent – the practice question will remain on the screen until the participant clicks on one of the 3 choices.

Feedback: Correct - "Good Job! Try the next one." Incorrect – "That's not quite right. Please try again.

Practice Trial Screenshot:



Correct Response: Right face.

Test Trials:

Summary:

The test has 36 trials total, all of which present the same format question within 4 categories of stimuli groups (happy, sad, fear, anger).

Presentation: the test is formatted such that subjects go through a set of 36 randomized pairs of stimuli, one pair at a time.

Time: Because the test is forced-choice, there is no time limit per question.

Response time is recorded.

Feedback: Although there is feedback during the practice trials, the test trials have none.

Test Trial Screenshot: same as practice screenshot.

Test Title: MPraxis
Current Version: 2.06
Aliases: Motor Praxis, Mouse Practice
Cognitive Domain Tested: Sensorimotor Ability

Test Description:
The MPraxis is a measure of sensorimotor ability. It is also designed to familiarize the participant with the computer mouse used during nearly all of the WebCNP tasks. During the MPraxis, the participant needs to move the computer mouse cursor over an ever-shrinking green box and click on it once each time it appears on a different location on the test-page. If participants can't complete the MPraxis, it is likely they won't be able to complete any other WebCNP task.

Rules & Variables:
The test is scored based on the number of correct responses for the test trials (Trial 2) and the median response times for the correct responses on the practice trial (Trial 1) and Trial 2.

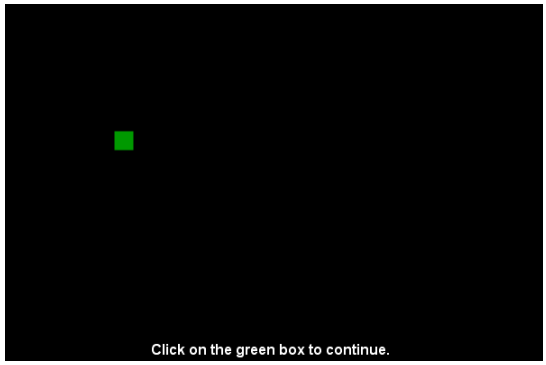
Scoring Variables List:

Score Name	Score Range
ScorVers (Current Programming Version of the Scoring Code)	1.00
MP1RT (Median Response Time for Mouse Praxis Trial 1)	0-5000 ms
MP2 (Mouse Praxis Correct Responses Trial 2)	0-20
MP2RT (Median Response Time for Mouse Praxis Trial 2)	0-5000 ms

Scoring Variable Notes:
* The scores presented on WebCNP are raw scores. Normative data for your project is not accounted for in the scores presented by the variables above.
* All time-based scores (e.g. Response Time) are given in millisecond units (ms).

ScorVers = scoring-code version - particularly important when analyzing data as we update the scoring code with corrections or necessary adjustments.
Trial 1 = forced-choice trial or practice trial. The participant can take as long as he/she needs to click on the box until the trials are over.
Trial 2 = time-limited trial. The participant has 5 seconds to click on the box before it appears, smaller, elsewhere on the page.

Test Screenshot:



Correct Response: Click once on the green box.

Reference:
Calkins ME, Ragland JD, Gur RE, Nimgaonkar LV, Pogue-Geile MF, Gur RC. Neurocognitive impairments reflect the degree of genetic predisposition to schizophrenia: evidence from a multiplex, multigenerational study. 2005; Poster Presentation.

Gur RC, Ragland JD, Moberg PJ, Turner TH, Bilker WB, Kohler C, Siegel SJ, Gur RE: Computerized neurocognitive scanning: I. Methodology and validation in healthy people. *Neuropsychopharmacology* 2001; 25(5):766-776.

Gur RC, Ragland JD, Moberg PJ, Bilker WB, Kohler C, Siegel SJ, Gur RE: Computerized neurocognitive scanning: II. The Profile of schizophrenia. *Neuropsychopharmacology* 2001; 25(5):777-788.

