

COSC 341 HCI Assignment 2

Analysis Report on Target Selection Performance Using Mouse and Touchpad

Sarabroop Aulakh, Ansyn Neuhaus, Mason Liu

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Introduction

This report analyzes the performance differences in selecting targets using a mouse versus a touchpad across various levels of task difficulty, represented by Fitts IDs. Fitts' Law is a predictive model of human movement, primarily used to estimate the time required to move to and select a target. A higher Fitts ID indicates a more difficult task.

Data Overview

Fitts ID	Mouse	Touchpad
3.459431619	0.9869	0.978573
2.807354922	0.751822	1.10098
1.584962501	0.66346	0.703771
2.584962501	0.687424	0.776202
2	0.583407	0.590164
1	0.613931	0.732829
2.115477217	0.617657	0.784674
1.584962501	0.489347	0.609341
0.736965594	0.665023	0.87547

Table 1: Performance Data for Mouse and Touchpad

Analysis

Overall Trends

Mouse Performance: The selection times tend to decrease as the Fitts ID decreases, indicating that the mouse is more efficient for easier tasks.

Touchpad Performance: The touchpad also shows a similar trend, but with generally higher selection times compared to the mouse.

Performance Differences by Fitts ID

High Difficulty (Fitts ID 3.5):

- **Fitts ID 3.459431619:** Mouse (0.9869) vs. Touchpad (0.978573)
- Performance is very close, with the mouse slightly slower.

Moderate to High Difficulty (Fitts ID 2.8):

- **Fitts ID 2.807354922:** Mouse (0.751822) vs. Touchpad (1.10098)
- The mouse is significantly faster.

Moderate Difficulty (Fitts ID 2.5):

- **Fitts ID 2.584962501:** Mouse (0.687424) vs. Touchpad (0.776202)
- The mouse is faster.

Lower Difficulty (Fitts ID 2):

- **Fitts ID 2.115477217:** Mouse (0.617657) vs. Touchpad (0.784674)
- **Fitts ID 2:** Mouse (0.583407) vs. Touchpad (0.590164)
- The mouse is faster in both cases.

Low Difficulty (Fitts ID 1.5):

- **Fitts ID 1.584962501:** Mouse (0.66346) vs. Touchpad (0.703771)
- **Fitts ID 1.584962501:** Mouse (0.489347) vs. Touchpad (0.609341)
- The mouse remains faster.

Very Low Difficulty (Fitts ID 1 and below):

- **Fitts ID 1:** Mouse (0.613931) vs. Touchpad (0.732829)
- **Fitts ID 0.736965594:** Mouse (0.665023) vs. Touchpad (0.87547)
- The mouse outperforms the touchpad for very low difficulty tasks.

Conclusion

The analysis indicates that the mouse consistently outperforms the touchpad across all levels of task difficulty. The performance gap is particularly noticeable in moderately difficult tasks (Fitts ID around 2-2.8), where the mouse demonstrates significantly faster selection times. For very high difficulty tasks (Fitts ID around 3.5), the performance of both devices is nearly the same, but the mouse generally provides a faster selection time in most scenarios.

The data suggests that, for tasks requiring precise and rapid selection, a mouse is the preferred input device over a touchpad, particularly for moderately difficult tasks where the efficiency difference is most pronounced.

