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Introduction

- Creating 2 virtual reality-based economics research simulations in collaboration with the McMaster Decision Science Laboratory.
- The participant repetitively completes a basic task with the goal of maximizing earnings that are awarded on every completed iteration of the task.
- The simulation's lifetime is separated into discrete time periods, days, in which the participant's ability to perform the repetitive task can be hindered by an impairment(s).
- The participant is can reduce the effects of such an impairment by receiving a treatment.
- Teatments can be paid for, or received for free after waiting a predetermined duration.
- Each simulation will feature both a virtual environment designed within Unity and HTC Vive support to offer a truly immersive simulation experience to the participant.

The Original Simulation

- User task is to carry crates to the designated point.
- Large environment that does not scale to Vive equipped testing room (Figure 1).
- No extensive customization of configuration variables.



Figure 1: Original Experiment Simulation

Our Simulations

- Two new participant tasks to use in experiments.
- Allow for complete customization of the experiment domain through a comprehensive configuration file.
- Use a SQL database for improved data storage.
- Scaled to the size of the Vive equipped the testing room (Figure 3).

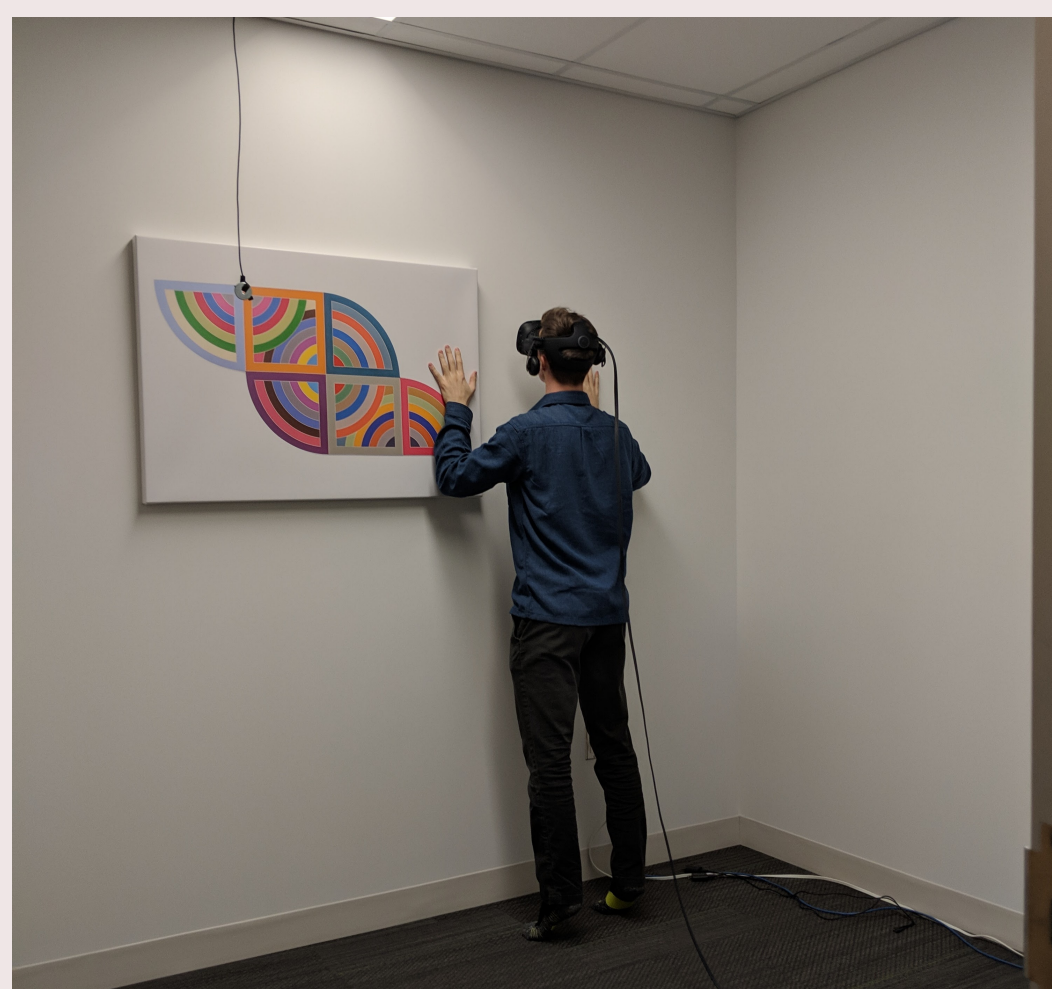


Figure 2: VR Experiment Room

Simulation 1

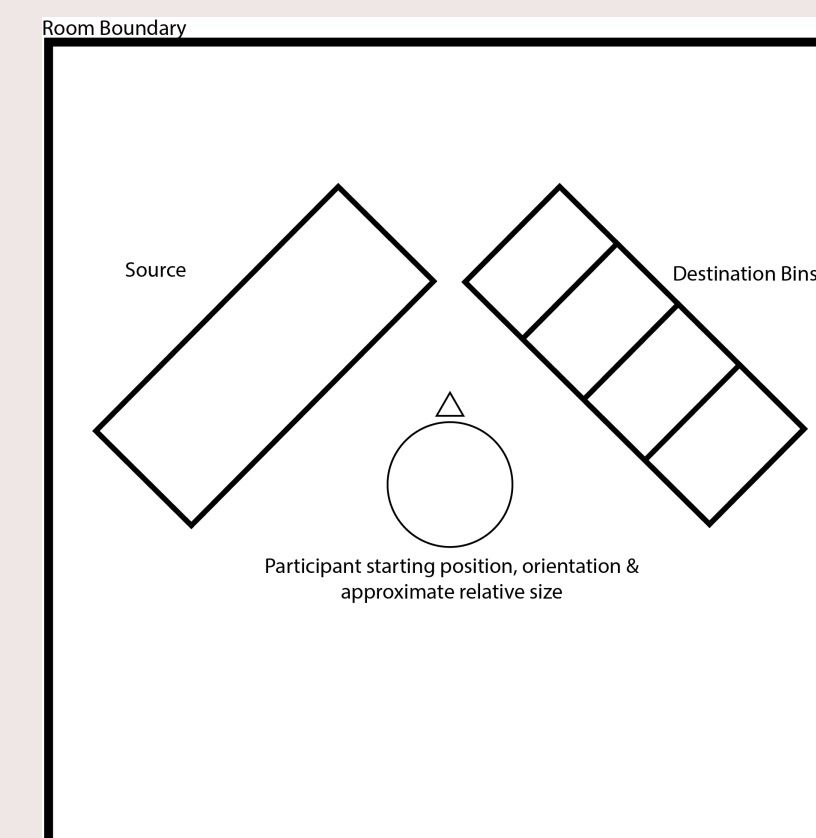
- The participant is required to repeatedly transport a volume of liquid between a source and destination using a single hand-carried vessel.
- Their goal is to maximize the total volume of liquid that successfully reaches the destination.



