Cognitive And Psychophysiological Test Operations

User Manual

CAPITO BASIC

R 1.1

www.neurofeedback-partner.de

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1 Introduction

CAPITO has multiple application areas.

Test Software for cognitive performance:

- attention, memory performance, impulse control, reaction time

Software for stimulus-presentation:

- event-related potentials (ERPs)
- event-related imaging
- evoked potentials (visual and auditive)

Additional application areas:

- coaching, consulting
- personnel area
- neuromarketing

1.1 Why tests?

A well working nervous system has an optimum of information processing which is for example clarified in the response time-inhibition control that is used by networks and especially the frontal lobe.

CAPITO offers you many opportunities to measure the most critical parameters of attention, processing speed, and impulse control. These are also called executive functions, which are mainly orchestrated by the frontal lobes and the attention networks in the brain.

Here are some of CAPITO´s essential features:

- Besides default tests, CAPITO users can create individual test designs and test sessions. Hence, CAPITO comes as a flexible tool which can follow your requirements.
- CAPITO users can reveal much information related to the client´s cognitive performance quickly.
- You can create as many data sets of clients as you want and get graphs that show the changes in performance during a specified period.
- The diagram of the test scores and their history facilitate understanding and assessing the scores. Other evaluation tools can be received by exporting a CSV-file that enables evaluating in the form of Excel-tables.
- CAPITO can also be used as a program for attention training because the parameters can be adapted for every level of difficulty regarding the current performance.

In the following, there is a walkthrough to the program´s main functions.

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2 Installation / Uninstallation

2.1 System Demands

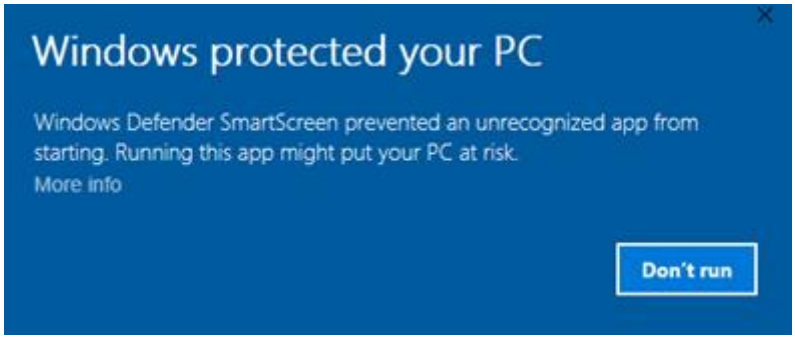
Make sure that the following system demands are fulfilled before installing CAPITO on your computer.

System component	Demand
System Software	Windows Vista, Windows 7, or Windows 10
Screen Size	We recommend screens with 17,3 inches, a second screen for the depiction of the visual stimuli at around 21 inches or higher.
Screen Resolution	1366 x 768 pixels
Processor	Intel, AMD
Processor speed	2.2 GHz or more
RAM-size	8 GB or more

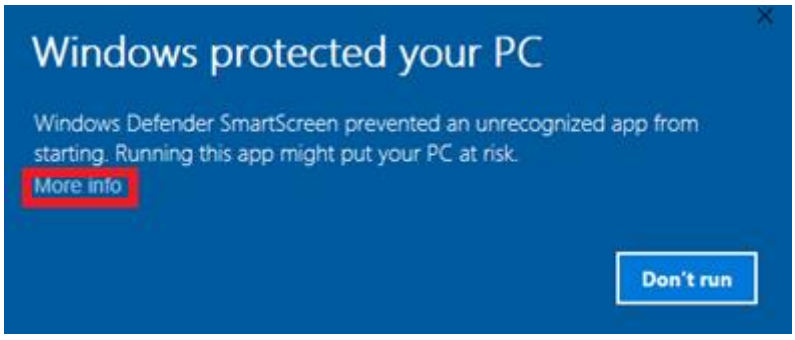
2.2 Installation of CAPITO

Follow these steps for installing CAPITO:

1. Double-click on the Software-Exe-file.
2. If Windows Defender is installed on your computer there might be showing up a warning (see image below):



3. Ignore this warning and click the option ”more info“ (see image below):



4. Click “Run anyway” as shown in the next image:

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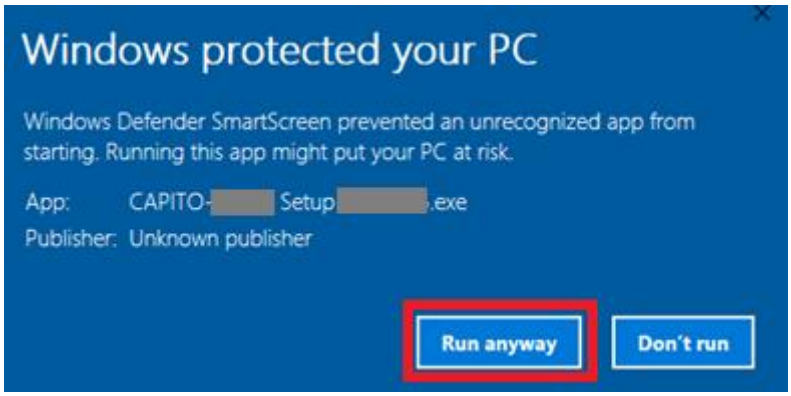
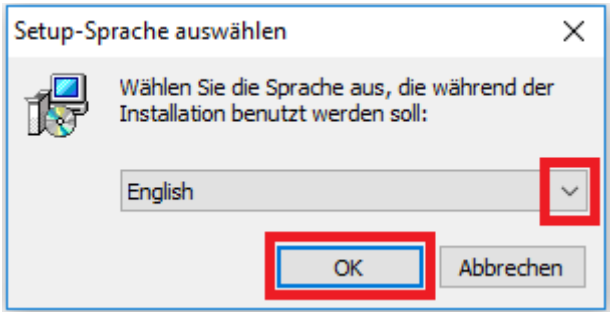


