PARiConnect™

Administration & Scoring

WCST/WCST-64

PAR Staff

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OVERVIEW

The Wisconsin Card Sorting Test (WCST; Heaton, 1981) is a test of perseveration (vs. flexibility), working memory, and abstraction for individuals age 6 years, 5 months to 89 years. It is also considered a measure of executive function because of its reported sensitivity to frontal lobe dysfunction. Completion of the WCST requires the ability to develop and maintain an appropriate problem-solving strategy across changing stimulus conditions to achieve a future goal. The Wisconsin Card Sorting Test–64 Card Version (WCST-64; Kongs et al., 2000) is an abbreviated form of the standard 128-card version of the test. It involves only administering the first deck of 64 cards. The normative, reliability, and validity data for the WCST-64 are derived from the same samples described in the Wisconsin Card Sorting Test Manual–Revised and Expanded (Heaton et al., 1993). The WCST-64 maintains the task requirements of the WCST; therefore, much of what is known about the WCST will generalize to the WCST-64 (e.g., administration and scoring, reliability).

BACKGROUND

The WCST and WCST-64 have been used extensively in clinical and research applications as a measure of executive function. Camara, Nathan, and Puente's (2000) survey of psychological test usage found that 43.9% of neuropsychologists reported using the WCST. In a survey of neuropsychologists in the U.S. and Canada, the WCST and WCST-64 were found to be the most frequently used executive functioning assessment instrument (Rabin, Paolillo, & Barr, 2016). Although some of the WCST literature may not be directly applicable to the WCST-64, it will provide helpful information until additional WCST-64 studies become available.

The computer versions of the WCST and WCST-64 allow the WCST or WCST-64 to be administered via a software program on a computer. These computer versions have been found to yield similar results to the card version in normal and psychiatric samples (Artiola i Fortuny & Heaton, 1996; Feldstein et al., 1999; Hellman et al., 1992; Wagner & Trentini, 2009). Although the computer versions have been used for more than 15 years, they are considered research editions because the norms were obtained using the card version of the WCST. These computerized versions of the WCST and the WCST-64, which were discontinued in 2024, have been adapted to allow for use on PARiConnect, PAR's online assessment platform. The WCST and WCST-64 on PARiConnect were developed with the intention that they closely mirror their respective software versions.

TESTING ENVIRONMENT

Ideally, the testing environment should be a comfortable, well-lit room with adequate ventilation. If possible, the room should be free of noise to minimize distractions. All other electronic devices should be turned off, and the testing area should be clear of all items except those needed to participate in the session. The lighting source should be overhead, so shadows are not cast on the computer screen. Glare from windows or other sources should be prevented because it may obscure important aspects of the stimuli. The client should be seated at a desk or table with a full view of the screen. The height of the desk or table should allow the examinee to view and respond to the test stimuli easily from their seat.

A qualified examiner must proctor the administration of the WCST and WCST-64. No other individuals should be present unless an observer or another facilitator is necessary. The client's activity should be closely monitored, and any attempts to open additional computer windows should be stopped immediately. The WCST and WCST-64 norms are based on administrations by trained psychometrists who intervened to ensure consistently adequate effort. Therefore, if examiners fail to adequately monitor or proctor client performance, the performance may be affected (positively or negatively) in ways that could invalidate the results.

ADMINISTRATION

Online administration and manual data entry options are available for the WCST and WCST-64 on PARiConnect. Detailed information on the use of PARiConnect is available under the All Help Topics section within PARiConnect. Examiners using PARiConnect to administer and score the WCST and WCST-64 should have a thorough understanding of the WCST (Heaton et al., 1993) and the WCST-64 (Kongs et al., 2000).

After purchasing WCST/WCST-64 administrations for use on PARiConnect, examiners can determine which version of the test to administer using the same pooled inventory. This allows examiners the flexibility to simply purchase inventory without having to first decide which version they plan to administer.

Technical Requirements

Before beginning administration, ensure the browser zoom level is set at a minimum of 100%. The recommended minimum screen resolution is 800 x 600. Your browser will automatically enter full-screen mode when you reach the On-Screen Administration Instructions page.

Demographic and Additional Information

Prior to administration, examiners must enter the client's first and last name, client ID, birthdate, age, and education (i.e., if the examinee is 20 years of age or older). Additional information that can be provided includes current medication and optional demographics of gender, ethnicity, handedness, and occupation. Similar to the software versions, examiners may also make judgements about several test performance factors by specifying the client's level of rapport, cooperation, and effort.

Administration Options

After reviewing demographic and additional information, examiners are provided several administration options. Before administering the WCST or WCST-64 on-screen, examiners may set administration and feedback options, card animation time, and administration language. The on-screen administration instructions are customized based on your selections. **Once administration begins, you cannot change these options.**

Instructions

Examiners can select which set of instructions to display. The sets of instructions are identical with the exception of how examinees are instructed to match a card and change their answer. Currently, the use of keytops is not supported for administration of the WCST or WCST-64 on PARiConnect.

Keyboard instructions. Examinees are told to simply press the (1, 2, 3, or 4) key (that correspond with the first, second, third, or fourth column) that they believe matches the card at the bottom of the screen (Card to Match). To change their answer, they are instructed to press the spacebar before the card is added to the stack.

