**4/29/2018 – Fitts Law Cardboard VR Specifications**

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**General Learning Outcomes**

1. Have opportunity to work on a multidisciplinary, geographically dispersed team.
2. Understand how psychological phenomena are in play in many types of games.
3. Understand how games may provide a window into understanding of psychological phenomena.

**Fitts Law Overview**

Students should have a good understanding of Fitts Law.

Fitts performed his initial study of time/motion in the 1950s. With an electric sensing pencil, on a task of moving the pencil from a start point to a target, he discovered at least three things.

1. The distance from the start to the target was linearly related to the time to move the pencil. Accuracy was also impacted by distance of target from start.
2. The size of the target impacted the time and accuracy.
3. Acceleration of the pencil was fast at first, slow in the middle and sort of faster as the pencil approached the target.
4. Other factors that may influence outcome: friction, 3D, type of pointing device.

Since 1991, Fitts has been the go-to way of comparing pointing devices. The ISO now uses Fitts as a way to instrument and certify pointing devices.

**Why are we interested in Fitts?**

The Fitts law phenomena has been thought to be entirely ergonomic (related to motor skills). It makes sense to use Fitts to compare pointing devices which are controlled by hand/arm movements as Andrew Sears did in his comparison of touch and mouse pointing in 1991. But what does Fitts mean if there are unusual (cardboard VR) or no (emotiv) motor engagement with the task? Will we still see any behaviors that resemble Fitts law?

We have some reason to think that the answer might be “yes”. Over the last decade, the BGSU CHIL lab did a number of studies of another task, called the Cube Comparison Task (CCT). We studied the CCT under a large number of different UI conditions including mouse with arrows, native mouse, touch, tangible, BCI, gestural (Kinect). One of the persistent and recurring finding from our CCT studies was this: the UI influenced not only the particulars of how the users operated variations on the CCT, the UI *changed the way that users understood and solved the task*. In other words, the UI influenced the users’ mental representations of the problem space itself. A person solving the CCT with the mouse experienced the CCT *problem* differently than a person solving the CCT with a tangible UI.

What if the UI changes the Fitts experience as well? That would be an enormously important outcome because Fitts is not a problem-solving task. It is a perceptual and motor task. If we can demonstrate that if we go to an extreme enough UI to change perception of the task, it would be a significant finding.

**Fitts Law Cardboard VR Gameplay Overview**

The player is located at the origin of a spherical room.

The interior of the sphere has a Start target and a Goal target on its surface. The targets must be a symmetric shape and contrast with the surface.

The player can move the on-screen cursor by utilizing Gaze controls with the Cardboard VR viewer.

The goal of the game is to click on the Start target and then move the cursor to the Goal target as quickly and accurately as possible.

The Goal target can only be clicked on after the Start target has been clicked. Once the Start target has been clicked, the Goal target becomes Click-able, and the Start target becomes un-clickable.

If the target the player must click on is currently off-screen, an indicator must appear to indicate where the player must look to find the target.

Data collection begins when the Start target is clicked, and ends when the Goal target has been clicked.

Many samples are repeated to collect data from the experiment.

Data must be output to a .CSV file.

**Fitts Law Cardboard VR Output Requirements**

Trial Name

Participant ID

Participant Name

Sample

Elapsed Time

Start Target Scale

Goal Target Scale

Arc Distance

Start Target Origin

Goal Target Origin

Start Target Color

Goal Target Color

A continuous stream of (time, Cursor Location) while data is being collected

**Fitts Law Cardboard VR User Interface Requirements**

All settings for creating the experiment must be workable using standard mobile controls prior to placing the device into the Cardboard VR Viewer.

The Experimenter must be able to define a trial and adjust its parameters. A Trial is defined by the following parameters:

Trial Name

Participant ID

Participant Name

Number of Samples

Start Target Scale

Goal Target Scale

Minimum Horizontal Offset

Maximum Horizontal Offset

Minimum Vertical Offset

Maximum Vertical Offset

Start Target Color

Goal Target Color

The Experimenter should be able to save a trial so that it does not need to be setup every time the experiment is done.

The Experimenter should be able to create a playlist of trials, which would allow Saved trials to be added to it or removed from it. The order of trials on the playlist would indicate the order that they are played in during the experiment. Once all trials of the playlist have been played, the experiment is over.

A User Manual is required that details how to setup the experiment and navigate the User Interface.