5. Choose your language and click “OK”.



6. Continue installing.

7. Tick the option “I accept the agreement“ and click “Next“ after reading the license agreement.

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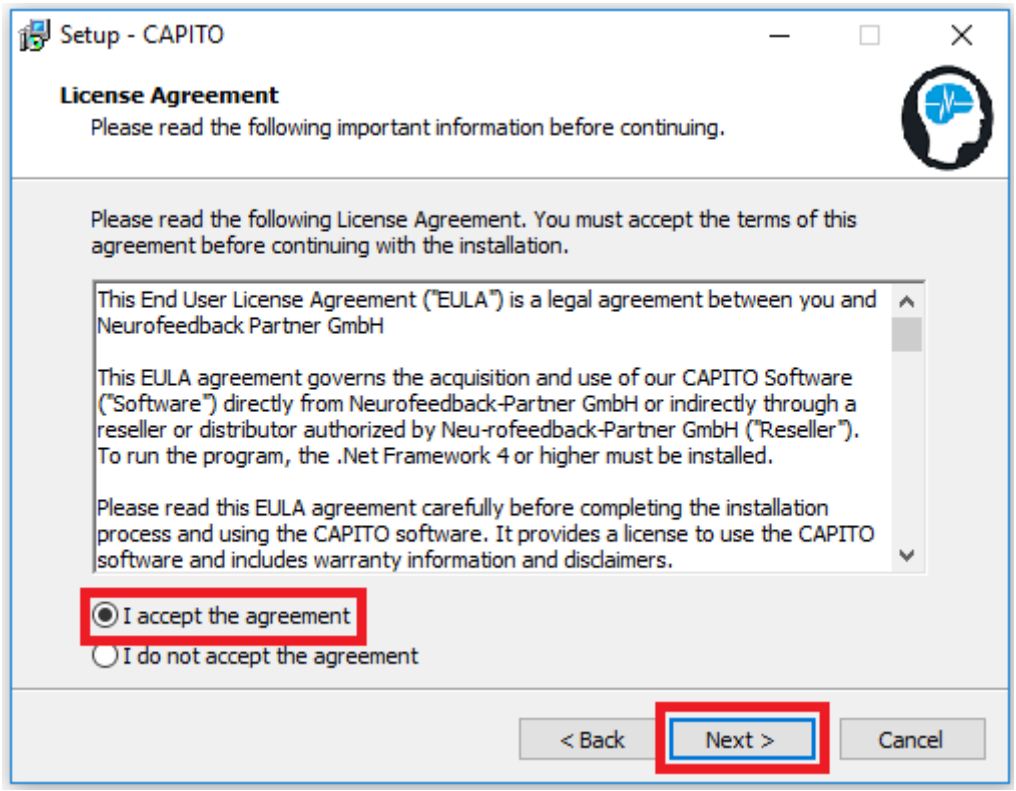
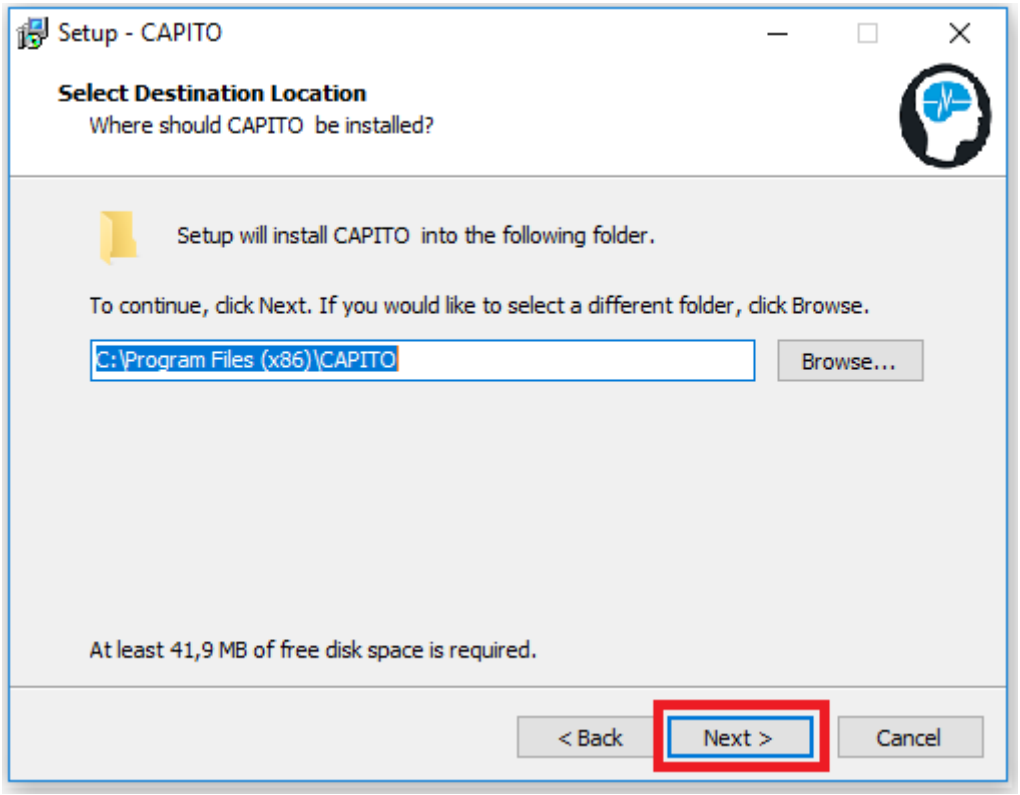


8. Select the folder in which CAPITO should be installed or click “Next“. Consider the needed space for saving the program.



9. Click “Install”

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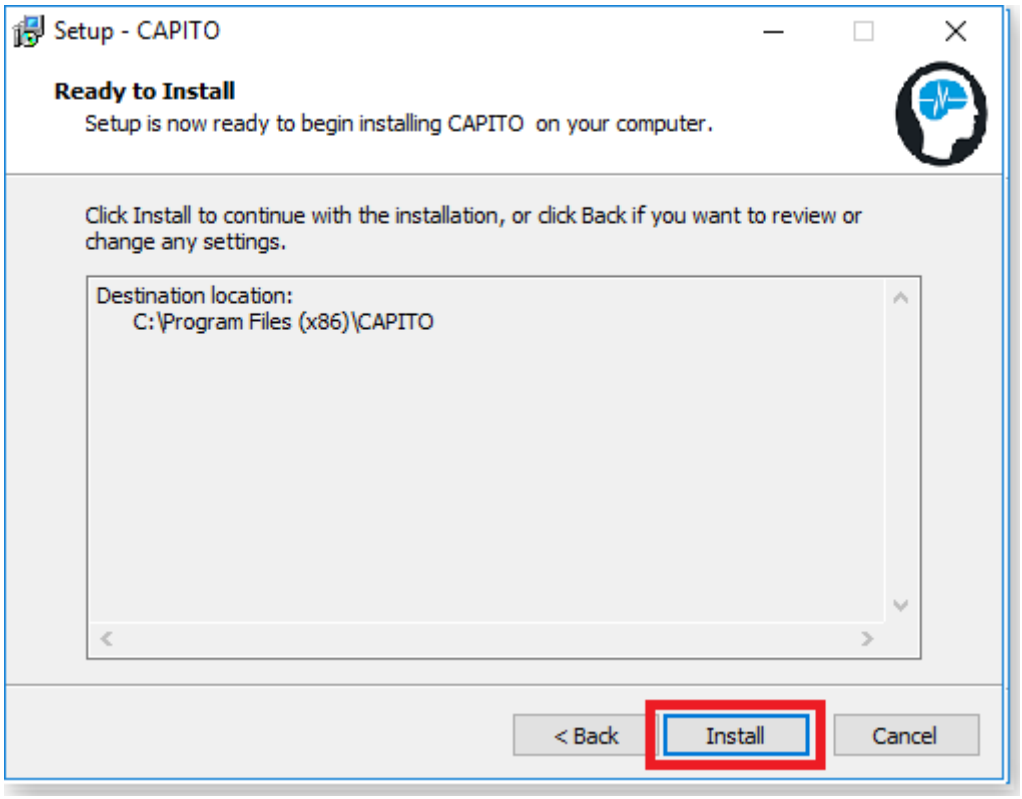
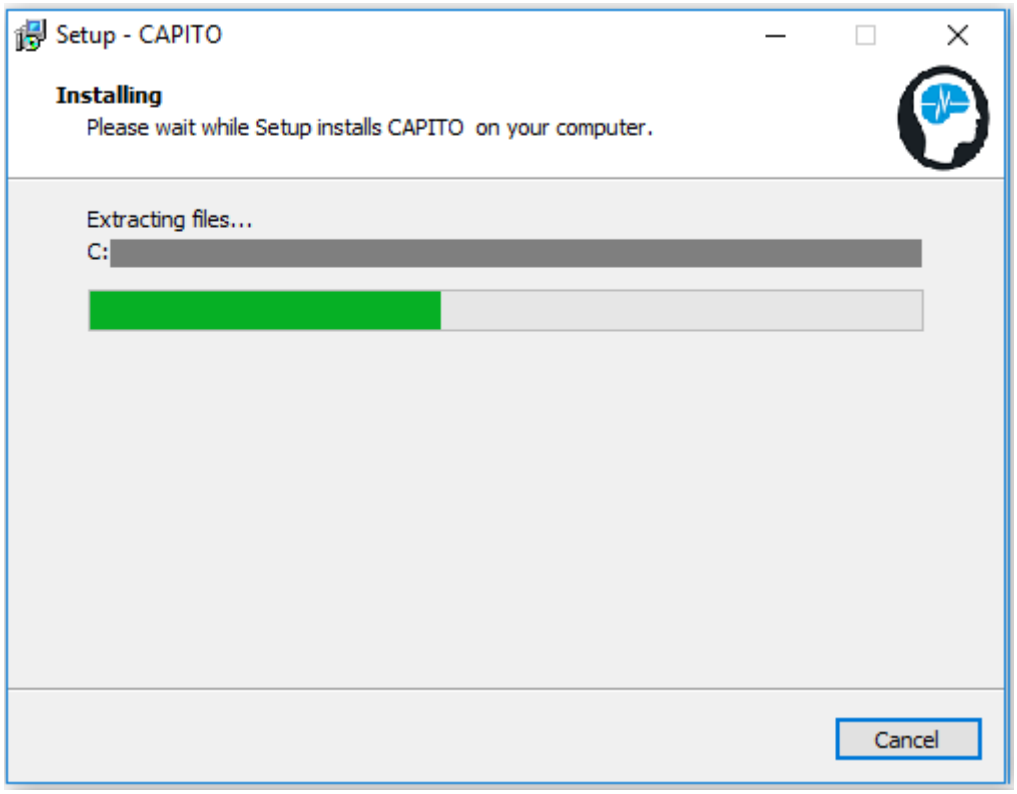


