

Choice Trails Test

Background

This test is still in development, but has already been used in experiments conducted at Chulalongkorn University in Bangkok. The basic idea is to have a trails test similar to the traditional Trail Making Test (Reitan, 1955), the D-KEFS Trail Making Test (Delis et al., 2001), or the Color Trails Test (Maj et al., 1993), but which involves free choices, rather than alternating in a predefined pattern. In the existing versions, participants alternate between joining number and letters in the standard and D-KEFS Trails Tests, and between pink and yellow circles in the Color Trails Test. The intention behind the design of this Choice Trails Test is produced an executive function test that involves more divergent thinking. It is hoped that in this way executive functions can be measured that are truly top-down cognitive control, rather than routine-based, which is a feature of existing trail making tests (Pluck et al., 2023). This is because although existing trails tests use alternation between task stimuli as the executive component, it is a very simple task to switch between numbers and letters, or pink and yellow, which itself appears to be rather routine (and therefore rather un-executive).

Choice Trails Test as an Executive Function Assessment

The Choice Trails Test provided here uses free choices, rather than alternation as the executive task component. To allow free choices, A4 size pages were produced in which there are circles containing the numbers 1 through 25. However, each number is shown four times, each time in a different colour. The same pink and yellow as the original Color Trails Test test (Maj et al., 1993) are used, but additionally blue and violet circles are included. The four colours were selected to have different brightness levels, so that they would be distinguishable even for colour blind people. The basic task requirement is that participants must join the circles in numerical sequence, choosing a different colour each time.

When a participant performs the task correctly the lines that they draw will not transect each other. For this task the completion of each page (i.e., joining all numbers from 1-25) is considered a single trial. Within each trial 24 free choices are made. As the starting point is a pink circle, the first choice made within a trial is whether to select a yellow, blue, or violet circle '2'. This continues until the participant touches circle '25' with their pencil. To allow for multiple trials by the same participants, multiple versions were made with the circles in different configurations on each page. However, the minimum line length to connect all clusters was within 5% of the total distance on all test versions. A set of materials for 8 trials (sheets marked a through h), plus one practice trial (sheet marked 'pr') are available to download from <https://gpluck.co.uk/Tests/> These should be printed in color on A4 or US Letter paper for task administration. A revised version of these notes will be uploaded to the same site when more details about applications and analysis methods are available.

Test Administration and Data Analysis

When completing the task, an individual is sat at a table and the page is placed in front of them but obscured by the experimenter's hand. The participant is given a pencil and told that they must draw lines to connect all of the circles starting at circle 1. The specific rules are:

- They should join the numbers in sequence with the pencil.
- They should perform as quickly as possible without making mistakes.
- They should not choose the same colour twice in succession.
- They should try to choose each colour equally often.
- They should avoid using any plans or strategies.

On the experimenter's instruction to begin, a stopwatch is started. The experimenter watches performance and if the participant breaks a rule, such as missing out a number, they are stopped and told to continue from the last point before the error was made. The stopwatch is left running until the participant completes the final drawn line. The trial completion time is recorded. However, for finer grained analysis of choice patterns and random responses, recording of each of the 24 choices within a trial should be recorded in a spreadsheet. Details of a method to analyse these choice-by-choice responses are given in a paper in preparation. It is recommended that a minimum of three trials are performed by each participant if there is intention to analyse the choice-by-choice responses.

Use of the Test for Psychomotor Speed Assessment

In the existing trails tests there are included trials that include no executive component (i.e., alternation). These are frequently used as a measure of speed of processing, and often also used to create difference scores from the speed of motor (Trails A) and executive (Trails B) trials. To collect such speed of processing data with the Choice Trails Test, the experimenter simply alters the instructions given to the participant, but can use the same materials. For use as a measure psychomotor speed, the participant is told to join all of the pink circles in number order, from 1 to 25, trial completion time is recorded.

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References

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