Experiment 1: Reaction Test

The aim of this experiment was to investigate whether there exists a non-trivial positive correlation between a participant's age and the time needed to react to a stimulus. Experiment 1 made 6 participants - four male and two female, aged 16 to 27, mean age: 20.83, standard age deviation: 3.97 - perform a simple reaction test; press space when a screen turns from black to red as fast as possible.
The dependent variable of this setup was the reaction time, measured by the test application in milliseconds. The refresh rate of the monitors on which the application was displayed (a screen with a 60Hz refresh rate) was kept the same throughout all tests. However, it was not possible to control the keyboard with which the users interacted, as the trials had to be conducted remotely, which is a potential limitation of the experimental setup. To counteract potential learning effects, the time at which the screen changes from black to red is random between each test within a window of 2 to 6 seconds. After each participants performed 20 trials, the following results could be obtained:

Table 1: Mean Reaction Time and Standard Deviation of the 20 trials per participant's age for experiment 1

Age	Mean Reaction Time (ms)	Standard Deviation
16	305,55	50,59
19	311,50	67,18
19	271,25	55,52
20	310,05	66,84
24	293,90	70,45
27	295,20	66,21

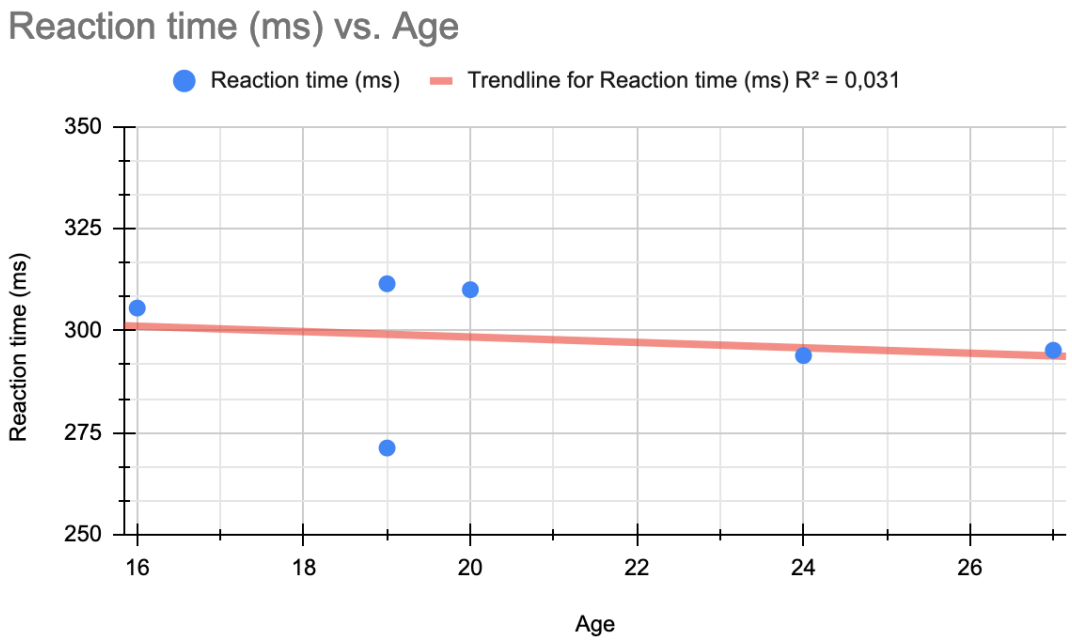

Figure 1: Mean Reaction Time against Age Graph with Trendline and Coefficient of Determination R^2 for Experiment 1

There was no significant correlation between age and reaction time to be found in our participant pool. The R^2 of just 0.031 is too small to indicate that the independent variable has any effect on the reaction time. This does not rule out a relationship between the two variables generally, but in our age range of 16 to 27 no effect could be proven. This is another potential limitation of our experiment, and further research could be improved by collecting more samples from a larger range of ages.