Test Title: PCET
Current Version: 2.01
Aliases: Penn Conditional Exclusion Task
Cognitive Domain Tested: Abstraction and Mental Flexibility (Executive Function)

Test Description:
The PCET is a measure of abstraction and mental flexibility related to the Wisconsin Card Sorting Test [1, 2]. It is a computerized variant form of the "Odd Man Out" model [3] where participants must decide which of four objects does not belong [1, 2]. There are three principles/criteria for choosing an object, which change as the participant achieves 10 consecutive correct answers for each principle: line thickness, shape, and size (respectively). The participant has 48 trials to get 10 consecutive answers correct for each principle. There is only one principle in effect for any trial, but a response may match more than one principle. The participant is not told what the ruling principle is and must derive the correct principle by clicking on an object and receiving feedback as to whether this is the correct response. If the participant does not achieve the first principle within 48 trials, the test ends.

Rules & Variables:
The test is scored based on the number of correct or incorrect responses as well as the median response times. Perseverative errors and perseverative correct responses are given in addition to the number of trials taken for each of the 3 criteria/principles.

Scoring Variables List:

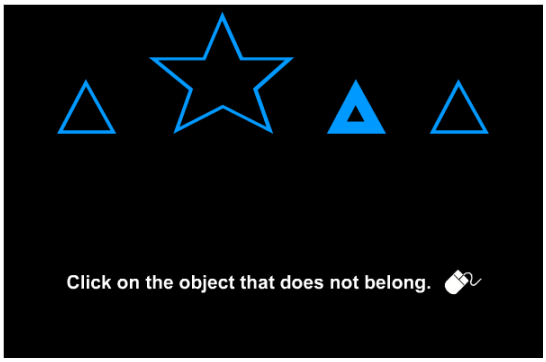
Score Name	Score Range
ScorVers (Current Programming Version of the Scoring Code)	1.06
PCETCR (PCET Number Correct Responses)	0-132
PCETRTCR (Median Response Time for PCET Correct Responses (ms))	time variant
PCETER (PCET Number Incorrect Responses)	0-134
PCETRTER (Median Response Time for PCET Incorrect Responses (ms))	time variant
PCET_NUM (Total Number of Trials)	0-144
PCET_CAT (Number of PCET Categories Achieved)	0-3
CAT1_TR (Number of Trials Required to Achieve Category 1)	10-48
CAT2_TR (Number of Trials Required to Achieve Category 2)	10-48
CAT3_TR (Number of Trials Required to Achieve Category 3)	10-48
PER_ER (PCET Number of Perseverative Errors)	0-96
PER_RES (PCET Perseverative Errors Plus Correct Perseverative Responses)	0-96
PCET_ACC (PCET Accuracy = PCET_CAT * PCETCR/(PCETCR +PCETER))	
PCET_ACC2 (PCET Accuracy2 = (PCET_CAT + 1) * PCETCR/(PCETCR +PCETER))	
PCET_EFF (PCET Efficiency = PCET_ACC/log(PCETRTCR))	

Scoring Variables Notes:
* If a category is not achieved within the allotted 48 trials, the value of CATn_TR will be null for that principle.
* All time-based scores (e.g. Response Time) are given in millisecond units (ms).

Sorting Principle 1 = first criterion/principle: line thickness
Sorting Principle 2 = second criterion/principle: shape
Sorting Principle 3 = third criterion/principle: size
PER_ER Perseverative Errors = errors made when the participant makes an answer based on a perseverative principle. The perseverative principle is coded whenever 3 consecutive incorrect responses based on a previous criterion are made without any intervening responses in-between that match any other criterion.

PER_RES Correct Perseverative Responses = responses based on a perseverative criterion but which also match the correct sorting principle for the trial (as some responses match two criteria/principles, it is possible to make a perseverative response and yet answer the trial question correctly).

Test Screenshot:



References:

[1] Kurtz, M.M., Ragland, J.D., Moberg, P.J., Gur, R.C., (2004). The Penn Conditional Exclusion Test: a new measure of executive-function with alternate forms for repeat administration. *Arch. Clin. Neuropsychol, 19,* 191-201.

[2] Kurtz, M.M., Wexler, B.E., Bell, M.D. (2004). The Penn Conditional Exclusion Test (PCET): relationship to the Wisconsin Card Sorting Test and work function in patients with schizophrenia. *Schizophrenia Research, 68,* 95-102.

[3] Flowers, K.A., & Robertson, C. (1985). The effect of Parkinson's disease on the ability to maintain a mental set. *Journal of Neurology, Neurosurgery, and Psychiatry*, *48*, 517–529.

