Deary-Liewald Test

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Purpose of this document

This file contains all the information to understand and analyze the Deary-Liewald 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 *Deary-Liewald Test*, participants are presented with two conditions: the simple one and the complex one. On the simple condition, there will only be one circle that will light up after a brief but irregular amount of time has elapsed, and participants should click on the button below the light as soon as possible. On the complex condition, there will be four circles, but only one of them will light up per trial after a brief amount of time has elapsed. Participants will need to click on the button below the circle that has lit up.

The concept of this task is based on the *Deary-Liewald task* (Deary et al., 2010).

You can try the *Deary-Liewald* 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 performance of the task will allow measuring the user's reaction time in simple situations (a single button response) and in more complex situations (four alternative responses). The difference in accuracy and reaction time between the two conditions allows for isolating the "choice effect".

Task Structure

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

During the first learning and testing phases, there will be just one circle and button per trial. During the second learning and testing phases, there will be four circles and four buttons, but only one of them will light up per trial.

Phase	Condition	Amount of lights/buttons	Amount of trials
Learning 1	Simple	1	4
Testing 1	Simple	1	20
Learning 2	Complex	4	4
Testing 2	Complex	4	40

Task Stimuli

The stimulus for each trial consists of one (simple condition) or four (complex condition) circles composed of a white circular frame and the gray (off) or green (lighted up) color inside. Below each circle, there will be a white rectangular button. The time it takes a circle to light up is irregular.

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.

Accuracy

This variable measures the percentage of accuracy in all trials of the testing phase. It ranges from 0 to 100, and higher values indicate better performance.

Accuracy in SRT

This variable measures the percentage of accuracy in all trials from Phase 1 in the testing phase. It ranges from 0 to 100, and higher values indicate better performance.

Accuracy in CRT

This variable measures the percentage of accuracy in all trials from Phase 2 in the testing phase. It ranges from 0 to 100, and higher values indicate better performance.

Response time

This variable measures the average response time to correct trials in the testing phase. It ranges from 0 to 5000 milliseconds, and lower values indicate better performance.

Response time in SRT

This variable measures the average response time to correct trials from Phase 1 in the testing phase. It ranges from 0 to 5000 milliseconds, and lower values indicate better performance.

Response time in CRT

This variable measures the average response time to correct trials from Phase 2 in the testing phase. It ranges from 0 to 5000 milliseconds, and lower values indicate better performance.

Effect of choice in accuracy

This variable measures the result of the operation “Accuracy in SRT” minus “Accuracy in CRT”. Its value should range from -100 to 100.

Effect of choice in response time

This variable measures the result of the operation “Response time in CRT” minus “Response time in SRT”. Its value should range from -5000 to 5000.

Additional Variables

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

Omission errors

This variable measures the number of trials where no response is given by the user after 5000 milliseconds since the presentation of the stimulus, that is, the number of timeouts. It ranges from 0 to 60. High scores on this variable indicate that the user is distracted (not paying attention) or has a slow response.

Omission errors in SRT

This variable measures the number of SRT trials where no response is given by the user after 5000 milliseconds since the presentation of the stimulus, that is, the number of timeouts in the SRT phase. It ranges from 0 to 20. High scores on this variable indicate that the user is distracted (not paying attention) or has a slow response.

Omission errors in CRT

This variable measures the number of CRT trials where no response is given by the user after 5000 milliseconds since the presentation of the stimulus, that is, the number of timeouts in the CRT phase. It ranges from 0 to 40. 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 after 5000 milliseconds since the presentation of the stimulus, that is, the percentage of timeouts in the whole task. It ranges from 0 to 100. High scores on this variable indicate that the user is distracted (not paying attention) or has a slow response.

Omission errors in SRT (percentage)

This variable measures the percentage of SRT trials where no response is given by the user after 5000 milliseconds since the presentation of the stimulus, that is, the percentage of timeouts in the SRT phase. It ranges from 0 to 100. High scores on this variable indicate that the user is distracted (not paying attention) or has a slow response.

Omission errors in CRT (percentage)

This variable measures the percentage of CRT trials where no response is given by the user after 5000 milliseconds since the presentation of the stimulus, that is, the percentage of timeouts in the CRT phase. It ranges from 0 to 100. High scores on this variable indicate that the user is distracted (not paying attention) or has a slow response.

Validity Index

Performance outside of these ranges 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’.

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’.

Accuracy in SRT validity

This variable measures the validity of the variable “Accuracy in SRT” and it is ‘true’ when its value is between 0 and 100. Otherwise, it is ‘false’.

Accuracy in CRT validity

This variable measures the validity of the variable “Accuracy in CRT” 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 100 and 5000. Otherwise, it is ‘false’.

Response time in SRT validity

This variable measures the validity of the variable “Response time in SRT” and it is ‘true’ when its value is between 100 and 5000. Otherwise, it is ‘false’.

Response time in CRT validity

This variable measures the validity of the variable “Response time in CRT” and it is ‘true’ when its value is between 100 and 5000. 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 higher than 30. Otherwise, it is ‘false’.

Omission errors in SRT validity

This variable measures the validity of the variable “Omission errors in SRT” and it is ‘true’ when its value is higher than 10. Otherwise, it is ‘false’.

Omission errors in CRT validity

This variable measures the validity of the variable “Omission errors in CRT” and it is ‘true’ when its value is higher than 20. Otherwise, it is ‘false’.

References

Deary, I. J., Liewald, D., & Nissan, J. (2010). A free, easy-to-use, computer-based simple and four-choice reaction time programme: The Deary-Liewald reaction time task. Behavior Research Methods, 43(1), 258-268. https://doi.org/10.3758/s13428-010-0024-1