The Cognitive Implications of Virtual Locomotion

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Overview

The experiment used a dual-task paradigm to investigate how virtual movements are affected by different input devices, the Wii Remote and Wii Balance Board or a body-based method, while performing a simultaneous working memory task.

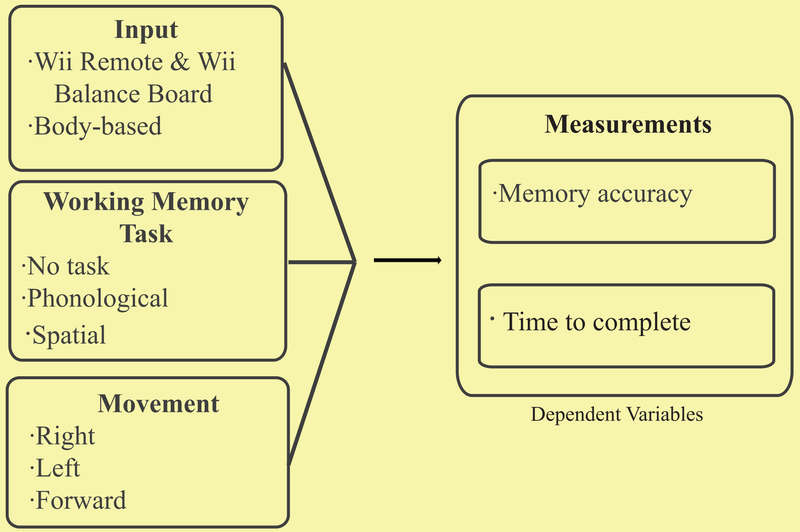
Motivation

Performing movements in a virtual environment (VE) can be cognitively and physically challenging for an user, especially when an input device does not emulate natural movement.

The user also faces the challenge of allocating his or her cognitive resources. The primary task competes with movements for cognitive resources.

It is important to evaluate the cognitive load required by locomotion interfaces. A lower cognitive load will enable users to focus more on their primary task.

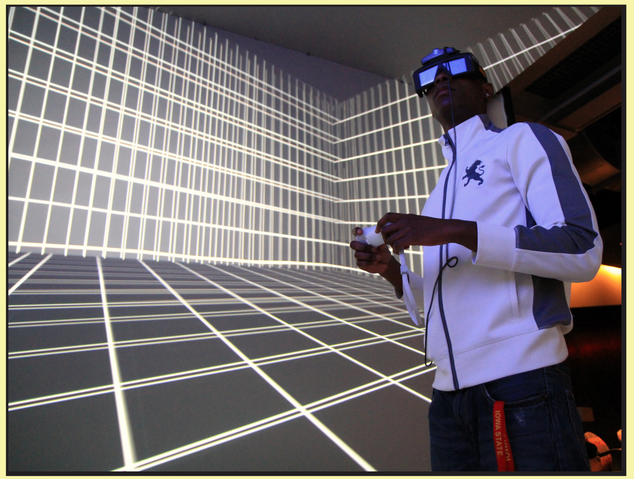
Methods



Independant Variables

Dependent Variables

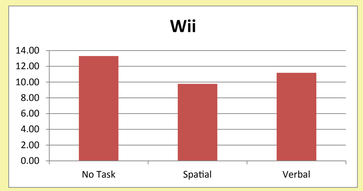
Participants were assigned to either the Wii Remote and Wii Balance Board or a body-based method. Once in the six-walled cave automated virtual environment (C6) participants were presented with 3 different working memory tasks. In each task participants collected virtual coins which guided him or her through a series of 5 movements. Finally, participants verbally recalled the working memory task.

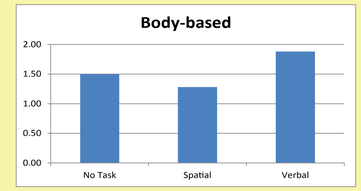


Results

	No Task	Spatial	Verbal
Body-based	1.50	1.28	1.88
Wii	13.30	9.77	11.18

Average Time to Collect a Coin (sec)





The data gave no specific conclusions of the effect of the three working memory conditions on the input devices. However, based on survey and interview responses, we have reason to believe that participants may have had a difficult time completing the locomotion task when given a concurrent working memory task.

Future Work

There are many aspects of our experimental design that can be improved. Some issues included participants performing improper movements to collect coins and the software properly recording the exact time a coin was collected. Creating a maze would eliminate stray movements, and better software design would allow for an accurate record of data collection.

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