DATA ANALYSIS EXERCISE

With the collected data, you have to perform an analysis of the data to see how the timings behave.

Since we are calculating an approximation to Fitts Law, we must analyze whether the data fits a Fitts curve. So we are going to see whether any of the experiments has a linear behavior of MT versus ID.

TASK 1: DATA GATHERING

The first task you have to do is to retrieve raw data measured during the experiments (available in Moodle)), and load it into Excel (Excel opens natively CSV files matching the structure used for the experiment). Table 1 illustrates the meaning of entries contained in single row of the CSV file.

Table 1: The meaning of entries in a single row of the CSV file

ID	modeAutoSetMousePos	modePrecuing	MT	DX	DY	W	H	Error
1	False	True	281	143	142	97	97	0

This way, you have to create an Excel file for each configuration.

In order to speed up this process, we suggest first to create a base file for one configuration (e.g., false_false.xlsx). Once the csv data is loaded, use the Exel command “format as table” (“Als Tabelle formatieren”), which produces column headers with filter options. Then, rename the columns according to the recorded parameters.

	A	B	C	D	E	F	G	H	I
1	X	Precuing	Reset	MT	DX	DY	W	H	Error
2	1021	False	False	859	-290	-154	32	32	0
3	1021	False	False	671	115	35	83	83	0
4	1021	False	False	609	90	-289	48	48	0

TASK 2: CHART CREATION

Now, calculate the ID based on the recorded parameters for distance and size of target.

- Distance: For the sake of comparison, we use for the formulas of Fitts and MacKenzie the distance in 2D that you can calculate from DX and DY. Create a new column for this parameter.
- ID: Create a new column for each formula. For Accot and Zhai, we assume h=0.1.

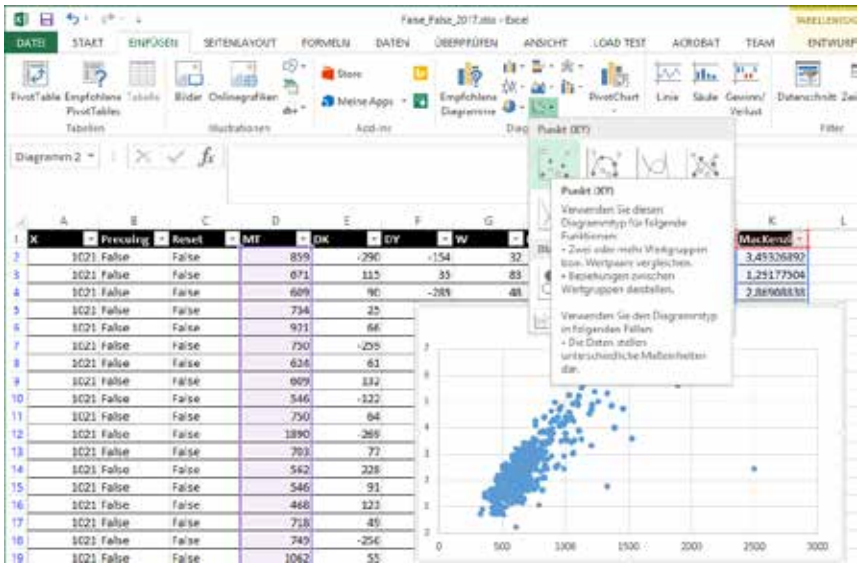
An intermediate result (here for MacKenzie only) might look like this one:

K2 =LOG(1+[@D]/[@W];2)