Chart

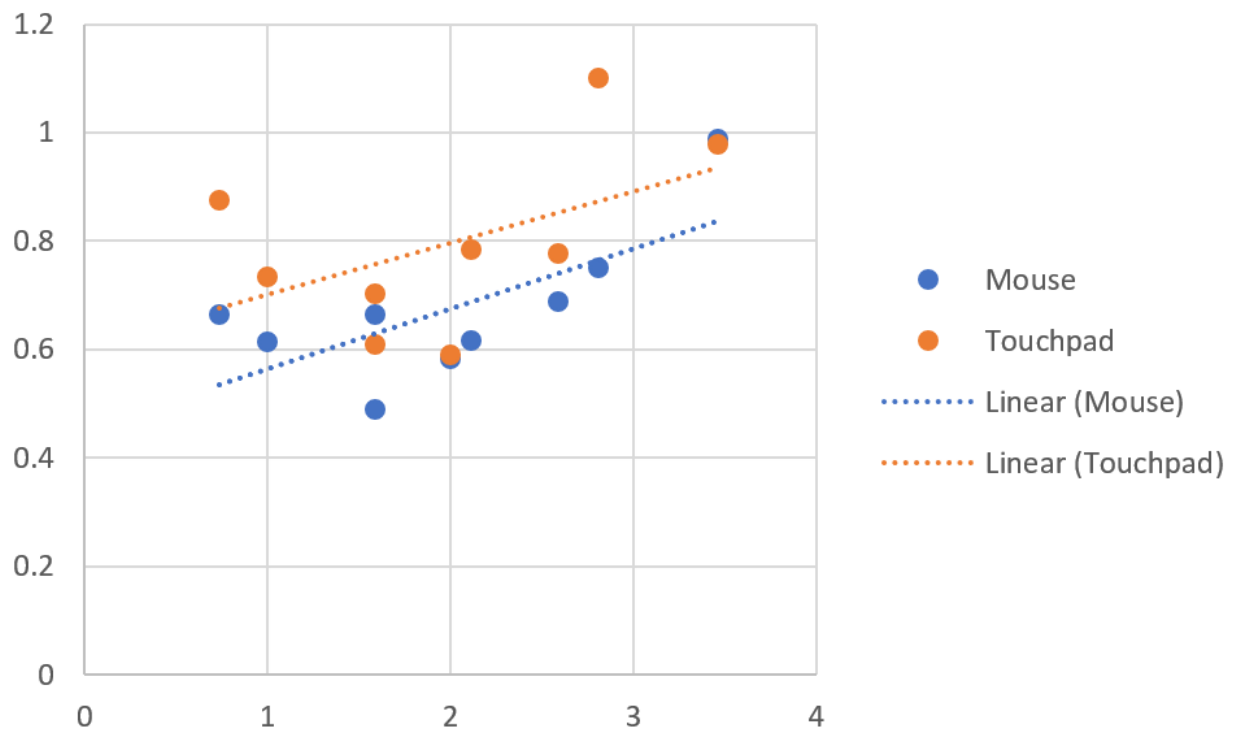


Figure 1: Chart of Target Selection Performance

Project Challenges and Solutions

Coding and Operational Challenges

Throughout the project, we experienced several coding and operational challenges that affected our progress.

GitHub Duplication Issues

One significant challenge emerged over the use of GitHub. The main branch ended up with redundant coding scripts after creating a new branch. This duplication cluttered the repository and caused confusion and conflicts during merges. To fix this issue, we had to adjust our branching strategy, establish protocols, and streamline our version control process.

Labor-Intensive Unity Test Case Configurations

Working on Excel sheets and data gathering was confusing and mistake-prone. Every test case required Unity-specific configurations and modifications, which increased the workload. This monotonous job was not only time-consuming but also prone to mistakes. Automating these processes or developing a more efficient system for managing test cases in Unity could ease the burden and increase accuracy rates in this area. Streamlining the data collection process from configuration would have given valuable time and resources, thus allowing the team to narrow down their focus on critical aspects about which they were concerned.

Canvas Tutorial Inconsistencies

Lastly, we encountered several problems associated with a Canvas tutorial involving clicking and changing the color of circles. To demonstrate interactive features, the tutorial was supposed to make circles respond when clicked by users; it failed because some circles never changed color as anticipated or lacked consistency.

Summary

In summary, we faced GitHub duplication issues, intensive Unity test case configurations, and inconsistent Canvas tutorial interactions. These challenges necessitated improved branching strategies, process automation, and debugging for smoother project execution.

GitHub Repo

GitHub Repository Assignment 2 group 2

References

- Fitts, P. M. (1954). The information capacity of the human motor system in controlling the amplitude of movement. *Journal of Experimental Psychology*, 47(6), 381.
- MacKenzie, I. S. (1992). Fitts' law as a research and design tool in human-computer interaction. *Human-Computer Interaction*, 7(1), 91-139.