Title
AN ADAPTATION OF THE TRAILS-A AND TRAILS-B TO THE P3

Journal
PSYCHOPHYSIOLOGY, 21(5)

ISSN
0048-5772

Authors
ROSENBERG, C
MEYER, L
STARR, A

Publication Date
1984

Rosenberg, C., Meyer, L., & Starr, A. (University of California at Irvine) **An adaptation of the Trails A and Trails B to the P3.** The following experiment describes a method of increasing task difficulty by increasing the complexity of the task in a paradigm analogous to the trail-making tests, Trails A and Trails B.

Two males and 5 females, aged 17–36, served as subjects. The stimuli consisted of numbers from 1–26 or letters from "A" to "Z." Each test presented the subject with 200 stimuli, each displayed for 70 ms, with 1½ s between stimuli. The subject was required to press a button whenever the target for the given task appeared. All tasks had a global probability of .20 of target stimulus presentation.

The first task was a simple oddball paradigm requiring the subject to distinguish between an "X" and an "O" with "X" the target stimulus. In the next task, the subject was presented with numbers from 1–26 in sequence with the target a number out of sequence. In the third task, the stimuli were the letters "A" through "Z," presented in sequence and the target stimulus was a letter out of sequence. In the last task, the sequence of stimuli consisted of alternating numbers and letters: 1, A, 2, B, 3, . . . 26, Z, 1, A, . . . The target stimulus could be either a letter or number out of sequence.

Potentials were measured from the scalp at F_z, C_z, and P_z, referenced to linked earlobes. All the correct responses were averaged separately, with the target potentials averaged separately from the non-target potentials and "numbers" averaged separately from "letters."

The target averages in each task generated a set of event-related potentials, N1, P2, N2, and P3. In the sequencing tasks, the P2 and P3 could appear as two components. The latency of the second P3 component was measured as the relevant P3 latency. There were no significant differences between the latencies of the N1 components. The latency of the P2 component to the target of the number sequence task was significantly later than the other P2 latencies and the N2 latency of the targets of the visual discrimination task was shorter than the other N2 latencies. There were significant differences between the latencies of the P3 components with the different tasks: P3 latency of the target letters of alternating sequence (460 ms) > P3 latency of the target numbers of the alternating sequence (417 ms) > P3 latency of the target letters of the letter sequence (382 ms), and the P3 latency of the target of the number sequence (384 ms) > target of the visual "X vs. O" discrimination (340 ms). The reaction times showed a similar pattern of differences: target letters of the alternating sequence (559 ms) > target numbers of the alternating sequence (480 ms), and target of the number sequence (485 ms) and target of the letter sequence (475 ms) > target of the visual discrimination (339 ms).

This experiment illustrated the potential of these paradigms. They generated well-defined event-related potentials, in particular, P3 components. The P3 components followed a definite sequence of latencies corresponding to the difficulty of the tasks as measured by reaction time.