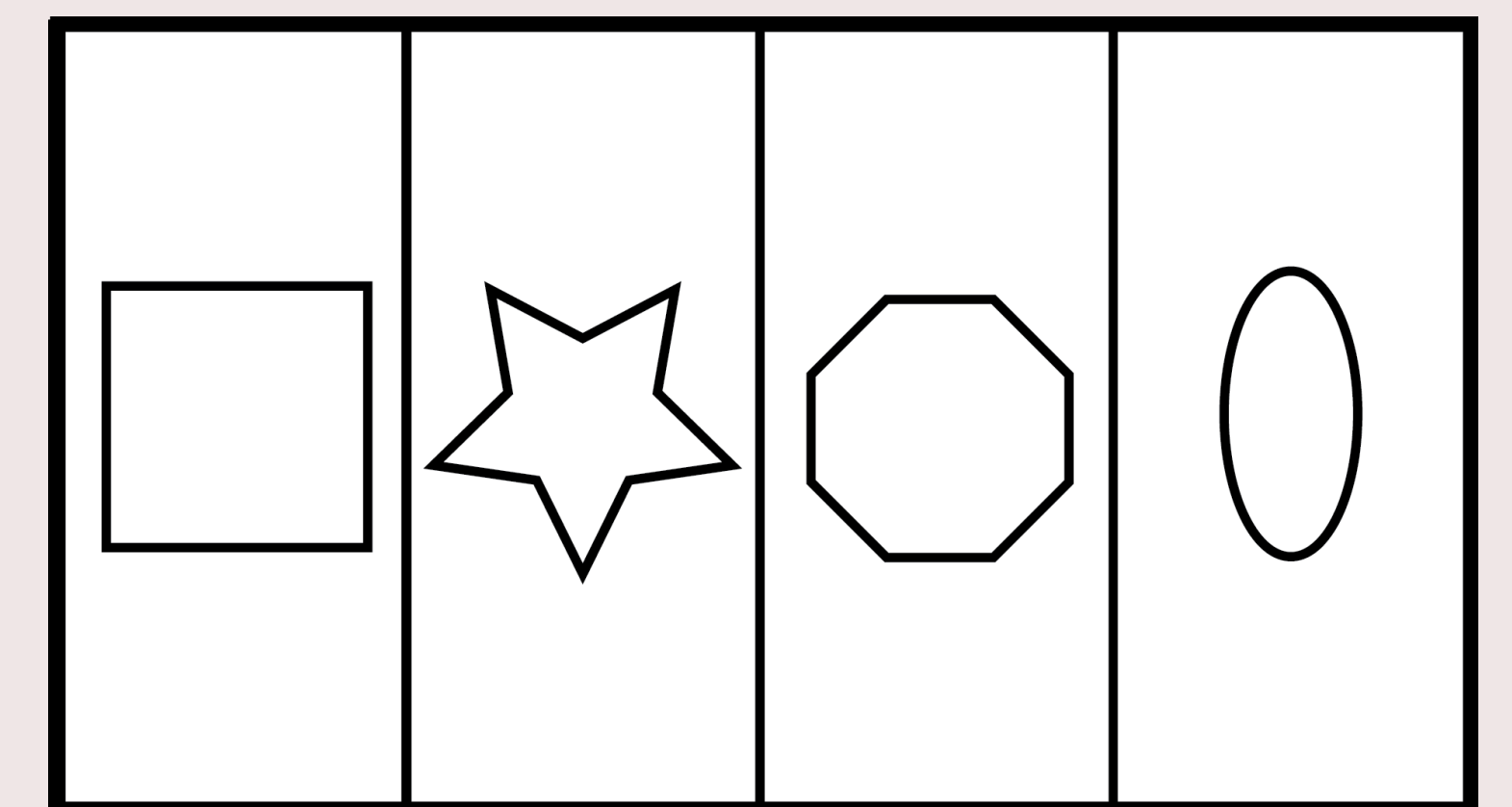
Figure 3: Simulation One Environment

Simulation 2

- 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.

Summary of Configuration Variables

Experiment variables to be set in the configuration file.

- Money acquired per accomplished task
- Cost of treatment
- Waiting duration for option to purchase treatment, or receive free of charge
- Waiting time after treatment before health restored
- "Day" configurations, such as the days the participants are impaired
- Health level on impaired days and the health gained from a treatment
- Impairment type and the intensity of impairment

Conclusions & Future Work

- Using the existing experiment and consulting with the McMaster Decision Science Laboratory we have developed a plan to implement the two simulations as described.
- These simulations will allow the laboratory to run unique experiments using either of the simulations with specific configurations while collecting data in a SQL database.
- The simulations will be tailored to the Vive equipped test room so the overall experience is as realistic as possible.

Acknowledgements

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References