Experiment 2: Simple Stimulus

This experiment tested the reaction time it took to press on the button ‘r’ when a bar in the participants screen turned red, and ‘b’ when a bar their screen turned blue. This was tested by letting participants perform this test on their computer and to report back the reaction time for each time they pressed the correct button. The reaction time was measured in milliseconds from the moment the bar turned red or blue to the moment the correct button was pressed. The reaction time of pressing incorrect buttons was not taken into account. The number of participants for this project was six, with 66.6% being male, and 33.3% being female, with age ranging from 16 to 27, and a mean age of 20.83 and a standard age deviation of 3.97. Overall the average reaction time was 633 milliseconds, with an SD of 302.63

The difference between the results of experiment 1 and this experiment can be explained by the fact that the participants had first had to pick which button was corresponding with the colour, before clicking, thus taking more time before clicking.

Table 2: Mean Reaction Time and Standard Deviation of the 20 trials per participant's age for experiment 2

Age	**Mean Reaction Time (ms)**	**Standard Deviation**
16	580,70	85,21
19	626,75	134,66
19	637,60	222,85
20	734,65	244,74
24	648,45	223,55
27	570,35	197,55

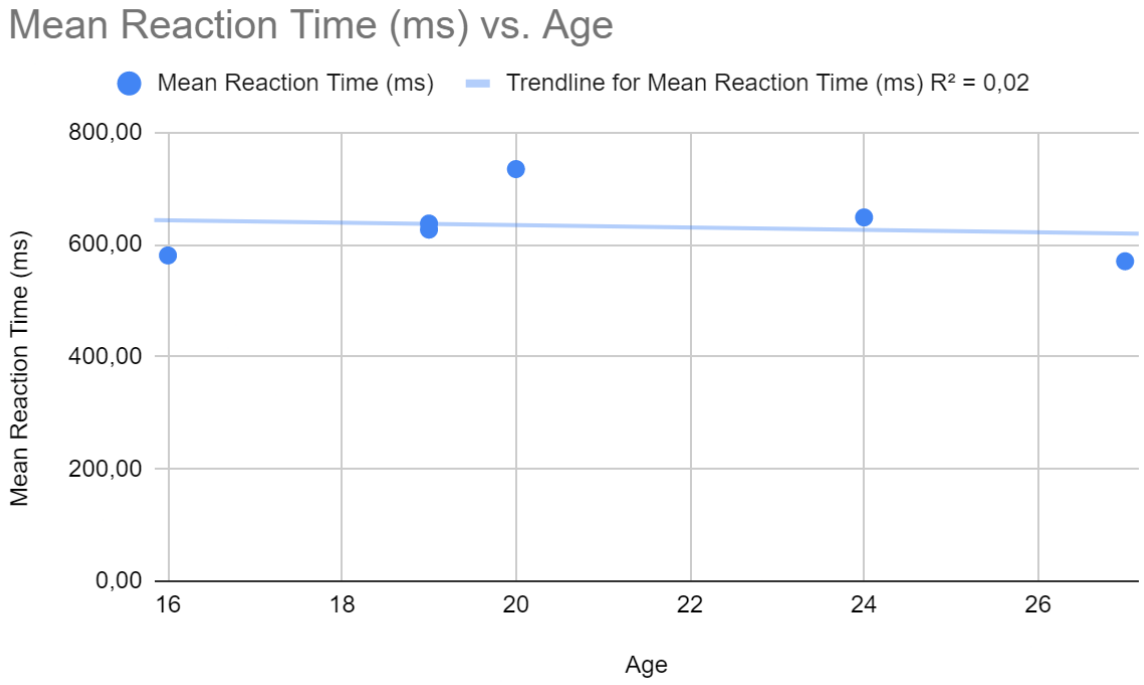

Figure 2: Mean Reaction Time against Age Graph with Trendline and Coefficient of Determination R^2 For experiment 2

There was no significant correlation between age and reaction time to be found in our participant pool. The R^2 of 0.02 is too small to indicate that the independent variable has any effect on the reaction time. This does not rule out a relationship between the two variables generally, but in our age range of 16 to 27 no effect could be proven. As mentioned before this could be caused by the limited age range.