Test Title: sPCPT-nl
Current Version: 1.01
Aliases: Short Penn Continuous Performance Test-Number and Letter Version; Short Penn CPT; Short PCPT-nl; Short NumLet-CPT
Cognitive Domain Tested: Visual Attention

Test Description:
The sPCPTnl is a measure of visual attention and vigilance based on the Penn CPT [1]. In this task, a series of red vertical and horizontal lines flash in a digital numeric frame (resembling a digital clock). The participant must press the spacebar whenever these lines form complete numbers or complete letters. The task is divided into two parts: one in which the participant is looking for complete numbers followed by another set of trials where the participant is looking for complete letters. Each part lasts 1.5m. Each stimulus flashes for 300 milliseconds followed by a blank page displayed for 700 milliseconds, giving the participant 1 sec to respond to each trial. The participant practices both types of trials before the task begins.

Rules & Variables:
The sPCPTnl is scored based on the number of true/false positives and true negative responses and their respective median response times.

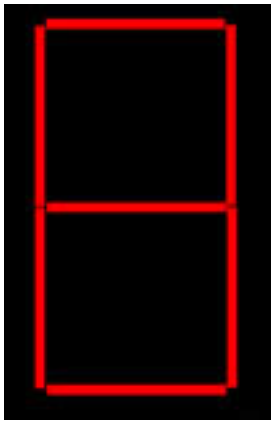
Scoring Variables List:

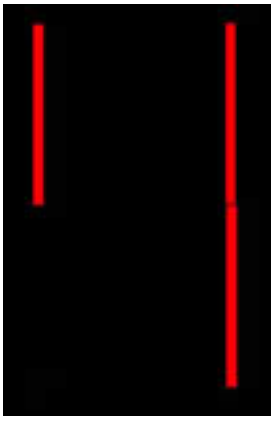
Score Name	Score Range
ScorVers (Current Programming Version of the Scoring Code)	1.31
SCPN_TP (Short CPT True Positive Responses for Number Trials)	0-30
SCPN_FP (Short CPT False Positive Responses for Number Trials)	0-60
SCPN_TN (Short CPT True Negative Responses for Number Trials)	0-60
SCPN_FN (Short CPT False Negative Responses for Number Trials)	0-30
SCPN_TPRT (Median Response Time for Short CPT True Positive Responses for Number Trials (ms))	0-1000 ms
SCPN_FPRT (Median Response Time for Short CPT False Positive Responses for Number Trials (ms))	0-1000 ms
SCPL_TP (Short CPT True Positive Responses for Letter Trials)	0-30
SCPL_FP (Short CPT False Positive Responses for Letter Trials)	0-60
SCPL_TN (Short CPT True Negative Responses for Letter Trials)	0-60
SCPL_FN (Short CPT False Negative Responses for Letter Trials)	0-30
SCPL_TPRT (Median Response Time for Short CPT True Positive Responses for Letter Trials (ms))	0-1000 ms
SCPL_FPRT (Median Response Time for Short CPT False Positive Responses of Letter Trials (ms))	0-1000 ms
SCPT_FN (Short CPT False Negatives = Sum of CPN_FN and CPL_FN)	0-60
SCPT_FP (Short CPT False Positives = Sum of CPN_FP and CPL_FP)	0-120
SCPT_TP (Short CPT True Positives = Sum of CPN_TP and CPL_TP)	0-60
SCPT_TN (Short CPT True Negatives = Sum of CPN_TN and CPL_TPN)	0-120
SCPT_TPRT (Median Response Time for Short CPT True Positive Responses)	0-1000 ms
SCPT_FPRT (Median Response Time for Short CPT False Positive Responses)	0-1000 ms
SCPN_RT (Median Response Time for All Number Positive Responses (ms))	0-1000 ms
SCPL_RT (Median Response Time for All Letter Positive Responses (ms))	0-1000 ms
SCPT_RT (Median Response Time for All Positive Responses (ms))	0-1000 ms
SCPT_SEN (Sensitivity = SCPT_TP/(SCPT_TP + SCPT_FN))	-

