

# Laboratory Notebook for a user pointing experiment

## Project overview

Fitts described 1954 the relationship between the distance to a target, its width, and the time needed to acquire it [Fitts, 1954]. To acquire a target, e.g., to move the mouse cursor and click on a file to select it, Fitts' law describes how the distance between the start point and the target ( $A$ : amplitude of the movement), and the size of the target ( $W$ : width of the target) impacts the index of difficulty of the task ( $ID$ ) [MacKenzie and Buxton, 1992]:

$$ID = \log_2(A/W + 1)$$

The time ( $MT$ : movement time) needed for a user to acquire a target is linearly correlated to  $ID$ :

$$MT = a + b \times ID$$

A large part of Human-Computer Interaction research since then builds on top of Fitts' law.

This project aims at finding the values of the  $a$  and  $b$  parameters. This document contains my attempts to experimentally find  $a$  and  $b$  parameters.

## General Organization

### data

The data is generated by me when I was using the software , and give me this:

Data Raw, i.e. the raw data as returned from the experimental software.

Data Mean, i.e. the processed mean movement times as returned from the experimental software.

### pointingAnalyze\_FittsLaw\_experiment/

This folder contains my R markdown script used to analyze the data collected from the experiment.

## Experimental Reports

### 2024-02-03

**Experimental task** I used the implementation of a pointing experiment from Ergonomics Web at Cornell University. On this Webpage, one can gather data for controlled 1D user pointing experiments. 1. In the first text field, the experimenter enters the *widths* of the targets, separated with ','. 2. In the second text field, the experimenter enters the *distance* between targets, also called "*amplitude*", separated with ','. 3. In the last text field, the experimenter enters the number of trials s/he wants to collect for each combination of *widths* and *distances*.

### Experimental variables

**First Experiment:** I ran the experiment from the above Webpage with 16,32, and 64 widths and with 128,256,512 amplitudes, with 10 trials for each combination.

Circumstance: using Dell XPS , during night , mouse , right hand , half tired.

**Second Experiment:** I ran the experiment from the above Webpage with 6,3,and 4 widths and with 12,25,52 amplitudes, with 10 trials for each combination.

Circumstances: using Dell XPS , during night , mouse , right hand , 70% tired, I didnt like the game.

**Data collected** The Webpage returned the following results:

**First Experiment:**

- I performed 0 pointing errors
- A Fitts modelling in the form of  $MT = 426.246 + 148.856\log(A/W + 1)$  with  $RSquare = 0.869$
- The table of mean  $MT$  that I provide in the data folder
- The table of raw pointing data that I provide in data folder

**Second Experiment:**

- I performed 77 pointing errors
- A Fitts modelling in the form of  $MT = 184.338 + 143.258\log(A/W + 1)$  with  $RSquare = 0.640$
- The table of mean  $MT$  that I provide in the data folder
- The table of raw pointing data that I provide in data folder

**Data analysis** My data analysis is performed and commented in the pointing\_experiment\_Analyze.Rmd file (R markdown file).