Experiment 3: Variation Complex Stimulus

The aim of this experiment was to investigate the effect of age upon reaction time, to react to a statement. Experiment 3 was a simple reaction test; press ‘t’ when the statement is true and ‘f’ when the statement is false. The dependent variable was the reaction time which was measured by the program in milliseconds. The rest of the variables except the distance or placing between the keyboards and size of the screen were unable to be controlled, because the experiment had to be set up remotely. Each participant had performed 20 trials in total with the randomized statements and was able to obtain the following results.

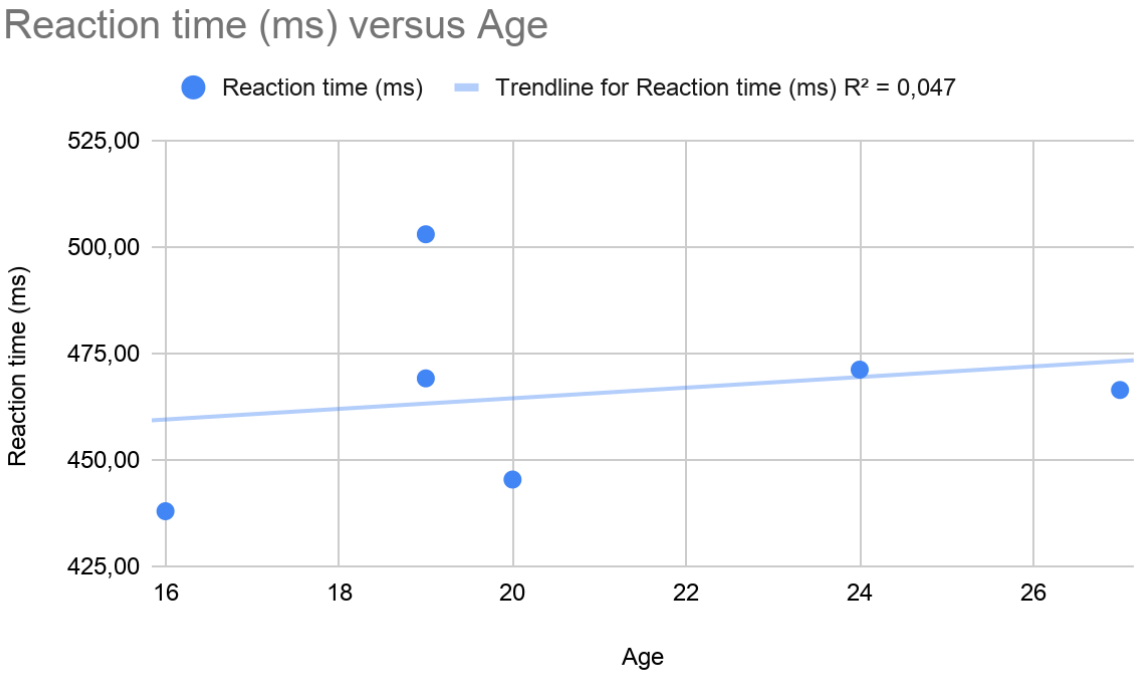

Figure 3: Mean Reaction Time against Age Graph with Trendline and Coefficient of Determination R^2 For experiment 3

Age	**Mean Reaction Time (ms)**	**Standard Deviation**	**Error Rate**
16	437,95	57,56	25,00
19	469,13	71,12	15,00
19	502,95	107,32	35,00
20	445,38	132,38	10,00
24	471,18	120,91	20,00
27	466,4	119,84	15,00

Table 3: Mean Reaction Time and Standard Deviation of the 20 trials per participant's age for experiment 3

Figure 3 displays the average reaction time for each participant with the trendline showing a fairly straight trendline, thus meaning that there was barely any positive nor negative but neutral correlation between the reaction time and age. Moreover, the R^2 gave a value of 0.047, thus proving that the independent variable, the age of the participants, had an effect on the reaction time. However, because the number of participants and trials were limited there is a potential that the age does have an affect on the reaction time. In regards to the error rate there was no significant relationship between the number of errors made during the trials and the participants ages. Therefore, in further studies it is advised to gather more participants with a larger age range and sex.