10. This will install the software.



11. As soon as the installation is finished the following screen shown. Click “Finish“ as displayed in the next image:

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12. The installation is completed, and the CAPITO-software immediately launched. It is launched because the control box “launch CAPITO” is activated standardly. If you do not want the software to launch when clicking “Finish” you have to untick the box “launch CAPITO”.

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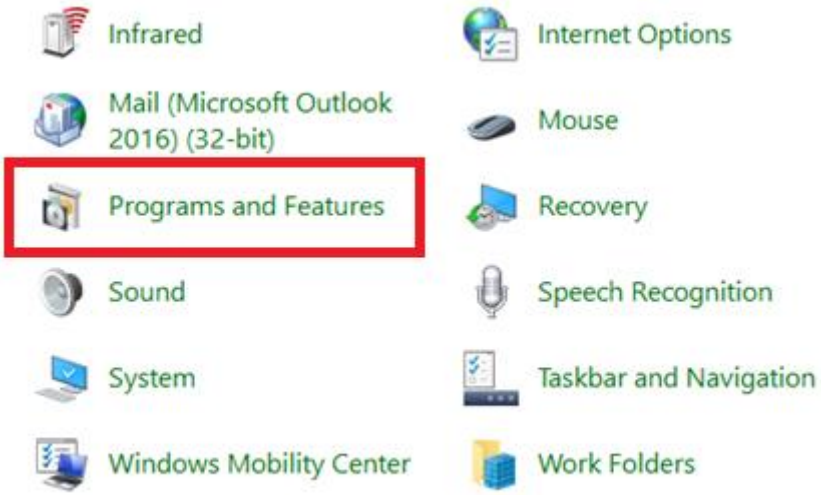
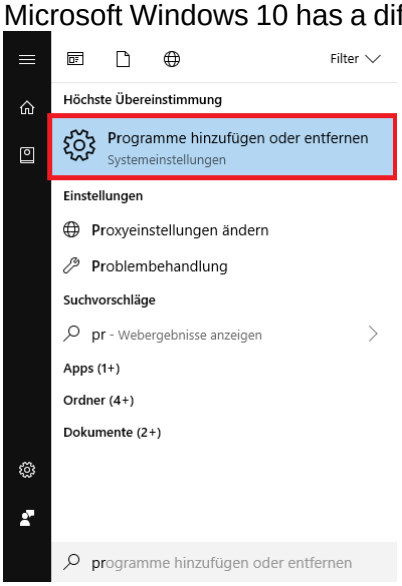
2.3 Uninstall CAPITO

Follow these steps for uninstalling CAPITO:

1. Launch Control Panel.
2. Search “Programs and Features” and click it as shown in the image below:



3. Microsoft Windows 10 has a different layout. There, the following options are deposited.
4. 

5. Right-click CAPITO and select “Uninstall“ (see image below):

6. A warning message will be shown. Click "Yes," and the software will be uninstalled.

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3 The Main Menu

If you launch the software, the first thing you will see is the main menu. It enables handling the software, configures necessary settings, calls up help, etc.

The following screen is shown when launching the software:

This is the main menu. You can create and view clients´ data, change settings and consult statistics.

“Change client´s data”: By clicking this symbol, you can view and change client´s data of the currently used profile.

“Add new clients”: You can create a new profile for clients here.

“Settings for Sessions and Sections”: Test sessions and Test-Sections can be changed and created.

“Settings Global”: Technical settings like Dual Screen and language can be configured here.

“Statistics and Results”: Here, test results can be inspected.

“Software Manual and Help”: By clicking this symbol you are linked in the documentation.