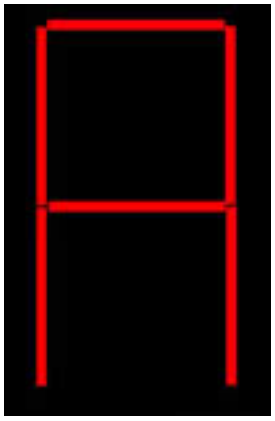
SCPT_SPEC (Specificity = SCPT_TN/(SCPT_TN + SCPT_FP))	-
SCPT_EFF (Efficiency=SCPT_TP/log(SCPT_TPRT))	-
SCPT_LRNR (NumLet CPT Longest Run of Non-Responses))	0-180
SCPT_FRNR (NumLet CPT Final Run of Non-Responses))	0-180
SCPN90_SEN (Sensitivity = SCPN90_TP/(SCPN90_TP + SCPN90_FN))	-
SCPN90_SPEC (Specificity = SCPN90_TN/(SCPN90_TN + SCPN90_FP))	-
SCPN90_TPRT (Median Response Time for Short CPT True Positive Responses for Number Trials (ms))	time variant

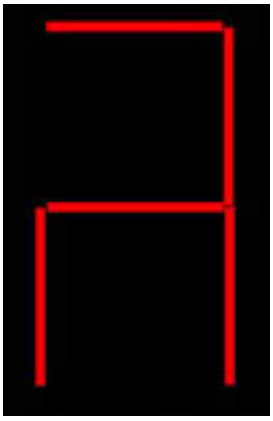
Scoring Variables Notes:
True Positives = spacebar press when the lines flashing form a complete number or a complete letter (a correct response).
False Positives = spacebar press when the lines flashing do not form a complete number or a complete letter (an incorrect response).
True Negatives = no spacebar press when the lines flashing do not form a complete number nor a complete letter (a correct response).
the scores presented by the variables above.

Test Screenshots:


Number Stimulus


Number Foil


Letter Stimulus


Letter Foil

Reference:
[1] Kurtz, M.M., Ragland, J.D., Bilker, W.B., Gur, R.C., Gur, R.E. (2001): Comparison of two forms of the continuous performance test, with and without working memory demands in healthy controls and patients with schizophrenia. *Schiz Res,* 48:307–316

[2] Gur, R.C., Ragland, J.D., Moberg, P.J., Turner, T.H., Bilker, W.B., Kohler, C., Siegel, S.J., Gur, R.E. (2001): Computerized neurocognitive scanning: I. Methodology and validation in healthy people. *Neuropsychopharmacology* 25:766–776

[3] Gur, R.C., Ragland, J.D., Moberg, P.J., Bilker, W.B., Kohler, C., Siegel, S.J., Gur, R.E. (2001): Computerized neurocognitive scanning: II. The Profile of schizophrenia. *Neuropsychopharmacology,* 25(5): 777-788.

Test Title: k-sPVRT
Current Version: 1.05
Aliases: Children's Verbal Reasoning Test, Kids' Short PVRT, PVRT
Cognitive Domain Tested: Verbal Intellectual Ability; Language

Test Description:
The k-sPVRT is a measure of language or verbal reasoning. It is the Children's Short version of the Penn Verbal Reasoning Test (PVRT) [1, 2]. It is a multiple-choice task in which the participant must answer age-appropriate verbal analogy questions [2]. The short PVRT has a total of 15 questions.

There are two forms: k-sPVRT-A and k-sPVRT-B. These forms were constructed from the original 30-item Children's PVRT by revising items, adding items and selecting items of similar type and difficulty for each form.

Rules & Variables:

Scoring Variables List:

Score Name	Score Range
K_SPVRT_CR (k-sPVRT Total Correct)	0-15
K_SPVRT_PC (k-sPVRT Percent Correct)	0-100%
K_SPVRT_RTTO (Median Response Time for All k-sPVRT Trials)	time variant
K_SPVRT_RTCR (Median Response Time for Correct k-sPVRT Trials)	time variant
K_SPVRT_RTER (Median Response Time for Incorrect k-sPVRT Trials)	time variant

Test Screenshot:

Correct Response: dinner

Reference:
[1] Gur RC, Gur RE, Obrist WD, Skolnick BE, Reivich M. Age and regional cerebral blood flow at rest and during cognitive activity. *Arch Gen Psychiat* 1987; 44: 617-621.

[2] Gur RC, Ragland JD, Moberg PJ, Turner TH, Bilker WB, Kohler C, Siegel SJ, Gur RE: Computerized neurocognitive scanning: I. Methodology and validation in healthy people. *Neuropsychopharmacology* 2001; 25(5): 766-776.

