

Supplementary Material

Detection of Mild Cognitive Impairment in an At-Risk Group of Older Adults: Can a Novel Self-Administered Serious Game-Based Screening Test Improve Diagnostic Accuracy?

Virtual Supermarket Test Metrics

The Virtual Supermarket Test (VST) uses a complex set of metrics to assess the user's performance. It assesses navigation in the virtual space, time needed to complete the VST exercise and mistakes conducted while completing the VST exercise. The user can move around the virtual space by touching footprints displayed in the screen. Each footprint represents a position inside the virtual space. The number of visits and the amount of time spent on each position are recorded. In each position, the user can perform actions such as collecting products, looking around the virtual space or moving to another position. For navigational performance assessment, the virtual space is divided into three color-coded areas representing different degrees of deviation from an optimal trajectory. The optimal trajectory is the trajectory that allows the user to collect all items listed in the shopping list in the quickest and most efficient manner, without venturing into areas that contain no listed products, and then swiftly proceed to the cashier desk to complete the exercise by paying for purchased products. Green areas represent the optimal trajectory. Yellow areas represent areas the user could pass through on their way to green areas but they do not represent the fastest or most efficient route. Red areas represent areas the user should not visit as they contain no listed products and the user should not pass through them on their way to green areas. This division of the virtual space is only used for performance assessment and is not visible to the user.

The 12 metrics included in the VST classifier model for mild cognitive impairment (MCI) detection are described in Table S1. As the users learn the VST task moving from trial 1 to trial 3,

different trial-specific metrics are useful in assessing their performance and differentiating between groups. At the same time a metric of average performance and a metric assessing improvement in navigation performance by trial 3, as measured by difference in subtle deviation from optimal trajectory between trials 1 and 3, are also used to assess performance and differentiate between groups. The abundance of navigation metrics in the classifier model highlights the importance of introducing detailed navigation metrics in the latest version of the VST.

Supplementary Table 1. Virtual Supermarket Test variables used for classification

Average performance and learning variables	
<i>DurAvg</i>	Average duration for the 3 test trials
<i>PosTimeYellow1-3</i>	Time spent in yellow zone positions in trial one minus time spent in yellow positions in trial 3
Trial 1 variables	
<i>Dur-Pos1</i>	Duration minus time in positions during trial 1*
<i>PosTimeGreen1</i>	Time spent in green zone positions in trial 1
<i>PosNumGreen1</i>	Number of green zone positions the user navigated through in trial 1
<i>PosTimeRed/Tot1</i>	Time spent in red zone positions as a fraction of total time spent in positions in trial 1
<i>PosNumRed/Tot1</i>	Number of red zone positions the user navigated through as a fraction of total number of positions the user navigated through in trial 1
Trial 2 variables	
<i>ErrMoney2</i>	Incorrect payment in trial 2
<i>PosNumYellow2</i>	Number of yellow zone positions the user navigated through in trial 2
<i>PosTimeYellow/Tot2</i>	Time spent in yellow zone positions as a fraction of total time spent in positions in trial 2
Trial 3 variables	
<i>PosNumTot3</i>	Total number of positions the user navigated through in trial 3
<i>PosNumGreen/Tot3</i>	Number of green zone positions the user navigated through as a fraction of total number of positions the user navigated through in trial 3

* Essentially this variable expresses time spent in the payment screen