



Symbol Digit Modalities Test

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Purpose of this document

This file contains all the information to understand and analyze the Symbol Digit Modalities Test. You will be able to find relevant information about how this assessment task works, what it measures, and all relevant data about the variables recorded during the performance of the activity.

Task Info

In this section information about the task, its structure, and stimuli will be given.

Task Description

The Symbol Digit Modalities Test measures the ability to rapidly associate abstract visual symbols with their corresponding numerical values according to a reference key. At the beginning of the task, participants are presented with a legend containing nine unique symbol-digit pairings that remain visible throughout the assessment. During the task, one symbol is presented at a time in the center of the screen, and the participant must identify its corresponding digit by selecting the correct number from an on-screen numeric keypad as quickly and accurately as possible.

The concept of this task is based on the Symbol Digit Modalities Test (SDMT; Smith, 1968).

You can try the *Symbol Digit Modalities Test* for free on [this page](#). If you want more information about its technical details, you can contact us at support@cognifit.com.

Cognitive skills measured

The primary cognitive ability measured by this task is **processing speed**.

This task contributes to the measurement of selective attention, focused attention, visual scanning, working memory, and associative learning.

Task Structure

The task is divided into two phases: one learning phase and one testing phase.

Phase	Amount of trials	Time to answer per trial
Learning	6	∞ seconds
Testing	1,000	90 seconds

Task Stimuli

A reference key is permanently displayed at the top-center of the screen. The key consists of nine abstract symbols, each paired with a unique digit from 1 to 9. The symbol-digit pairings remain constant throughout the task.

During the learning phase, a simplified set of symbols is used to familiarize participants with the task mechanics. These tutorial stimuli are different from those presented during the testing phase and are used exclusively for practice purposes. For the first three items in the learning phase, if the user does not provide an answer within eight seconds, the correct answer is highlighted.

During the testing phase, a single target symbol is presented at the center of the screen. The participant must identify the corresponding digit according to the reference key and select the correct response from an on-screen numeric keypad displayed beneath the target symbol. The keypad contains the digits from 1 to 9 arranged in a 3 × 3 grid. On computers, responses are made by clicking the appropriate number with the mouse, whereas on touchscreen devices, responses are made by tapping the desired number directly on the screen.

Several parallel versions of the task are available, each using a different set of abstract symbols with comparable visual complexity. In every administration, the correspondence between symbols and digits is randomized, so that each symbol is assigned to a different digit. The order in which the target symbols are presented is also randomized across trials.

As soon as a response is registered, the next target symbol is presented immediately. There is no interstimulus interval between consecutive trials.

Variables Info

In this section details about the variables, their definition, range, and other pieces of relevant information will be given.

Basic Variables

Basic variables refer to variables and indices that are commonly used in experimental research and clinical settings.

Correct Responses

This variable measures the total number of correctly identified symbol-digit associations during the testing phase. It ranges from 0 to 1000, and higher values indicate better performance.

Commission errors

This variable measures the number of incorrect responses in which an incorrect digit was selected for the presented symbol. It ranges from 0 to 1000, and lower values indicate better performance.

Accuracy

This variable measures the percentage of correct responses relative to the total number of responses given during the testing phase. It ranges from 0 to 100, and higher values indicate better performance.

Response Time

This variable measures the average response time in milliseconds for correct trials in the testing phase. It ranges from >0 to 90,000, and lower values indicate better performance.

Additional Variables

Additional variables refer to the variables and indices that are calculated by CogniFit for its internal computation of results.

Response Time Fatigue

This variable measures the relative change in average response time between the first and final thirds of the testing phase. It ranges from -100 to 100, where positive values indicate slower response times over the course of the task, negative values indicate faster response times, and values close to 0 indicate similar response times in both thirds.

Correct Responses Fatigue

This variable measures the relative change in the number of correct responses between the first and final thirds of the testing phase. It ranges from -100 to 100, where positive values indicate an increase in correct responses over the course of the task, negative values indicate a decrease, and values close to 0 indicate similar performance in both thirds.

Validity Index

The user's performance will be considered to deviate from what is expected to the point of invalidating the results of the assessment when it falls outside these ranges.

Task validity

This variable represents the validity of the whole task, and it is 'true' only when all the individual variables of the Validity Index of the task are 'true'. Otherwise, it is 'false'.

Correct Responses validity

This variable measures the validity of the variable "Correct Responses" and it is 'true' when its value is between 0 and 1000. Otherwise, it is 'false'.

Commission errors validity

This variable measures the validity of the variable "Commission errors" and it is 'true' when its value is between 0 and 1000. Otherwise, it is 'false'.

Accuracy validity

This variable measures the validity of the variable "Accuracy" and it is 'true' when its value is between 0 and 100. Otherwise, it is 'false'.

Response time validity

This variable measures the validity of the variable "Response time", and it is 'true' when its value is between 250 and 90,000 (both included). Otherwise, it is 'false'.

Response Time Fatigue validity

This variable measures the validity of the variable "Response Time Fatigue" and it is 'true' when its value is between -100 and 100. Otherwise, it is 'false'.

References

Smith, A. (1968). The Symbol-Digit Modalities Test: A neuropsychologic test of learning and other cerebral disorders. In J. Helmuth (Ed.), Learning Disorders (pp. 83–91). Seattle, WA: Special Child Publications.