[3] Gur RC, Ragland JD, Moberg PJ, Bilker WB, Kohler C, Siegel SJ, Gur RE: Computerized neurocognitive scanning: II. The Profile of schizophrenia. *Neuropsychopharmacology* 2001; 25(5): 777-788.

Test Title: sVOLT
Current Version: 3.00
Aliases: Visual Object Learning Test, Short VOLT, VOLT, sVOLT
Cognitive Domain Tested: Visual Object Learning and Memory

Test Description:
The sVOLT is a measure of visual object learning and memory. It was designed as a spatial analog of the California Verbal Learning Test. The sVOLT includes only the first set of trials of a series of 7 sets from the full version (VOLT) [1]. In the first part of this test, participants are shown 10 three-dimensional Euclidean shapes that they will be asked to identify for both immediate and delayed recalls (delayed recall = sVOLTd). During the immediate recall (sVOLT), participants are shown a series, one at a time, of 20 three-dimensional Euclidean shapes - the 10 shapes they were asked to memorize mixed with 10 novel shapes. The participant's task is to decide whether he/she has seen the shape before by clicking with the mouse on one of four buttons: "DEFINITELY YES", "PROBABLY YES", "PROBABLY NO" and "DEFINITELY NO". (NOTE: The original sVOLT had only two response choices: "YES I have seen the shape" and "NO I have not seen the shape."). Participants have 20 seconds to select a response before the test moves on to the next trial.

There are two forms of the sVOLT: the sVOLT-A and sVOLT-B.

NOTE: There are five classes of objects: triangles, squares, pentagons, hexagons and octagons. For each class, there are 2 figures in both study stimuli (5 x 2 = 10), and foils (5 x 2 =10) for a total of 20 shapes during the test trials [1]. All stimuli have a geometric blue two-dimension shape within the three-dimensional figure. The three dimensional shape, two dimensional blue shape and its location must be remembered in order to correctly answer test trials.

Rules & Variables:
The test is scored based on the number and median response time of true/false positive/negative responses. The total correct and median response times of total correct and total incorrect responses are given, as well as the median response time of all responses.

Scoring Variables List:

Score Name	Score Range
SVT (Short VOLT Total Correct)	0-20
SVTRT (Median Response Time for Short VOLT All Responses)	0-20000ms
SVTCRT (Median Response Time for Short VOLT Correct Responses)	0-20000ms
SVTIRT (Median Response Time for Short VOLT Incorrect Responses)	0-20000ms
SVTTP (Short VOLT True Positive Responses)	0-10
SVTTN (Short VOLT True Negative Responses)	0-10
SVTFP (Short VOLT False Positive Responses)	0-10
SVTFN (Short VOLT False Negative Responses)	0-10
SVTTPRT (Short VOLT True Positive Median Response Time)	0-20000ms
SVTTNRT (Short VOLT True Negative Median Response Time)	0-20000ms
SVTFPRT (Short VOLT False Positive Median Response Time)	0-20000ms
SVTFNRT (Short VOLT False Negative Median Response Time)	0-20000ms
SVT (Short VOLT Total Correct)	0-20

Scoring Variable Notes:
SVTTP = "YES" responses to shapes that belong to the 10 shapes the participant was asked to study (correct responses).

SVTTN = "NO" responses to shapes that do not belong to the 10 shapes the participant was asked to study (correct responses).
SVTFP = "YES" responses to shapes that do not belong to the 10 shapes the participant was asked to study (incorrect responses).
SVTFN = "NO" responses to shapes that belong to the 10 shapes the participant was asked to study (incorrect responses).
* The score ranges are not standardized. Normative data for your project is not accounted for in the scores presented by the variables above.

Test Screenshot:

References:
[1] Glahn DC, Gur RC, Ragland JD, Gur RE. Reliability, performance characteristics, and construct validity and initial application of the visual object learning test (VOLT). *Neuropsychology* 1997; 11:602-612.

[2] Gur RC, Ragland JD, Moberg PJ, Turner TH, Bilker WB, Kohler C, Siegel SJ, Gur RE: Computerized neurocognitive scanning: I. Methodology and validation in healthy people. *Neuropsychopharmacology* 2001; 25(5):766-776.

[3] Gur RC, Ragland JD, Moberg PJ, Bilker WB, Kohler C, Siegel SJ, Gur RE: Computerized neurocognitive scanning: II. The Profile of schizophrenia. *Neuropsychopharmacology* 2001; 25(5):777-788.