ELEC-D7010 Engineering for Humans 2020

Aalto University

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Assignment 1: Introduction & Human Performance

General instructions: There are one Mandatory and two Optional tasks in this assignment sheet. If you do any task -- remember that you do not need to attend all assignments, you only need to collect minimum 40 assignments in total by the end of the course -- you must start with the Mandatory. *If* you do an Optional task, which I recommend, you can choose which one to do; you can also do both. Prepare a separate PDF for every task that you submit. Submit each PDF to the corresponding Assignment in MyCourses. Pay attention to reporting: use full sentences and prefer visual explanation when needed. Observe the submission deadline.

Note: All exercises are to be done on your own. Do not do them in pairs or groups. In cases of plagiarism, we will follow the policy of Aalto University. While we recommend talking with other students and learning from the Internet, exercise solutions must be executed individually and by the student only. The student must be ready to explain his/her solution when requested.

A1-1: Heuristic Analysis (5 p) [Mandatory]

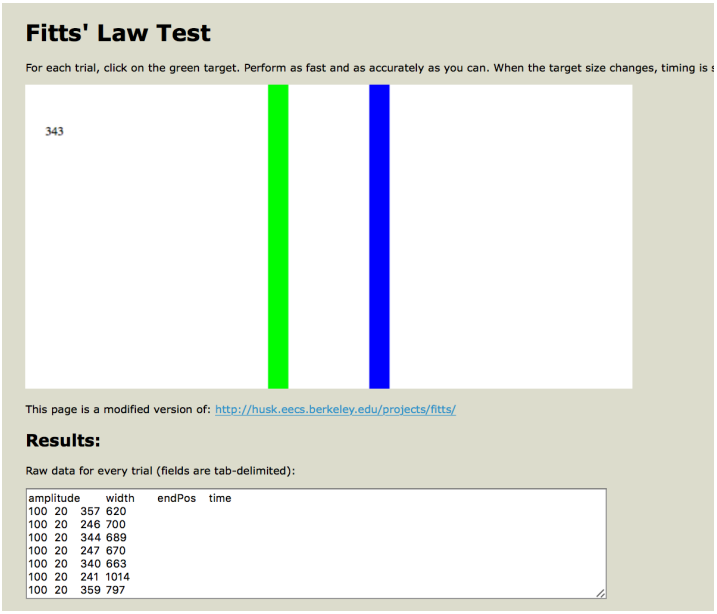
Preparations: Familiarize with Shneiderman's Eight Golden Rules and how they are used at Apple: https://www.interaction-design.org/literature/article/shneiderman-s-eight-golden-rules-will-help-you-design-better-interfaces If you want to use another set of heuristics, that is fine; Just remember to 1) state the source and 2) justify, briefly, *why* you picked it.

Choice of user interface: Choose a device or service or application, the common noun (yleisnimi) of which starts with the last letter of your last name. For example, Oulasvirta could choose anything that starts with *a*, such as *augmented reality* (e.g., HTC Vive configuration screen?). If you cannot come up with anything on the last letter, use the second to last, and so on.

Your task is to use the heuristic set to find *potential problems* with the chosen UI. Communicate them in your written report. The more comprehensive and insightful findings you make, the better.

Tips: Choose a sufficiently complex UI such that these heuristics can be demonstrated.

Report: In your written (PDF) report: 1) introduce the user interface you chose with a photo or screencapture, 2) then go through design problems *heuristic-by-heuristic*. For clarity, I ask you to mark the problems you found visually by annotating (e.g., circling and labeling) them to images (screenshots, photos). Finally, 3) provide a written conclusion about the quality of the design in the light of your analysis. Summarize its pros and cons from the heuristics' viewpoint.



A1-2: Fitts' law (5 p) [Optional]

After the companion lecture (Human Performance, in MyCourses > Materials), you should know the basic idea of Fitts' law. But how to obtain a model from empirical data? In this exercise, you will perform a Fitts' Law experiment and use the data to construct a Fitts' law model.

Preparations: Familiarize with Fitts' law. Refresh your memory of linear regression. Download and try out a Javascript tool (in MyCourses) for collecting the data (should look like as shown above).

Your task: Obtain Fitts' law model for one user using one input device.

Steps:

a) **Choose an input device** (e.g, touchpad on your computer)
b) **Conduct your study with one user. Use the Javascript tool.** Ask a friend to take part in your experiment, or do it yourself (one is enough).You should decide how many observations are needed.
c) **Copy the data to software where you can do linear regression.**
d) **Do linear regression (this part you will have to solve)**
e) **Report**

Reporting: Report 1) how data was collected (ID values and total number of trials carried out), 2) a photo of the study setup with the participant and the input device visible, 3) how model fitting was done, 4) what level of model fitness was achieved (using R-squared), 5) a plot of the resulting Fitts' law model (ID on x-axis and MT on y-axis), 6) your conclusion on what the result means.

A1-3: KLM (5 p) [Optional]

Preparation:

1. Familiarize with KLM (slides and video lecture)

2. After choosing your UI (see below) and user task, think how it could be improved

3. Find suitable parameters for KLM (from Wikipedia or from an article e.g. by searching from scholar.google.com)

Choice of user interface: Choose a device, service, or application, the common noun (yleisnimi) of which starts with the third letter of your last name. For example, Oulasvirta could choose anything that starts with *l*, such as *laptop* (ASUS?). If you cannot come up with anything on that letter, take the next one, and so on.

Choice of user task: Choose one *common* task done with the UI.

Your task is to *improve* the design using KLM. This task has two parts. 1) First you need to analyze the existing design using KLM, making a TCT (task completion time) prediction for the chosen task. 2) After that you should find a reasonable way to improve it and prove that it's better by using KLM.

Report: In your written report: 1) introduce the UI (visually) and the user task (verbally); 2) report your KLM model and conclude with a prediction for TCT; 3) describe how you intend to improve the design; 4) show the improvement visually; 5) show the new KLM model and 6) conclude how much faster it will be with your design. If your change might hamper other uses of the design (which they often do), what might those be? Bonus: Discuss the limitations and validity issues of your model.

Your report is mainly evaluated for the validity of KML analysis and secondarily for how good the improvement idea was. You can get full points with a modest improvement if the KLM analysis is correct.