Experiment 4: Variation Simple Stimulus

The aim of this experiment was to test the relationship between and age when testing the participants with challenging them by using a stimulus, which displayed a red square meaning that they would have to press ‘space’, but on the other hand when a blue square was displayed they would have to press nothing and wait for the next square to appear. The dependent variable was the reaction time measured by the program as in all experiments before. The same participants from the above experiments were also used for this experiment and we were able to collect and analyze the data points into the following output.

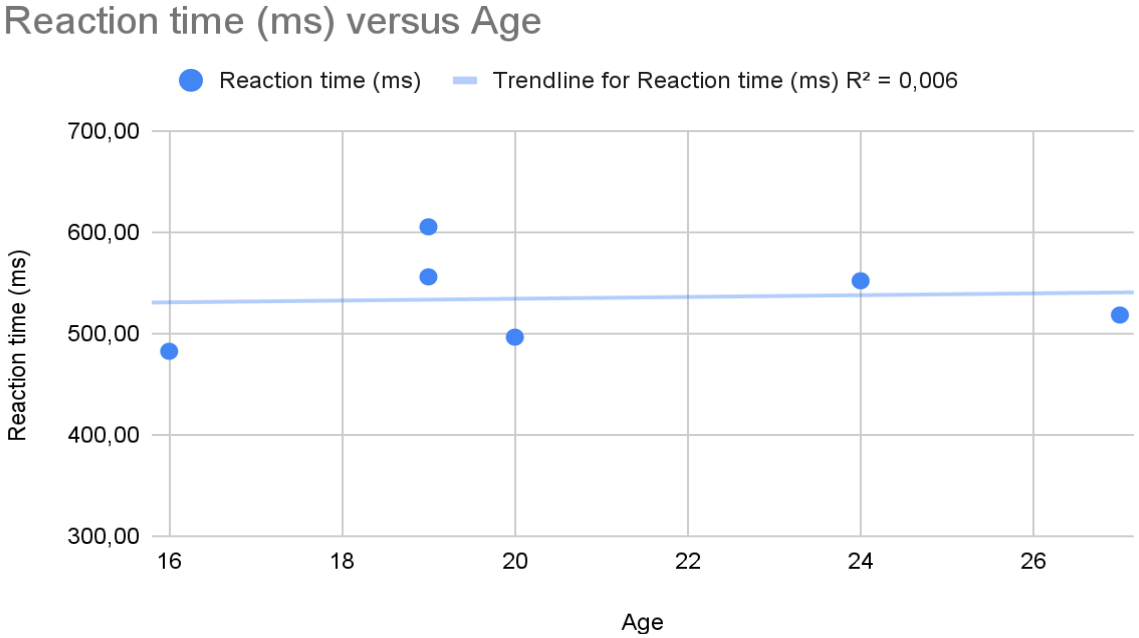

Figure 4: Mean Reaction Time against Age Graph with Trendline and Coefficient of Determination R^2 For experiment 4

Age	Reaction time (ms)	Standard Deviation	Error Rate
16	482,38	66,39	20,00
19	555,81	113,67	10,00
19	605,15	141,87	35,00
20	496,33	181,64	10,00
24	551,95	169,92	10,00
27	518,17	149,69	20,00

Table 4: Mean Reaction Time and Standard Deviation of the 20 trials per participant's age for experiment 4

In comparison to the other experiments this showed the lowest R^2 value of 0.006. Therefore, the value is too low, to have concern about impact of the reaction speed to the participants' age. Moreover, the trendline in Figure 4 is also neutral, showing no positive neither negative correlations. The error rate in Table 4 displays that there is no relationship between the age and amount of errors made. On the other hand, there are too little participants to conclude that any of these experiments have a significant effect. Therefore, it is advisable to have more data points by gathering more participants and by increasing the number of trials.