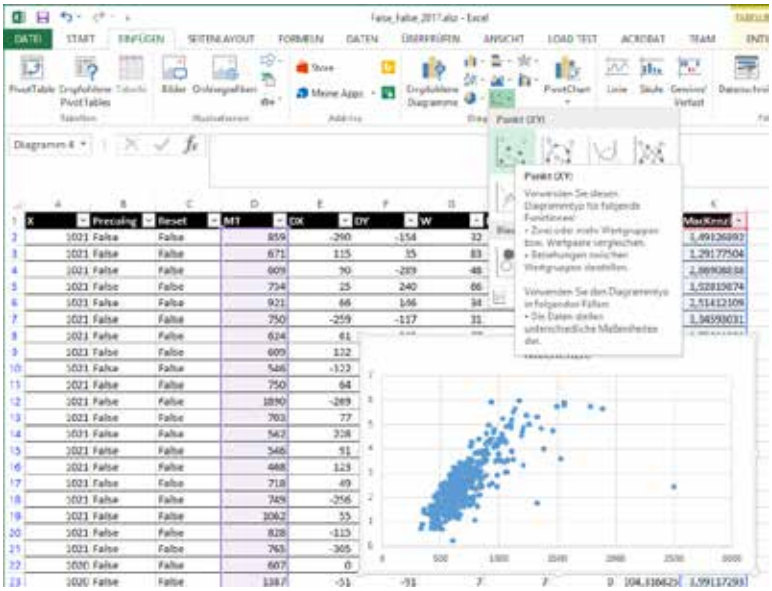
	A	B	C	D	E	F	G	H	I	J	K
1	X	Precuing	Reset	MT	DX	DY	W	H	Error	D	MacKenzi
2	1021	False	False	859	-290	-154	32	32	0	328,353468	3,49326892
3	1021	False	False	671	115	35	83	83	0	120,208153	1,29177504
4	1021	False	False	609	90	-289	48	48	0	302,68961	2,86908838
5	1021	False	False	734	25	240	86	86	0	241,29857	1,92819874

In the following, we use this data to create a chart, which co-relates ID and MT. In order to obtain a basic scatter plot (“Punkt XY”) with X=ID and Y=MT, you may proceed as follows:

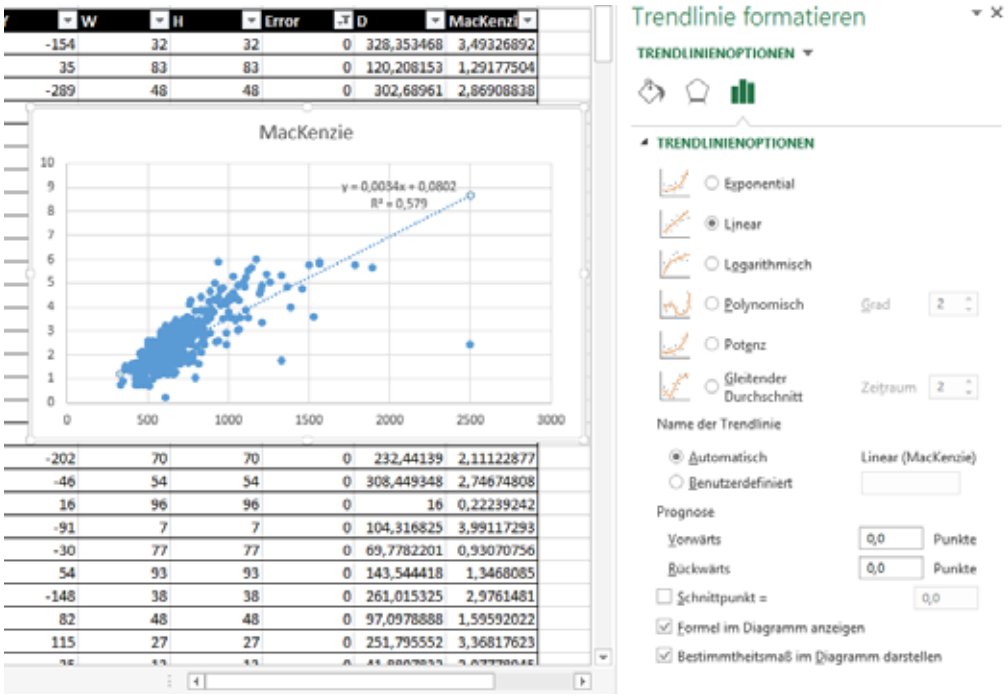
- Select the desired ID column and the MT column.
- Choose from “Insert” Ribbon, area diagrams, the scatter plot (“Punkt XY”).



If we are plotting ID vs MT, we expect this to behave as a linear relationship. Therefore, we select “trend line” from the options (see below). Then, we have to configure the trend line.



By checking the options to “Display equation” and “Display R-square” (Bestimmtheitsmaß) you will have the values of the constant, as well as the fitting error produced by the function (see below).



TASK 3: DATA ANALYSIS

Once you have created the charts, you may start analyzing the measurements.

- Outliers
  - Experiment with the impact of outliers on R-square
    - Hiding rows containing errors
    - Rows with very high MT
    - Rows with very low MT
    - Rows with very high distance
    - Rows with very low distance
- Overall rating
  - Which formula worked best (in terms of “R-square”) for which configuration?
- Configurations
  - Does pre-cueing affect MT?
  - Does the automatic positioning of the cursor in the initial button affect MT?