Number-Size Congruency Test

Version No: 2022.1
Issue Date: 2022-11-15

Purpose of this document

This file contains basic information about the Number-Size Congruency Test. You will be able to find relevant information about how this assessment task works, what it measures, and some relevant data about the variables recorded during the performance of the activity.

Task Information

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

Task Description

The *Number-Size Congruency Test* measures the participant's motor inhibition and shifting ability. The test-taker, during the first level of the task, is required to click on the larger circles shown on the screen, regardless of the number shown inside them. During the second level of the task, the participant will have to click on the circles with the highest number, regardless of the size of the circle containing it.

The concept of this task is based on the classical *Stroop Test (*Stroop, 1935), more specifically, on the semantic version of the Stroop test (Henik & Tzelgov, 1982).

You can try the *Number-Size Congruency 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 ***non-verbal inhibition***. Additionally, this task contributes to the measurement of updating, shifting, processing speed, and *response time*.

Task Structure

The task is divided into three phases: the learning phase, and two testing phases.

Phase	Stage	Amount of Trials	Description
Learning	0 (Learning)	3	Click on **bigger shape**
Testing 1	1 (No additional distractors)	4	Click on **bigger shape**
	2 (Additional written distractors)	4	
Testing 2	3 (No additional distractors)	16	Click on **highest number**

Task Stimuli

There are two circles on the screen that will be displayed for a total of 5000 milliseconds, or until a valid response is made by the user. One of them is larger than the other. Both contain one number. The position of the target items is counterbalanced across trials. They are clearly differentiated from the background, as the circles are white, and the numbers are written in black font. In 4 of the trials, there is also a distracter, which is always a word related to size or magnitude and it is written in black font and presented above the circles, centered on the width of the screen. It never comes into contact with the stimuli.

Trials can be congruent (the higher number is displayed in the bigger shape) or incongruent (the higher number is displayed in the smaller shape). There are a total of 10 incongruent trials (2 in the first phase, 8 in the second phase), and a total of 14 congruent trials (6 in the first phase, 8 in the second phase).

Variables Information

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.

Accuracy

This variable measures the mean accuracy, as a percentage, in answering all the trials in the whole task. It ranges from 0 to 100, and higher scores indicate better performance.

Incongruity effect in accuracy

This variable measures the difference between the average accuracy, as a percentage, of all congruent trials and all incongruent trials. It ranges from -100 to 100.

Response time

This variable measures the average response time (in milliseconds) of all the correct trials from the testing phase. Its value should be less than 5000 milliseconds and greater than 0, and lower values indicate better performance.

Incongruity effect in response time

This variable measures the difference in milliseconds between the average response time of correct incongruent trials and correct congruent trials. It ranges from -5000 to 5000 ms.

Omission errors

This variable measures the number of trials where no response is given by the user, that is, the number of timeouts in the testing phase. Its range can go from 0 to 24, and high scores on this variable indicate that the user is distracted (not paying attention) or has a slow response.

Omission errors (percentage)

This variable measures the percentage of trials where no response is given by the user, that is, the percentage of timeouts in the testing phase. Its range can go from 0 to 100, and high scores on this variable indicate that the user is distracted (not paying attention) or has a slow response.

Commission errors

This variable measures the number of trials where the user clicked on the wrong circle, that is, the number of errors in the testing phase. Its range can go from 0 to 24, and high scores on this variable indicate that the user's response is not being thought through.

Commission errors (percentage)

This variable measures the percentage of trials where the user clicked on the wrong circle, that is, the number of errors in the testing phase. Its range can go from 0 to 100, and high scores on this variable indicate that the user's response is not being thought through.

Additional Variables

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

Incongruity effect in accuracy in shape decision

The difference between the accuracy of all trials in the first phase (where the user has to choose the bigger shape, ignoring the value of the number) with congruence and all trials in the first phase without congruence. It ranges from -100 to 100.

Incongruity effect in accuracy in number decision

The difference between the accuracy of all trials in the second phase (where the user has to choose the higher number, ignoring the size of the circle) with congruence and all trials in the second phase without congruence. It ranges from -100 to 100.

Incongruity effect in response time in shape decision

The difference in milliseconds between the average response time of correct trials in the first phase (where the user has to choose the bigger shape, ignoring the value of the number) with congruence and correct trials in the first phase without congruence. It ranges from -5000 to 5000 ms.

Incongruity effect in response time in number decision

This variable measures the difference in milliseconds between the average response time of correct incongruent trials in the second phase (where the user has to choose the higher number, ignoring the size of the shape) and the correct congruent trials in the second phase. It ranges from -5000 to 5000 ms.

Accuracy in congruent trials

This variable measures the mean accuracy, as a percentage, in all the congruent trials (trials without discrepancy) from the testing phase. It ranges from 0 to 100, and higher scores indicate better performance.

Accuracy in incongruent trials

This variable measures the mean accuracy, as a percentage, in all the incongruent trials (trials with discrepancy) from the testing phase. It ranges from 0 to 100, and higher scores indicate better performance.

Response time in congruent trials

This variable measures the average response time, when answering correctly, across all the congruent trials from the testing phase, that is, to the trials without discrepancy. It ranges from 0 to 5000 milliseconds, and lower response times indicate better performance.

Response time in incongruent trials

This variable measures the average response time when answering correctly, across all the incongruent trials from the testing phase, that is, to the trials with discrepancy. It ranges from 0 to 5000 milliseconds, and lower response times indicate better performance.

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 the ranges established for each variable of the Validity Index.

The following ranges do not correspond to a person who is performing poorly, but rather to someone who is misusing the task or to a technical problem drastically altering the results.

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’.

Accuracy validity

This variable measures the validity of the variable “Accuracy”, and it is ‘true’ when its value is between 0 and 100 (both included). 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 5000 (both included). Otherwise, it is ‘false’.

Omission errors validity

This variable measures the validity of the variable “Omission errors”, and it is ‘true’ when its value is 12 or below. Otherwise, it is ‘false’.

References

Stroop, J. R (1935). Studies of interference in serial verbal reactions. *Journal of experimental psychology*, 18(6), 643.

Henik, A. & Tzelgov, J. (1982). Is three greater than five: The relation between physical and semantic size in comparison tasks. *Mem Cogn* 10, 389–395. https://doi.org/10.3758/BF03202431