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Assignment 2: Experiments, Logging –

2.2 Plan an Experiment

Sabrin-Leila Kenaan, Maximilian Schubert, Andreas Pritschet
1553090, 1572885, 1572870
Medieninformatik
3. Semester M.A.,
Email: Sabrin-Leila.Kenaan@stud.uni-regensburg.de, Maximilian.Schubert@stud.uni-regensburg.de, Andreas.Pritschet@stud.uni-regensburg.de

Introduction:

In this study we examine the influence of two different factors on the speed with which users are able to correctly press keys on a keyboard. These factors are, on the one hand, the required amount of mental processing depending on two different stimuli (pre-attentive and attentive) and on the other hand, the influence of an existing or non-existing/ the existence of a distraction. The hypotheses tested in the course of the following experiment are hypothesis 1 "the participants react faster to pre-attentive stimuli than to attentive stimuli" and hypothesis 2 "distraction slows down the participants' reaction time".

Experimental Setup:

The study was designed as a within-subject multi-factorial experiment. Every participant was subjected to four different conditions, which means that each participant had to complete the pre-attentive as well as the attentive test with and without a distraction. In order to get a counter-balanced measure design and prevent measurement errors due to order effects, learning effects or fatigue, a balanced latin square design was used to set the order of the four conditions for the four participants (Hornbæk, 2013, S. 25 f.; Jain, 2015). The order as well as the participant's id, the number of repetitions for each condition, the time until a new signal was shown and other demographical information of the participants (gender, age, handedness) were saved in four different test configuration files. These files were necessary to setup the python script that has been written for this experiment. After a short textual instruction presented in the application window the participants had to absolve the four conditions: in case of the pre-attentive test the participant had to press the 'v' key every time one blue rectangle was shown and the 'b' key when two blue rectangles appeared on the screen. The number and position of the rectangles were chosen randomly. In case of the attentive test, numbers from one to eight were presented. Every time an even number was shown the 'v' key should be pressed and the 'b' key in case of odd numbers. Both conditions were tested with and without a distraction. As a visual distraction additionally pictures of cats were randomly shown in the background of the application screen.

Independent Variables:

The independent variables in this experiment were the amount of mental complexity required (pre-attentive or attentive) and the existence or absence of a visual distraction.

Dependent Variables:

The dependent variable was the reaction time - the time a participant needs to press the correct key after a visual signal.

Controlled Variables:

In order to ensure the same experiment conditions for all participants, the experimenter read the same test introduction at the beginning of the experiment. Thereby all participants had the same knowledge of the test setup. Additionally, every trial was conducted at roughly the same time (in the evening) and in the same environment: in the same room, on the same table, in the same chair, on the same laptop with the same keyboard and with the same python program. The test setup itself (except the order of the conditions and the participant's id) was the same for every participant. The number of repetitions (n=10) for each conditions and the time between signals (1s) were constant values in the test configuration. Furthermore, the keys that should be pressed after a visual signal were always 'v' and 'b' depending on the tested condition. The distraction, different pictures of cats, stayed the same for the two mental complexity conditions.

Participants:

The experiment was conducted with two male and two female participants. The participants were selected because of their (similar) demographic background. All participants were of similar age (MV = 23.25, SD = 0,829), right-handed and media informatics (M. S.) students. These characteristics were considered important because technophile people in the same age and with the same educational background should react in a similar way to the presented tasks and should have a similar ability of mental processing. To ensure that none of them had an advantage in terms of the used keyboard all participants were foreign to the used laptop and keyboard. The detailed summary of the participants' demographic data is shown in table 1.

Participant ID	Gender	Age	Handedness
1	female	23	right
2	male	25	right
3	male	24	right
4	female	25	right

Table 1: Demographic Data

References

Hornbæk, K. (2013). Some Whys and How of Experiments in Human-Computer Interaction. *Foundations and Trends in Human-Computer Interaction*, 5 (4), 299-373.

Jain, E. (2015). *Week 5 Lecture 1: Order effects, Counterbalancing and Latin Squares*. Retrieved from: http://www.cise.ufl.edu/class/cis6930sp15res/week5_lecture1_scribe2.pdf [29.04.2016]