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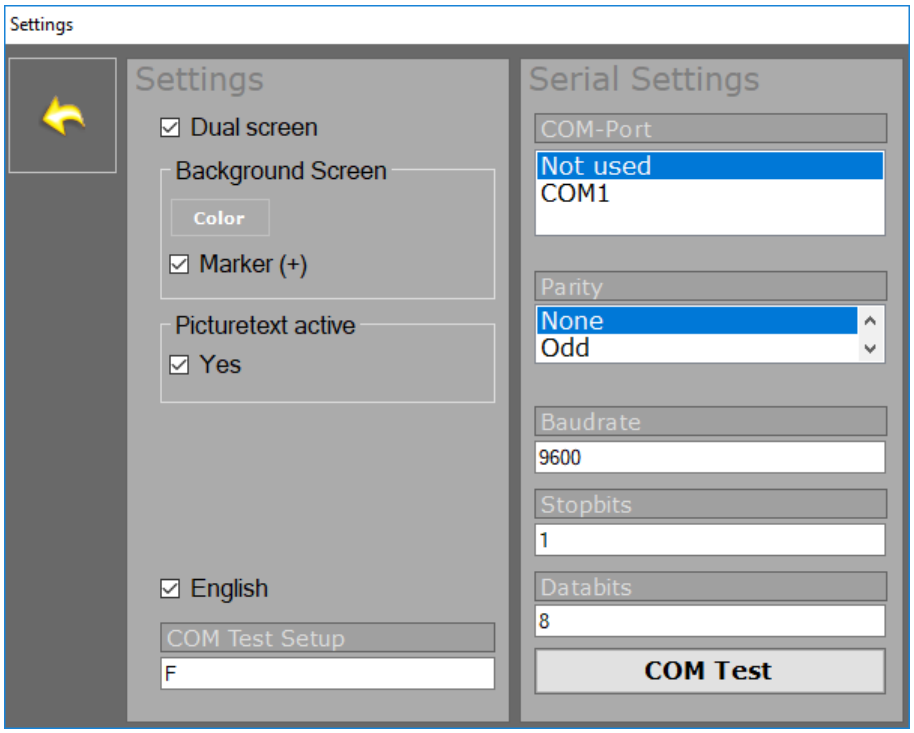
4 Global Settings

Before moving on and understanding how the software works, global settings need to be configured for you being able to use the software ideally.

Follow these steps for configuring global settings:

1. Launch the software.
2. Click **Settings Global** ( ):

3. The Preference Windows appears.



Use this Pop up for configuring the global settings.

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4.1 Settings

Some of the available options are selected by default. You can change the setting as you wish, however. Use this section to configure the following settings:

- **Dual Screen**: Tick this control box to activate the dual screen.
- **Background Screen**: Here, you can change the color setup for your background screen. You can also adjust the marker (+).
- **Text card-Setup**: Tick the control boxes “Text on” and “Image on“ to activate the text and image features.

4.2 Serial Settings

In this section you can configure the following settings:

- **Com-Port**: Select COM-Port.
- **Parity**: Select a figure from the Dropdown-field.
- **Baud rate**: Put in a baud rate figure or move on with the standard value.
- **Stop bits**: Put in the stop bit figure or move on with the standard value.
- **Data bits**: Put in a data bits figure or move on with the standard figure.
- **COM Test Setup**: Put in a figure.
- **COM-Test**: Click this to test COM.

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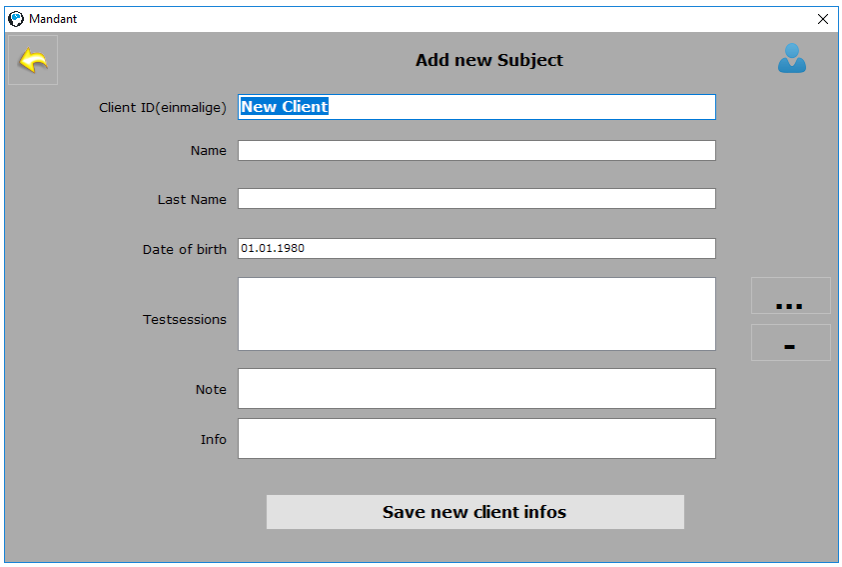
5 Clients

If you create a new client, you can select the test session(s) to test your client´s reaction. Depending on the requests you can create many clients and select the required sessions for each one of them.

Follow these steps for configuring global settings:

1. Launch the Software.
2. Click **Add new clients** ( ) in the main menu :

The client screen appears as displayed:



5.1 New Client

Follow the steps above on the screen "Client":

- Put in a Client ID into the array for Client ID. We recommend giving the client a distinct name/ID so that he/she can be recognized more easily later on. The ID can be an abbreviation or a number. It is used to identify the client quickly.
- Put in the client´s name into the array Name.

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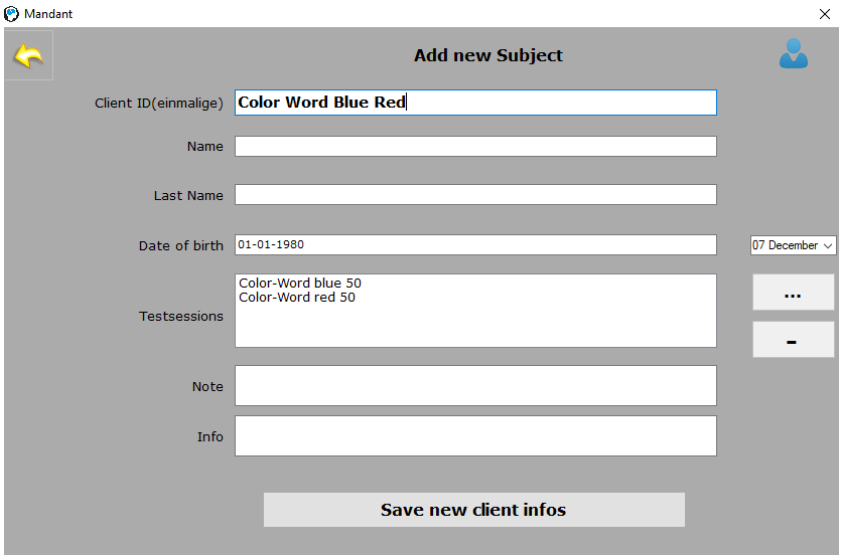
- Put in the client´s last name into the field the Last Name.
- Put in the client´s date of birth into the field Date of Birth.
- Click ... to get to the test sessions. Depending on requires you can select multiple sessions. The selected sessions are shown in the field of Test sessions.
- Click the - button for removing selected test sessions.
- Add additional notes on the client to the field Note.
- Add information on the client and the session in the field Info so that you can recognize the client and the related details more easily later on.

