MCI: Can Decline to Dementia be Monitored and Delayed by Computer-Based Games?

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BACKGROUND

- The Canadian Study on Health and Aging (CSHA) estimated that 16.8% of those over 65 have Mild Cognitive Impairment (MCI).
- There is currently no accepted treatment for MCI.
- There is growing literature on “brain plasticity” & the role of computer based games for brain health improvement.
- Project aims to engage people with MCI in computer-based games that are programmed to:
  1. allow off-line monitoring of improvement and/or decline and
  2. strengthen cognitive function through improvement in game performance.

METHODS

- 3 ARM study
- 9 weeks of supervised training
- 3 times per week for 75 minutes

POSIT SCIENCE - BRAINHQ ARM
- Posit Science Corporation is a company based in San Francisco
- Dynamic Brain is the Canadian partner of Posit Science & Canadian provider of BrainHQ
- BrainHQ has modules they have shown to improve memory, attention and brain processing speeds in healthy adults
- The modules have increasing difficulty & results are tracked on a score card.

CARLETON GAMES ARM
- Graduate students from the Carleton University Department of Systems and Computer Engineering have designed 2 games:
  - Sudoku (a numbers based game)
  - Word Search (a word based game).
- Both games have built-in signal processing and off-line monitoring capability for subject performance tracking.
- The parameters include need for cuing, speed of task completion, and number of mistakes made.

CONTROL GROUP ARM
- Computer activities that only offer limited cognitive stimulation.

RESULTS

The table below summarizes what results can be gathered from each game in the experimental arms.

<table>
<thead>
<tr>
<th>Game</th>
<th>Measured Parameters</th>
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</thead>
<tbody>
<tr>
<td>Word Search</td>
<td>Mouse location &amp; movements, All keyboard entries &amp; mouse movements, Speed &amp; accuracy of each trial</td>
</tr>
<tr>
<td>Sudoku</td>
<td>All keyboard entries &amp; mouse movements, Correct/Errors relative to solution</td>
</tr>
<tr>
<td>BrainHQ</td>
<td>Speed &amp; accuracy of each trial, Tracks scores and overall progress</td>
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<tr>
<td></td>
<td>Correct/Errors relative to solution, Break down that allows for data collection specific to attention, brain processing speed &amp; memory</td>
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Hints provided & if acted on:

EEG Data
- This study will also pilot the pre- and post-intervention measurements of a subset of participants using electroencephalography (EEG).

HYPOTHESES

- Computer activities can improve patient outcomes by:
  - Delaying decline to dementia
  - Detecting decline earlier to allow timely treatment initiation
- Results expected by fall of 2014

ACKNOWLEDGEMENTS

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- Dynamic Brain is the Canadian distributor of BrainHQ & has supplied the study with licenses
- Chartwell Retirement Residences has supplied some of the study sites for the project