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# Assignment 2: Experiments, Logging –

# 2.2 Plan an Experiment

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## Introduction:

In this experiment the influence of the required amount of mental processing (single or binary stimulus) and handedness on the speed with which users are able to press keys on a keyboard should be examined. We assume the following hypotheses: "The participants press the correct key with the index finger of their preferred hand faster than with the index finger of their non-preferred hand" and "the participants react faster to a single stimulus than to a binary stimulus". In order to prove this assumptions, the goal of this experiment is to measure the users' reaction time between a given signal (pre- or post-attentive) and the correctly pressed key in dependence on the prescribed hand to use.

## Experimental Setup:

The experiment was conducted as a multi-factorial-design within-subject experiment, therefore one participant had to do all task combinations. To be exact, every participant had to complete the single- and the binary stimulus-test with his preferred hand as well as with his non-preferred hand. To ensure this requirement a python3 program was written that reads in a given experiment description file (prepared by the experimenters) which contains the number of the current participant, the participant's preferred hand, the number of signal repetitions in one test, the time between the shown signals, the order of the single- and binary-stimulus-tests, the keys the participant has to press and the hand to use for each test. According to this description the software started four different sequential tests for one trial. Additionally, while the conduction of the test the program saves all relevant information for an analysis in a csv file, e.g. the hand used for each test, the test current test type, the reaction time, the shown stimulus and the pressed key.
The procedure of the experiment was always the same. At the beginning of each trial the experimenter gave a short introduction to the participant which summarized the procedure of the trial: Every test starts with a "startscreen" describing the hand to be used and the test type (single- or binary-stimulus). By pressing "enter" the test starts and the participant's time to react to the signals will be calculated. After 10 repetitions the next description-screen will be shown and so the participant could start the next test after reading the shown text. This procedure repeats four times. After this introduction the participant's preferred hand was determined and added to the prepared experiment description file. Then the python program was started and the trial began. To prevent a learning effect the test order as well as the hand to be used defined in the test description and the shown keys in the test itself were randomized. Despite the randomization every participant had to do every test with both hands.

### Independent Variables:

The independent variables of this experiment setting were the following: the finger which had to be used, the hand which had to be used, the key or keys which should be pressed, the number of repetitions, the time between a new signal will be shown and test type (single- or binary stimulus).

### Dependent Variables:

The dependent variables are the time a participant needs to press the key (reaction time) and the actual pressed key on the keyboard.

### Controlled Variables:

First of all, all participants got the same test introduction, so that they all had the same knowledge of the test setup. To ensure that every participant had the same test requirements they had to use

the same software on the same laptop/keyboard sitting in the same chair in front of the same table in the same room.

## Participant Selection:

The experiment was conducted with four male participants. All of them were media informatics students, of similar age and right-handed. One of them already had experience with the used keyboard.

The data of the participants were the following:

| Participant | Gender | Age |
|---|---|---|
| P1 | M | 25 |
| P2 | M | 27 |
| P3 | M | 23 |
| P4 | M | 29 |