If all necessary arrays are filled in click the button "Save new client info" as displayed in the image below:



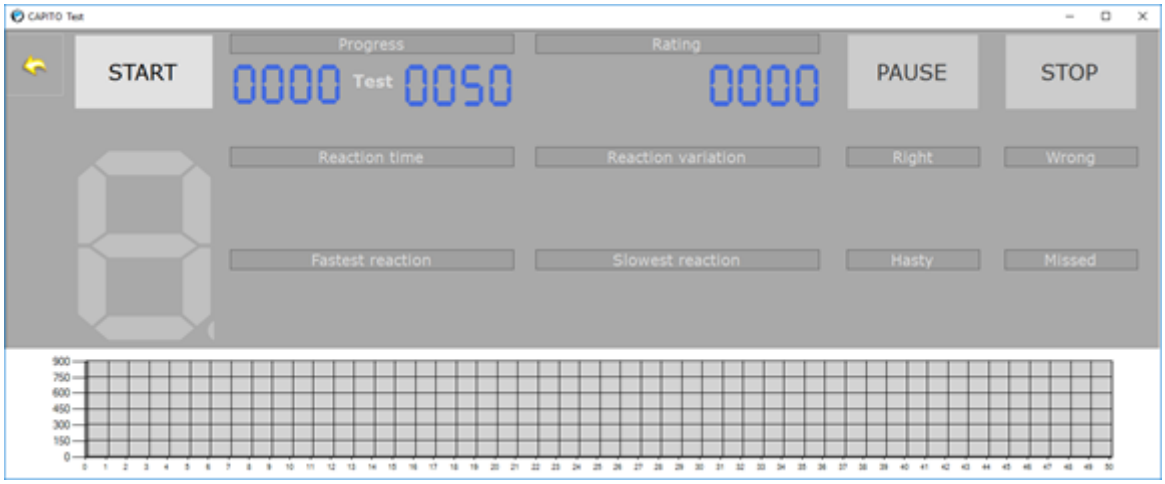
6 Test process

After creating a new subject you can see how a test is implemented.

Follow these steps to launch the test:

1. Launch the software.
2. Select a client in "client" in the Dropdown-list (a client, you created in the section "Add new client ").
3. Select a session in the Dropdown-list “session”.
4. Click the button “Start test” as shown below.

5. After this, the test screen appears:



In the test screen you can see the following elements:

- **Button "Start"**: Click this to start the test.
- **Button "Pause"**: Click this to pause the test.
- **Button "Stopp"**: Click this to stop the test.
- **Progress**: Contains information on the test progress.
- **Rating**: Shows the test rating.
- **Reaction time**: Shows the client´s reaction time.
- **Reaction variation**: Shows the variation time.
- **Right**: Shows the number of right actions.

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- **Wrong**: Shows the number of not correct actions.
- **Fastest Reaction**: Shows the quickest reaction time.
- **Slowest Reaction**: Shows the slowest reaction time.
- **Hasty**: Shows the number of hasty reactions, means that a response occurred when there was no stimulus presented.
- **Missed**: Shows the number of lost reactions.
- **Graphs**: During the test, the client´s responses are shown graphically at the bottom of the test screen. Also, usually a second screen opens for the client. There are appearing visual stimuli like target stimuli and non-target stimuli. Other settings (e.g., Dual Screen) can be seen in the menu “Global Settings."

Please note:

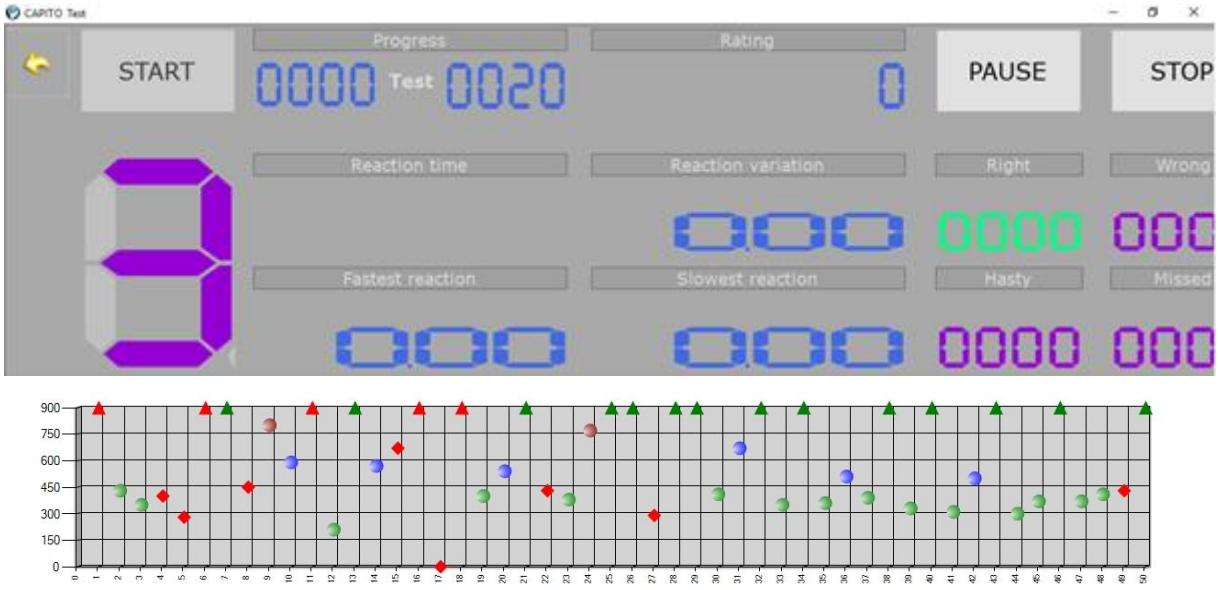
Right before the test, there is a countdown, In the test field, there will be shown a short explanation for the test terms.

Before you start the test, you can use the countdown-time for explaining the test session to the client – or for mental and emotional preparation.

A session is a sequence of individual examinations, so-called sections. The program saves sessions as concluded units that can be shown in the evaluation and statistic screen.

The client´s responses are executed by pressing space on the keyboard or an external "Push Button" (available through Neurofeedback-Partner GmbH).

If the client reacts to the session, the software draws the actions in the sections described above. Furthermore, a diagram of the action is depicted in the part Graphs as seen below:



As soon as the test is over, you are asked (in a dialogue array) whether or not you want to save the session details.

6. Click the button “Yes” to save the session details (see image below):

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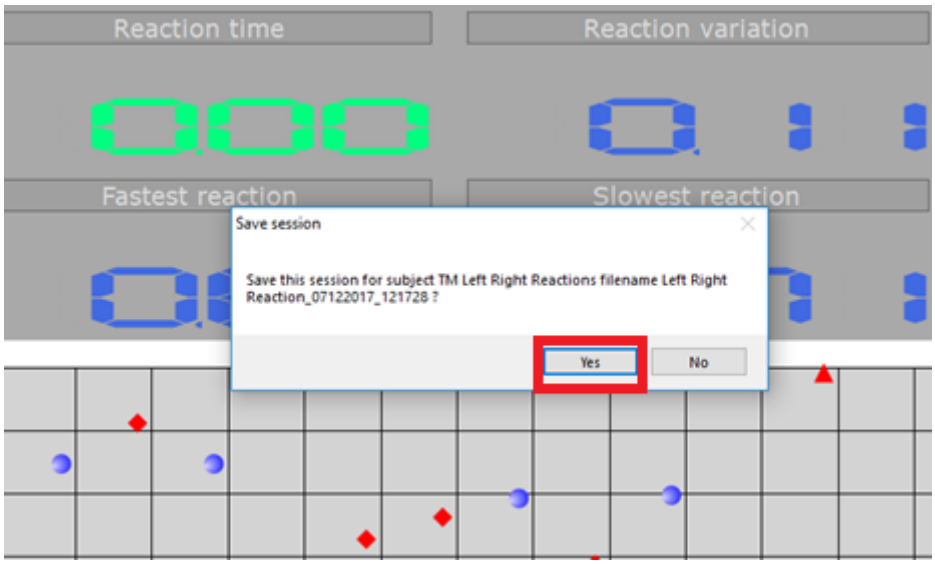
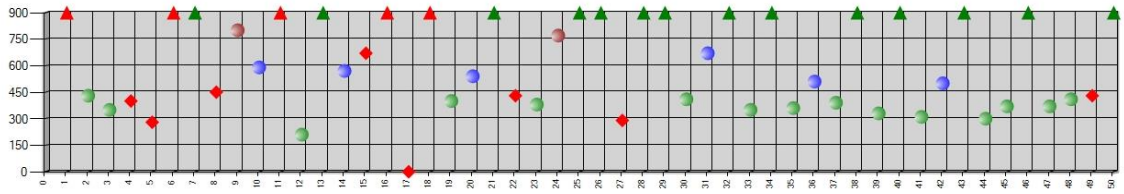


