Virtual Reality in Experimental Economics

Capstone Project: Computer Science

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Project Overview

- **Goal**: develop immersive virtual reality environments, as an extension of previous work done by the McMaster Decision Science Laboratory, to carry out experimental economics research simulations to gain insight into how participants make health-related decisions.
- Simulations are structured around the participant maximizing earnings that are awarded on every completed iteration of some basic task.
- The simulations' lifetimes are separated into discrete time periods, days, in which the participant's ability to perform the repetitive task can be hindered by an impairment(s).
- Participants can choose to alleviate the symptoms of such impairments by receiving treatment; but, it comes at a cost. The question is when will the participant resort to paying the necessary cost, or will they do so at all?
- A suite of simulation environments will be designed within the Unity game engine; participants will interact with each simulation through an HTC Vive.

Existing Simulation

- The participant's task is to move crates from a pile to the target block.
- The environment is large and does not scale to the Vive-equipped testing room (Figure 1).
- No extensive customization of configuration variables.

Figure 1: Experiment room

Our Simulations

- Each simulation features its own basic task for the experiment participant to complete.
- Their respective virtual environments and experiment structures will be highly customizable through the usage of a proprietary configuration filetype.
- Key metrics will be tracked throughout the simulations' lifetimes and persisted into a database for analysis.
- Each environment is carefully designed with consideration towards the physical constraints of the Vive-equipped testing room (Figure 2).
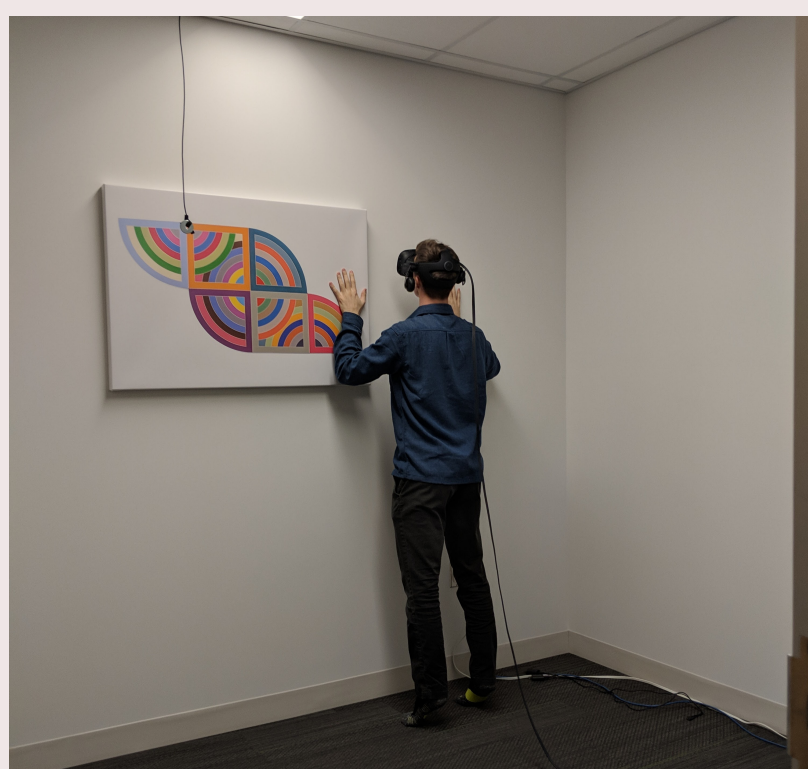

Figure 2: Experiment room

Summary of Configuration Variables

Experiment variables to be set in the aforementioned configuration file. These variables include:
- Reward obtained by the participant for every completed task iteration.
- Impairment types and their respective intensities.
- Treatment methods, costs, and effectiveness.
- Per-day settings such as duration and active impairment(s).
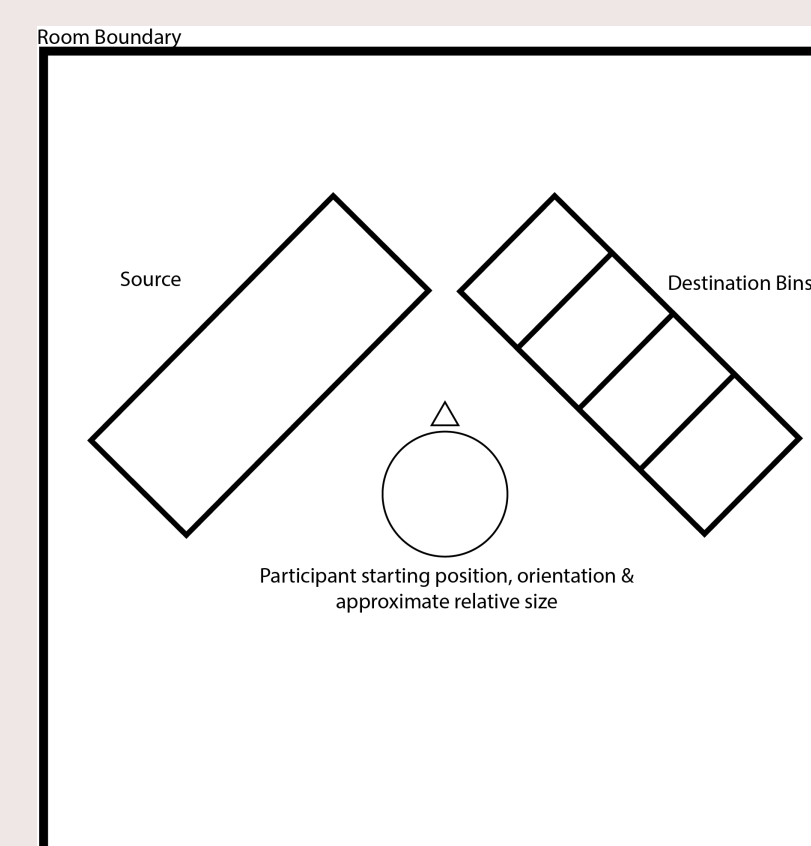
Simulation One

