MemTrax to Identify Alzheimer's Disease and other Cognitive Impairments

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Abstract

With the pervasiveness of memory problems in conditions such as dementia, Alzheimer's disease (AD), mild cognitive impairment (MCI), traumatic brain injury (TBI), and others, it is clear that there needs to be innovation in the field of neuropsychology to meet the healthcare demands that these conditions present. Often these types of problems arise in a subtle fashion that goes undiagnosed and untreated. In order to begin addressing these issues, we have developed MemTrax—an online memory game that is designed to measure and track memory performance. It is our assertion that MemTrax has applications as a tool to assist in preventing cognitive decline in aging populations, and to help identify AD and other cognitive impairments.

Methods

• We developed MemTrax.net, a free online game that consists of a continuous recognition task along with tracking of memory performance through adaptive development processes.

• The MemTrax game was created using a combination of Flash and HTML.

• The continuous recognition task requires users to encode a series of interesting images into their memory and then press the spacebar to indicate if they had seen an image previously within the image set. Each image set contains a total 50 images, with 25 new images and 25 repeated images placed at varying intervals throughout the test. Each game takes about 2 to 4 minutes to complete.

• To make the game more relevant and interesting to individuals with different levels of function, easy, medium, and hard versions were created based on the similarity and familiarity of individual images in a set.

• Individuals are given their results when the task is completed. Results given include average reaction speed, the percent of correct responses, and a brief summary of what the results indicate.

• The results of all MemTrax games that have been played are represented to the individual in the form of a graph so results and changes overtime (improvement or deterioration) can be monitored.

• To promote MemTrax, we have taken a social networking approach to gain online visibility. We have a Facebook Fan Page, Twitter account, and Wordpress blog that we post interesting facts about memory related topics in order to encourage users to play the MemTrax game.

Results

• Here is the developed test, and some of the graphs that we provide users to provide clear feedback

• Our user-base has been increasing rapidly, with many new users signing up each week.

• We have received positive feedback from users that have played the game

Discussion

• We have developed a fun memory game that has the potential to detect problems with memory.

• Research suggests that the Memtrax game is a well-tolerated method and highly specific and sensitive to memory difficulties (Ashford, 2007).

• Estimate level (based on 200 patients, caregivers) (Ashford, 2007)

>90% very good

80-90% good

70-80% consider mild cognitive impairment

<70% dementia

• Test can be repeated often (e.g. weekly, quarterly)

• Any change over time can be detected

• We are working toward making MemTrax more user-friendly and compelling in order to increase user sign-ups

• The MemTrax game is a stimulating cognitive exercise that challenges memory, which suggests that it may be able to help prevent cognitive decline

• With an increased user-base, we will be able to analyze the data we collected in order to establish the validity of the game as a potential screening test for Alzheimer's disease and other cognitive impairments

• The game has potential applications in screening for changes in cognitive ability, including those that might occur with procedures, injuries, disorders and diseases such as:

- Chemo therapy
- Neuro surgery
- Adverse drug effects
- Traumatic brain injury (sports injuries, combat injuries, motor vehicle accidents)
- Hormonal changes (e.g. menopause)
- Mild Cognitive Impairment
- Dementia
- Alzheimer's disease

• MemTrax has applications in screening for Alzheimer's disease specifically, because it is assessing encoding of new problems related to memory that would indicate the onset of more serious conditions.

References