6.1 Reaction times, experiment and assessment aspect

During the test, the client´s responses are charted in the screen´s bottom as shown in the following image:



You can see that the picture has multiple different symbols. Every symbol has a particular meaning.

The colors point out general information on the reaction time. Therefore, the scale is divided in the middle, and a green point marks the faster reaction/response times whereas slower responses are shown as a blue or red dot.

Please take into account that these tests do not show normative date.

Correct Responses to a target stimulus:

The proper response to a target stimulus

A proper response to a tar

get stimulus (reaction time slower than half of the total amount of available reaction times)

Indicates appropriate response to a target stimulus (response time at the end of the total amount of available reaction times)

Indicates the proper behavior to a non-target stimulus (stimulus on which a reaction must not follow was left out; showing the ability of inhibitory control)

No reaction to a target stimulus (response was too slow or missed stimulus); error type: error of omission (Omission-Error)

Indicates a noncorrect response to non-target stimulus (reaction executed hasty, i.e. reaction, without a stimulus was presented);

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If the red rhombus appears on the bottom line of the evaluation table there are several possibilities of interpreting:

- The reaction was executed in a moment without an existent stimulus (possible immaturity of the nervous system, damaged cells, development disorders, non-compliant behavior, etc.)
- The response matched a target stimulus but the given time for the task was too short and the stimulus-response occurred in the following stimulus but belonged actually to the stimulus preceding the current stimulus. In this case, you might need to check whether you increase the maximum duration of the trial.

For a first evaluation, there are shown counters for the single reactions in the right screen area.

Additional information about the best and the worst reaction time and the fluctuation range can are shown. A number made up of all reactions is calculated in order to compare the results. For every test card, the maximal score is 10 000.

Hence, in a test session with 10 pictures (trials) a maximal assessment score of 10 * 10 000, so 100 000, can be achieved.

points = 10 000 – reaction time in ms

points = 10 000 – reaction time in ms

points = 10 000 – reaction time in ms

points = 10 000

minus-points = – 10 000

minus-points = – 10 000

Please note:

The level of difficulty is determined by the maximal reaction time. Therefore, only sessions with the same maximal reaction time should be compared with each other directly.

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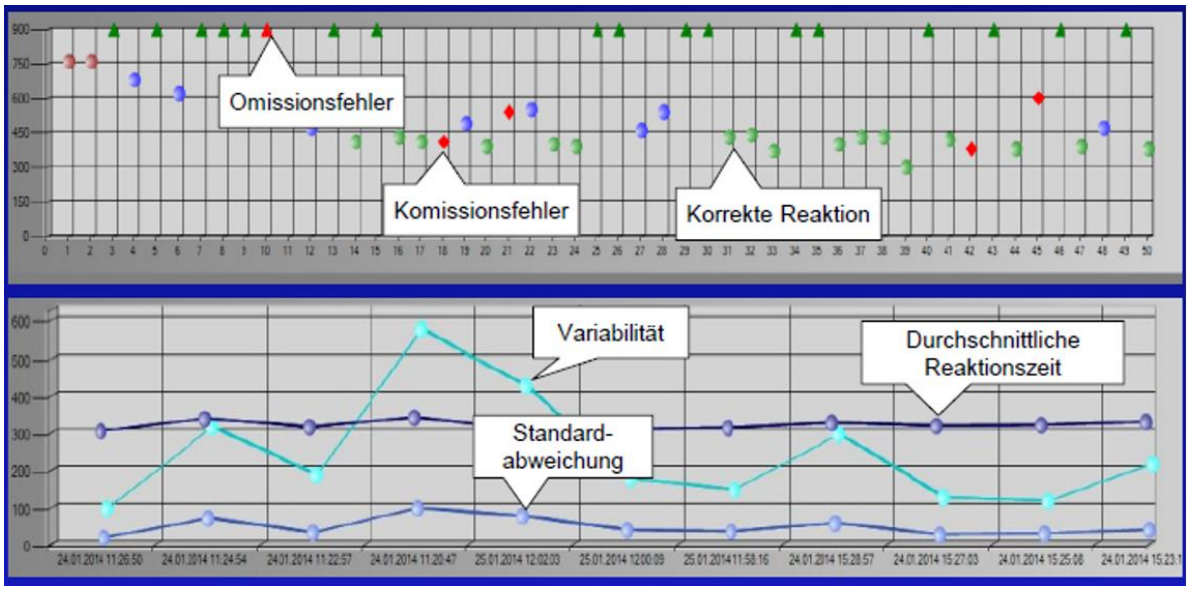