- The participant is required to repeatedly transport a volume of liquid between a source and destination using a single hand-carried vessel.
- Their goal is to maximize the total volume of liquid that successfully reaches the destination.
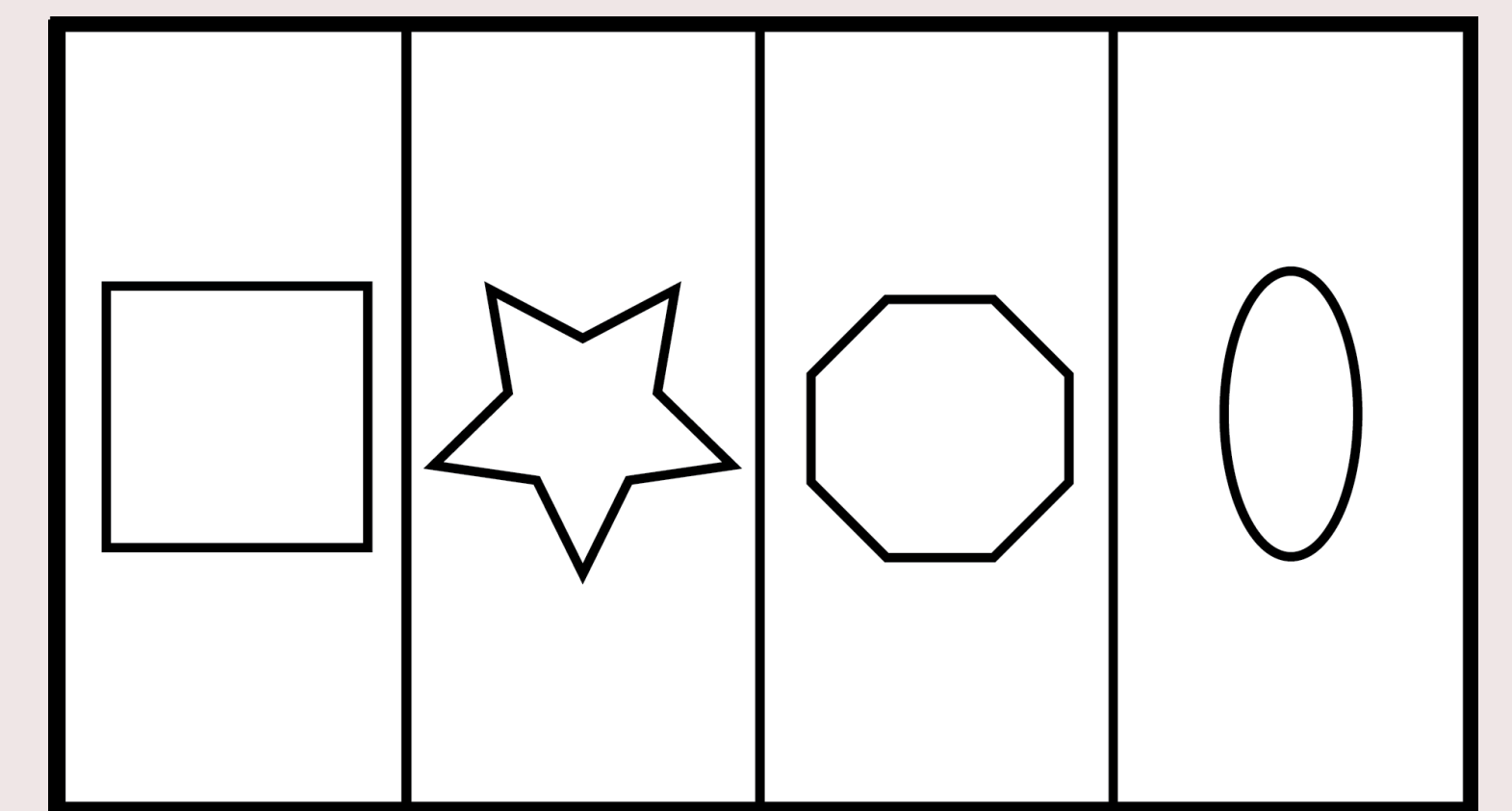

Figure 3: First simulation environment

Simulation Two

- The participant is required to sort a set of three-dimensional shapes into separate containers by passing them through a filter that only permits one particular shape.
- The goal is to maximize the total number of shapes successfully sorted into their respective containers.

(a) Layout of simulation environment.   (b) Shape sorting filter.

Sound Interesting?

Send us what you think of our project, and tell us if you'd like to participate in experimental trials. Email any of us:

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Experimental trials will likely be scheduled for February 2019.

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