MemTrax: A continuous recognition task online to measure memory performance and recognition speed

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ABSTRACT

BACKGROUND: The "continuous recognition task" (CRT) paradigm is a type of assessment widely used in advanced research on memory mechanisms: CRTs are especially sensitive for early detection of memory problems, such as those caused by dementia and Alzheimer’s disease, as well as for detecting changes that occur with head injury.

METHODS: MemTrax based on the CRT paradigm provides a short on-line cognitive assessment tool for measuring memory, as well as attention and recognition reaction time, within a period of less than three minutes. MemTrax users are provided with a set of images on any video screen, which they look at and indicate that they recognize a repeated image by a specific movement response within the shortest period of time possible. MemTrax consists of 25 unique images and 25 repeats (5 of the repeats being second repeats). The pictures occur in 5 sets of 5 images. True-positives and correct rejections are recorded, as well as reaction time for true positives.

RESULTS: In examining 18,282 individuals who provided ages, 21-99, took the test for the first time or, and performed better than random chance, age only explained 3.8% and 4.4% of the variance in reaction time and 1.6% and 1.1% of the variance in total correct for males and females respectively. No speed-accuracy trade-off was found, rather performance in reaction time and total correct varied together. Recognition time and total correct at each age may provide an estimation of performance impairment at any level of specificity chosen.

CONCLUSION: MemTrax is a quick, fun, widely accessible memory assessment tool providing information that can be analyzed to screen effectively and efficiently for brain dysfunction.

METHODS - CONTINUED

Test Development
• Based on the continuous recognition task paradigm
• Database consist of 1,339 images within 54 categories (e.g. art, mountains, fountains, etc.)

RESULTS

Analysis

Variables for analysis:
• Number of hits
• Number of correct rejections
• Response time for hits
• Total responses
• Total correct

Statistical analysis:
• Total correct and correct recognition times were plotted against age, both as male and female groups and by specific age.
• Recognition time was plotted against total correct to determine whether there was speed-accuracy trade-off.

RESULTS - CONTINUED

The average number of correct responses was 47.3 and 47.2 (out of 50) respectively, and recognition time was 963 msecs for males and 895 msecs for females, with decreasing number correct and increasing recognition time with age (see Figure 2a & 2b & 3a & 3b). The deterioration with age is consistent with findings in the literature. The number correct of subjects over 80 years was substantially less than at younger ages, and the variability was substantially increased, but many of the older individuals had total number correct and recognition time that were in the ranges of young individuals. However, the age effects accounted for less than 2% of the variance in total correct and less than 5% of the variance in recognition time with age.

The relationship between speed and accuracy accounted for 10% of the variance, which individuals who performed more correctly having a faster recognition time, indicating that the speed-accuracy trade-off is a minor factor relative to the overall performance of individuals.

CONCLUSIONS

The scores of the test takers lie on the plausible lines of the performance categories, including number of total responses, correct hits, correct rejections, total correct responses, and recognition reaction time.

Online testing appears to provide a suitable approach to evaluating episodic memory function for large populations of individuals and could potentially be used to track the performance of memory function of individuals over time.

REFERENCES