

DEVELOP AND EVALUATE A USER EXPERIENCE: FITTS'S LAW

OBJECTIVES

The objective of these 4 sessions is to **develop and evaluate a user experience** of pointing using the mouse. You will therefore **develop a pointing application**. 3 classmates or more will pass your experience and you will **analyze their results**.

FITTS'S LAW

Fitts' law is a predictive model of human movement used in human-computer interaction. This law predicts that **the time required to move the pointer to a target area** is a function of **the ratio between the distance to the target (A) and the width of the target (W)**, see Figure 1. Fitts's law is used to model the act of pointing, either by physically touching an object with a hand or finger, or virtually, by pointing to an object on a computer monitor using a pointing device (such as a mouse).

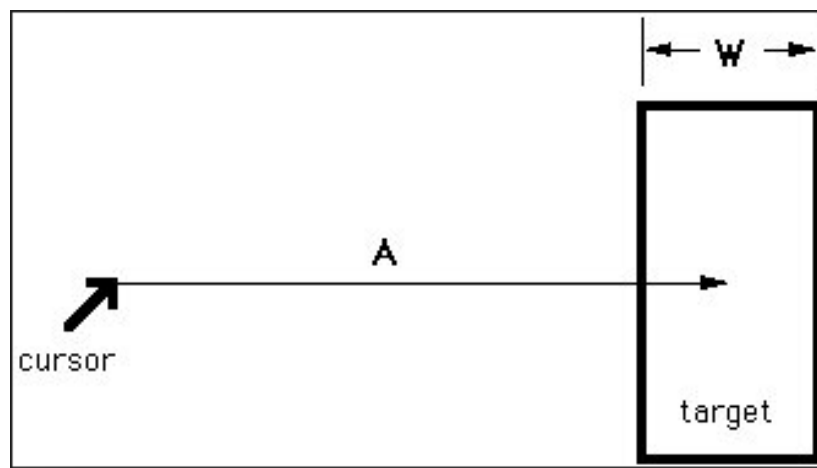


Figure 1. Retrieved from <https://www.yorku.ca/mack/GI92.html>

For more details, see:

https://en.wikipedia.org/wiki/Fitts's_law

<http://www.yorku.ca/mack/ijhcs2004.html>

SESSION 1-2: DEVELOP A POINTING APPLICATION

You will develop an interface with **13 targets**. You will choose **3 different target width (W)** and **3 different distances (D)** (see Figure 2). Your application has 9 possible configurations.

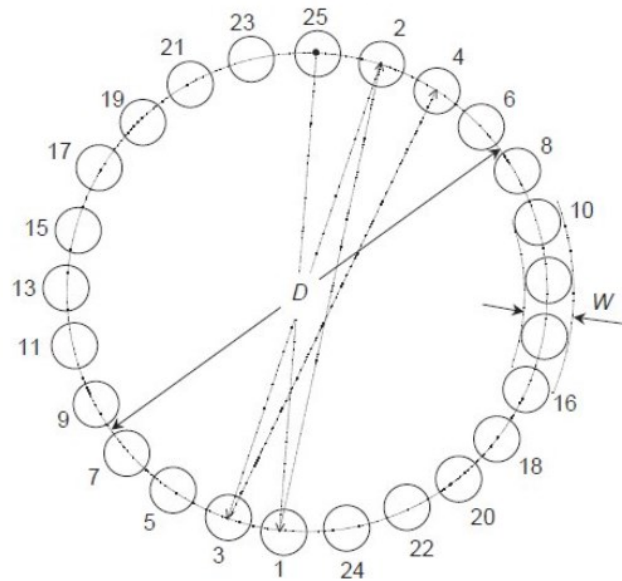


Figure 2. Build the interface

Using the target width and the distance, we can calculate the difficulty index (ID) as follows:

$$ID = \log_2 \left(\frac{D}{W} + 1 \right),$$

APPLICATION

The goal of the user experience is to click on a target as **quickly as possible and with minimal error**. **The target to click is red** (see Figure 3). Once the user clicks on the target, the next target turns red. The **next target is opposite** to the current target (as illustrated in Figure 2).

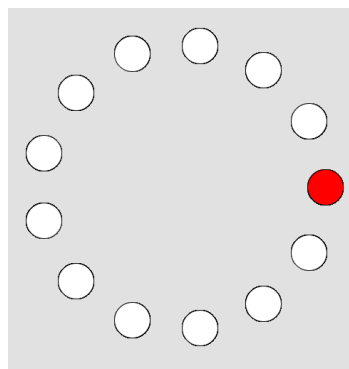


Figure 3. Example of the interface with W= 20 pixels, D= 400 pixels

When the user has finished clicking on the 13 targets, a new configuration appears on the screen (different width and distances). The experiment and the application end when the 9 configurations have been completed. The order of configurations is **generated randomly**.

For an example of the interaction of the application, see: <http://simonwallner.at/ext/fitts/>

The application has to be code in **Java**.

LOGS

You must record the **user's number, the width of the target and the distance between the targets, the completion time, the number of clicks errors, ...** You will have a .csv file for each participant

OPTIONAL (A FILE FOR EACH TRIAL)

You must record **all mouse movements, clicks, and time** to reach the targets. These logs must be saved in **.csv format**. A log file must correspond to a configuration (9 files in all). The file name must be in the form **user_X_width_Y_dist_Z** where X is the user's number, Y is the width of the target, and Z is the distance between the targets.

SESSION 3: RUN THE EXPERIMENTATION

You will pass this experience to at least 3 people. A user experience is always anonymized; you will assign an identifier to each participant.

You can make a consent form. This is mandatory before any experiment, it allows the user to know his rights, including the progress of the experience and the disclosure of his personal data. You can see an example at: <https://wagner.edu/psychology/informedconsent/>

At the beginning of the experiment, you will get information about the participant profile: age, sex, level of study, ...

At the end of the experiment, make sure you have your 9 log files.

SESSION 4: RESULTS ANALYSIS

Once the experiments are done, the results of the study must be analyzed.

For each configuration, we can look at the results according to the **time** taken by the user to reach all the targets (or each target as in Figure 4) and the **error rate**.

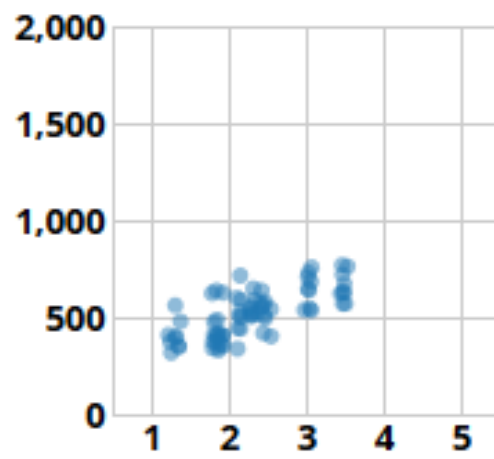


Figure 2. Time in ms over ID