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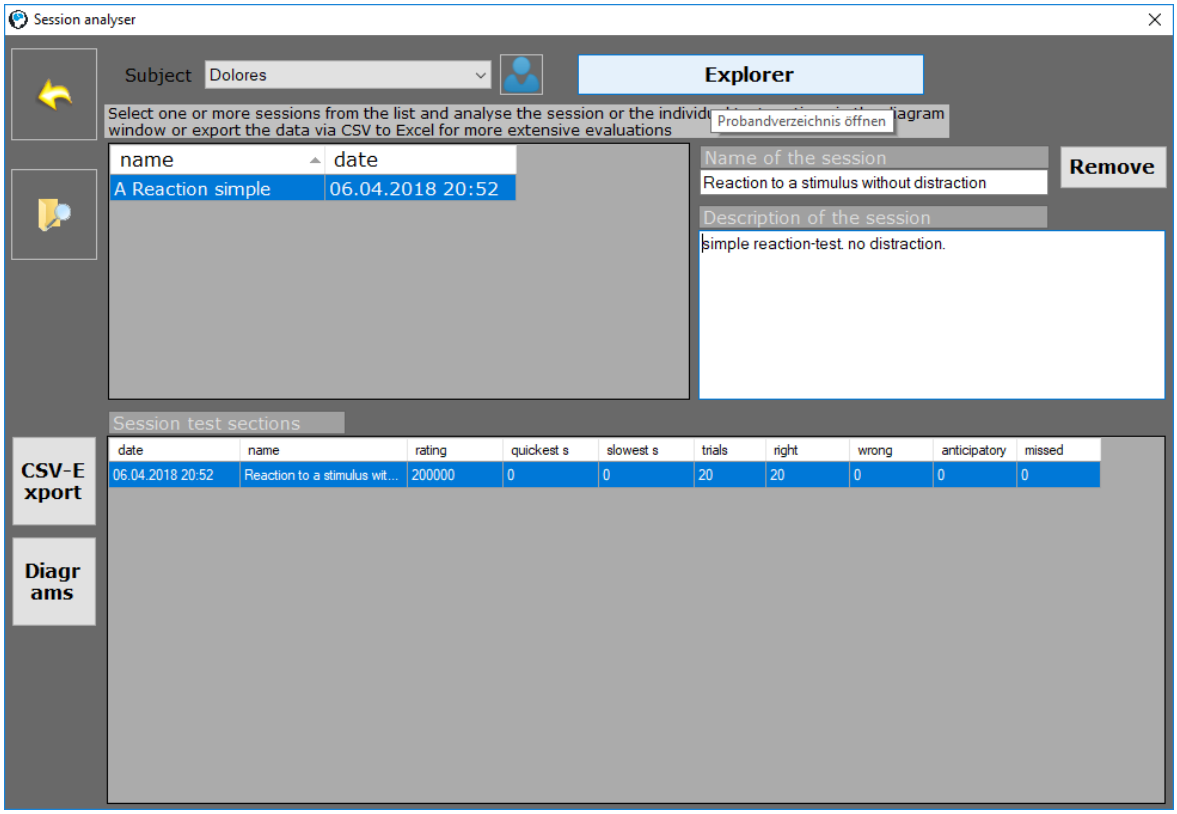
7 Evaluation

Follow these steps to evaluate the test scores:

1. Launch the software.
2. Click **Statistics and Results** ( ) in the main menu of CAPITO

You now get to the statistics and result screen.



You can look at the results of particular tests for the selected clients and if necessary save the results as Excel-File.

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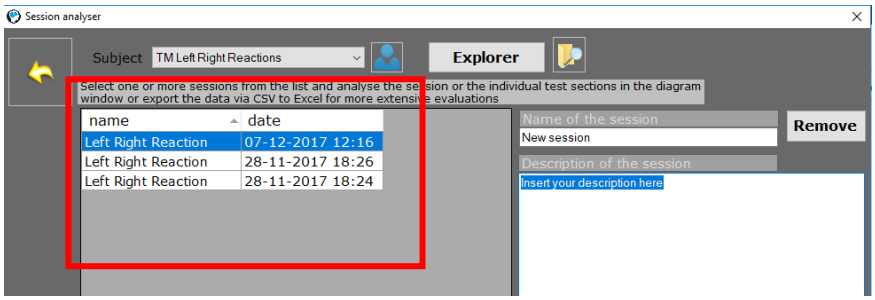
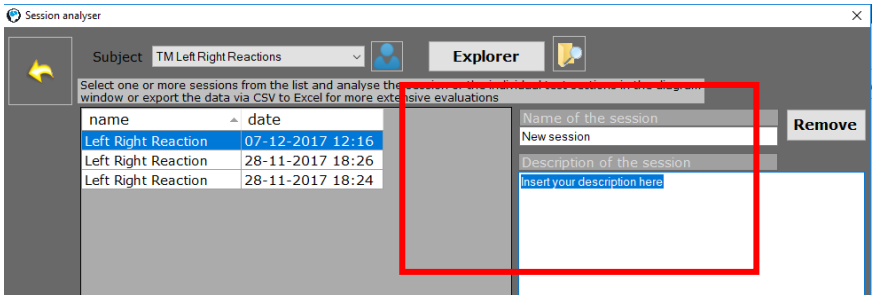
3. Select a client in the Dropdown-list. Depending on the selected client the associated details are indicated (see image below):



4. Select a session on the left side. The associated details will be shown on the right side as shown in the next picture:

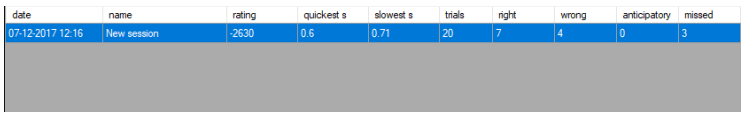


Please note:

To select more than one session click and pull with the mouse or click a setting, press the (CTRL-key (CTRL) and click to show more sessions.

Click the button "Remove" if you want to remove the selected session from the list.

5. Tick the control box “List/Export single test sections with results“ if you want to evaluate the results for different sections. If you tick this box, the result for different sessions will be shown (see below):



This button takes you back to the main menu.

This button enables opening a new tab in the Explorer. Here, you have direct access to saved client files.

This button enables exporting the selected session as Excel-File into the file „Export“ into the client´s file.

This button opens a new tab in which the selected session is depicted as a diagram. More information about this can be found in the subtopic “Show evaluations as diagrams“.

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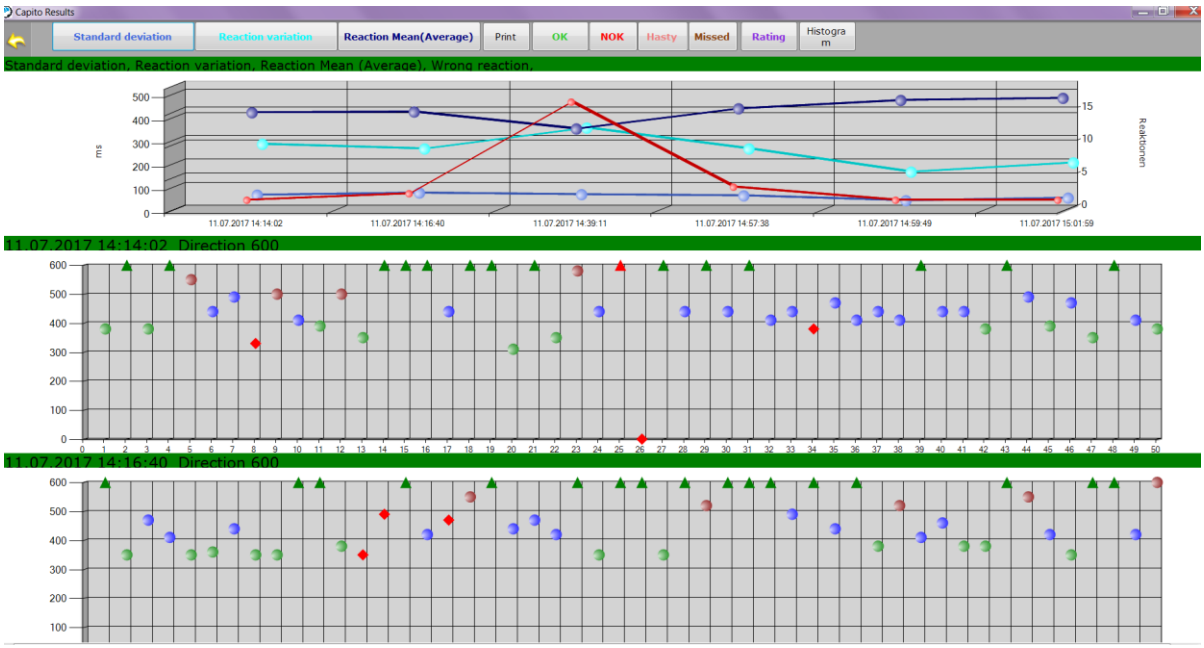
7.1 Show evaluations as diagrams

Select one or more test sessions in the statistics and results tab.

