Tower of Hanoi Test

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Purpose of this document

This file contains all the information to understand and analyze the Tower of Hanoi 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

In the *Tower of Hanoi Test*, participants are presented with 3 pegs (towers) and 4 disks stacked on the left peg. The objective is to move the disks from the left tower to the right tower using the fewest possible steps while adhering to the rules: (1) it is not allowed to move more than one disk at a time, (2) it is not allowed to move a disk that has another disk on top of it, and (3) it is not allowed to place a disk on top of a smaller disk.

The concept of this task is based on Tower of Hanoi Test (Hinz, 1989).

You can try *Tower of Hanoi 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

This task aims to measure high-order cognitive problem-solving and learning of complex cognitive procedures, providing information about cognitive abilities primarily related to executive functions, such as planning, visual imagery, abstract thinking, working memory, and self-monitoring.

Task Structure

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

The learning phase consists of a single trial with 3 pegs and 2 disks placed on the left peg. The minimum number of steps to move them to the peg on the right is 3 (disk 1 to the peg in the middle, disk 2 to the peg on the right, disk 1 to the peg in the right).

The testing phase is composed of one trial with 3 pegs and 4 disks on the left peg. The minimum number of steps to move them to the peg on the right is 15.

Phase	Amount of trials	Number of disks	Minimum number of steps
Learning	1	2	3
Testing	1	4	15

Task Stimuli

The stimulus for each trial consists of 3 gray equidistant vertical pegs, and 2 (learning phase) or 4 (testing phase) white flat disks with a number in it. Each disk has different size, and they are ordered by size (from 1 to 4) with the smallest one (1) on top, and the largest one (4) at the bottom.

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.

Number of moves

This variable measures the total number of valid moves taken to build the tower correctly. It ranges from 15 to 60, and lower values indicate better performance.

Completion time

This variable measures the time required to correctly complete the tower. It ranges from 0 to 300000 milliseconds, and lower values indicate better performance.

Planning time

This variable measures the time required to perform the first movement once the testing phase has started. It ranges from 0 to 300000 milliseconds, and lower values indicate better performance.

Commission errors

This variable measures the total number of errors, either by selecting a wrong ring who is not on the top of any peg or by trying to place a bigger ring above a smaller one. It ranges from 0 to 60 and lower values indicate better performance.

Omission errors

This variable measures if the user could complete the tower in the required time. It ranges from 0 to 1, and lower values indicate better performance.

Validity Index

If the user's performance falls outside these ranges, it will be considered deviating from the expected and may invalidate the assessment 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’.

Completion time validity

This variable represents the validity of the variable “Completion time”, and it is ‘true’ when its value is greater than 5000 and lower than 300000 milliseconds. Otherwise, it is ‘false’.

Planning time validity

This variable represents the validity of the variable “Planning time”, and it is ‘true’ when its value is greater than 100 and lower than 300000 milliseconds. Otherwise, it is ‘false’.

Number of moves validity

This variable represents the validity of the variable “Number of moves”, and it is ‘true’ when its value is greater than 15 and lower than 60. Otherwise, it is ‘false’.

Number of errors validity

This variable represents the validity of the variable “Number of errors”, and it is ‘true’ when its value is greater than 0. Otherwise, it is ‘false’.

Omission errors validity

This variable represents the validity of the variable “Omission errors”, and it is ‘true’ when its value is 0. Otherwise, it is ‘false’

References

Hinz, A. (1989). "The Tower of Hanoi". L'Enseignement Mathématique. 35: 289–321. doi:10.5169/seals-57378.