Mouse instructions. Examinees are told to use the mouse to point to the key card they believe matches the card at the bottom of the screen (Card to Match). Once they have made a choice, they must press either the left or right mouse button to make their selection. To change their answer, they are instructed to immediately click anywhere on the screen before the card is added to the stack.

Visual Feedback

This option allows examiners to change the number of seconds the response feedback remains on the screen after the client makes a sorting selection. The visual feedback default setting is for 3 seconds, but it may be changed to any number between 1 and 15 seconds.

Audio Feedback

Online administration via PARiConnect only supports auditory feedback if the device is equipped with a sound device that is compatible with the web browser. Currently, PARiConnect only supports English-language audio feedback. Examiners may choose whether to use auditory feedback from the Audio Feedback section of the Administration Options screen. Examiners can choose whether to activate audio feedback and may also choose the gender of the voice.

Language

The WCST and WCST-64 on PARiConnect support English and Spanish visual response feedback. Use the Language pull-down menu to choose if the English words "Right" and "Wrong" or "Correct" or "Incorrect" appear, or if you prefer visual feedback in Spanish, displaying the words "Correcto" or "Incorrecto."

Card Animation Time

Move time is used to control the stimulus card animation during administration. This option changes the length of time it takes for the card chosen by the client to move to the selected card pile. The default setting is 2.5 seconds, but it can be changed to any number between 0.1 and 10 seconds.

Administration Instructions

Examiner Instructions

After selecting the administration options, the next screen provides examiner instructions. Examiners will see the on-screen administration instructions and are informed that they are customized depending on their selected options.

It is important to note that although the instructions have been customized, all response options remain available during administration. The client may choose a column to sort by either using a mouse to click on a key card or card pile (in the center row) or using a keyboard to press keys 1, 2, 3, and 4 for columns 1 through 4. Once the client has chosen a column, the current response card will move from the bottom of the screen to a pile under the chosen key card. Although the card is moving, the client can cancel the move by (1) clicking anywhere on the screen or (2) pressing the spacebar before the card reaches the chosen pile.

This test should be proctored. Seat the client comfortably in front of the computer and click Next to read the on-screen administration instructions. The test begins in your web browser in full-screen mode on the next page.

At the end of administration, your results will be uploaded to PARiConnect. In the event the internet connection is not active at that time, a warning message will appear. Do not exit the browser until the internet connection has been reestablished so the data can be saved.

On-Screen Administration Instructions

The on-screen administration instructions are customized depending on the selections made on the Administration Options screen. As a reminder, examiners may use the show/hide toggle to hide the instructions from the examinee's view. Examiners may also access a printable version of these instructions on the PAR Training Portal. The test items are displayed after the On-Screen Administration Instructions page. Most examinees complete the WCST within 20–23 minutes and the WCST-64 in about 10 minutes.

SCORING, REPORTING, AND INTERPRETATION

Manual Data Entry

Examiners can enter data manually from a card administration of the WCST or WCST-64 by selecting the "Enter From Paper" option when assigning the assessment. Scores can be entered for each item by column or by category.

After administering the WCST or WCST-64 on PARiConnect or entering data from a card administration, examiners will be able to review the responses to ensure the client spent adequate time and paid attention to the items. When administering via PARiConnect, the length of time it took for the client to complete the assessment will be displayed. For the WCST, only the number of trials administered and categories completed will also be displayed on the review responses screen. For the WCST-64 only, the number of trials administered will be displayed on the review responses screen. This allows examiners to determine if a complete administration was conducted.

Report Options

For the WCST, examiners will have the option to generate either a WCST or WCST-64

report. The ability to generate a WCST-64 report from an initial 128-card WCST administration may be warranted if administration was terminated early due to extenuating circumstances (i.e., internet disconnected, computer shut down). However, only the first 64 trials are included in this report; the remaining trials are not included. It is also important to recognize the normative data used in a WCST-64 report of an initial 128-card administration was developed using the 64-card version of the WCST-64 (Kongs et al., 2000).

Score Report

WCST and WCST-64 score reports will include a cover page with demographic and additional information, a caveats page, test results, and card responses.

For complete administrations, score reports will include raw and standardized scores. For individuals age 20 years and older with education specified, age and demographically corrected standardized scores as well as U.S. Census age-matched standardized scores will be displayed. For individuals age 19 years and younger, age-corrected standardized scores will be displayed.

For incomplete administrations with at least one trial administered, score reports for the WCST and WCST-64 will display raw scores only with a note reading, "The raw scores printed below are based on an incomplete WCST [or WCST-64] administration."

For incomplete administrations where no trials were administered, the score report will not produce any scores and the following warning will be displayed: "The protocol does not contain any responses!"

Interpretation

Examiners should refer to the WCST Manual (Heaton et al., 1993) or the WCST-64 Professional Manual (Kongs et al., 2000) for the clinical interpretation of the score report. Examiners can view sample reports for the WCST and WCST-64 on parinc.com. Clinical interpretation of the WCST and WCST-64 requires professional training and expertise in clinical psychology and/or neuropsychology. The utility and validity of the WCST and WCST-64 as a clinical measure of cognitive ability are directly related to the professional's background and knowledge and, in particular, familiarity with the information contained in the WCST and WCST-64 manuals.

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