Documentation

**Study Parameters**

For this study, the goal was to compare two different input methods: a **trackpad** (Input Method 1) and a **mouse** (Input Method 2). These input methods were analyzed based on their performance in a task that required participants to interact with different targets. The task was designed according to the Fitts' Law model, which relates movement time (MT) to the index of difficulty (ID). The parameters for this study are outlined below:

* **Target Combinations**: The study used combinations of two variables, the width of the target (W) and the amplitude (A), or the distance between the starting point and the target.
  + **Target Width (W)**: 15 mm, 30 mm, and 45 mm (3 levels)
  + **Target Amplitude (A)**: 150 mm, 300 mm, and 450 mm (3 levels)

1. **Table Summary:**

A screenshot of a data analysis

Description automatically generated

1. **Equation of MT:**

Input Method 1: y = 3.22E2 + 2.21E2\*x

Input Method 2: y = 1.23E2 + 2.15E2\*x

1. **R-squared Values:**

Trackpad (Input Method 1): R2 = 0.820

Mouse (Input Method 2): R2 = 0.825

1. **Mean Error Rate:**

Input Method 1: 10.97%

Input Method 2: 5.08%

1. A graph with numbers and lines

   Description automatically generated with medium confidence

A graph with numbers and a line

Description automatically generated

**Results**

From the analysis, the mouse (Input Method 2) was slightly faster overall than the trackpad (Input Method 1), as evidenced by the lower intercept in the linear regression equation. The slope of the line for the mouse condition is also slightly less steep, indicating that as the index of difficulty increases, the movement time increases at a slower rate compared to the trackpad.

The **R-squared values** for both input methods are quite high (around 0.82), indicating a strong linear relationship between the index of difficulty and movement time. This is consistent with Fitts' Law, which suggests that movement time increases as task difficulty (ID) increases.

**Throughput**

Throughput= ID/MT​

For each input method, the throughput can be used to determine the efficiency of the device:

* **Trackpad Throughput**: 1 / (2.21E2)

Lower than the mouse due to higher movement times.

* **Mouse Throughput**: 1 / (2.15E2)

Higher, indicating greater efficiency for more difficult tasks.

**Limitations and Considerations**

* **Sample Size**: The study involved a relatively small number of participants, which may limit the generalizability of the results.
* **Learning Effects**: The study may have been influenced by learning effects as participants became more familiar with the task, especially with the second input method used.

The findings align with expectations that a mouse generally allows for quicker and more precise interactions, particularly as task difficulty increases. The trackpad, while effective, tends to result in slower movement times, especially for tasks with a higher index of difficulty.