Click “Diagrams“

.

A new tab opens in which the particular results are presented as diagrams.



The aspects of the selected session can be consulted as diagrams.

Additional information is shown when you move your mouse along the data aspects.

In the lower tab, there are shown all reactions of the particular tests in the process. More information can be found in the subtopic "Tests – Times and Evaluation Points".

Click one of the buttons on the upper screen to show the individual statistic.

7.2 Meaning of the evaluation criteria

- **Standard Deviation**: Measurement for the distance between the fastest and slowest reaction (figure should be as small as possible; the lower the better performance of the client. Means there is a constant performance, but check for overall response time as well. The mean of response times is not very helpful to measure functional performance when there is a high standard deviation.
- **Fluctuation Rate**: Measurement for the fluctuation of reaction times (smaller figures prove steady performance, similar to standard deviation.
- **Average**: Average reaction time
- **OK**: Number of correct reactions on target stimuli.
- **NOK**: Number of incorrect reactions on aim stimulus (Commission-Errors)
- **Hasty**: Amount of hasty responses to a non-existent stimulus
- **Missed**: Amount of lost stimuli (Omission-Errors)
- **Assessment**: Total score (for multiple sessions)

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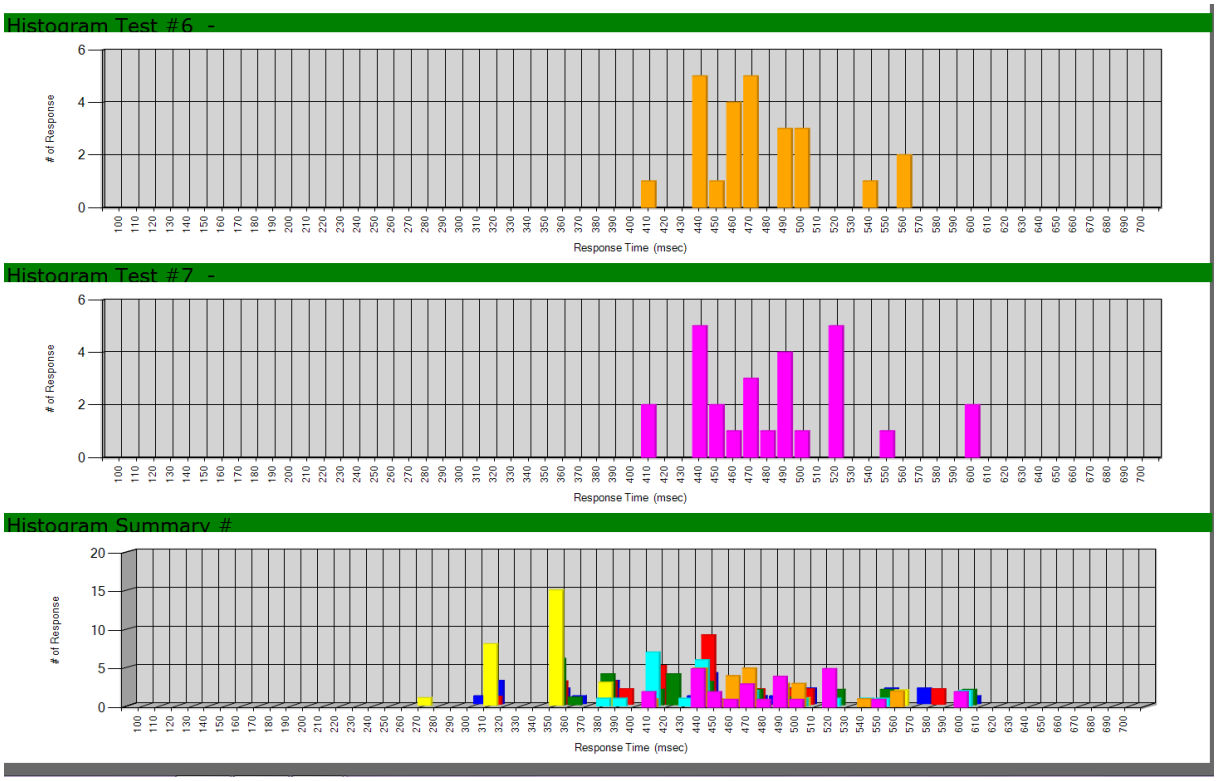
Pressing a key adds a graph or removes it to give you a better overview.

The key „Print“ creates a report in MS-Word which contains the selected parameters. You can adapt this report with your own letterhead and logo. You can print it then and hand it over to your client or add it to your medical report.



7.3 Bar graphs

Bar graphs show the distribution of reaction times and therefore the medians concerning the targeted reactions towards the target stimulus. The height of the bars displays how often the client has achieved a particular reaction time. Both upper ones cover single evaluations. The lowest graph shows all the assessments put on top of each other. You see the process and can estimate how the figures for the reaction times have changed over time in total.

A favorable process shows:

- Only a very few outliers, either to the left (very fast) or to the right (very slow). The reaction times agglomerate somewhat in the center.

Standard figures:

Reaction times for most tests with only one target stimulus:

- The fastest reactions are probably agglomerated around 150 ms. Faster reaction times are only rarely seen. 100 ms should rather be interpreted as crucial random key pressing.
- Reaction times with a target stimulus (or multiple target stimuli and non-target stimuli)
- Usually, healthy individuals rarely have faster response times than 400 - 450 ms on average. Cognitive high performing clients have times of 250 ms, but there is a tradeoff with errors.

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Effects of practice:

- Practicing a test has the effect of achieving a plateau level from which further improvement (especially seen at the beginning) does not happen. Here comes the interesting part: Interventions like neurofeedback, meditation and different methods of brain stimulation (tDCS, Vielight, Microtesla, TMS etc.) can, however, lead to a distinct increase of cognitive efficiency which is measurable with CAPITO.

Implementation suggestion:

- CAPITO offers many possibilities with different tests. The Institute for EEG-neurofeedback, for example, gives webinars on these subjects.

Basically:

- Please keep up with one test and do not vary too much if possible. For the beginning, direction tests with the arrows (React if the yellow arrow shows to the right) are a good opportunity to start. The color-word-exercises are suitable to evaluate particularly the frontal lobe´s inhibitory control abilities. This should result in increased response time.
- For clients with substantial cognitive impairments you should not use Choice-reaction-time tests as they would just create frustration and might have a negative impact on emotion and self-esteem. So please use those exercises with only one stimulus and longer trial duration.

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8 Create and change test sessions

With CAPITO you can arrange tests and sessions and change single parameters (e.g. reaction times and amount of trials) as needed.

8.1 Creating of own test sessions

Click “Settings for Sessions and Sections“ in the main menu.

You now get to the test section and session manager.

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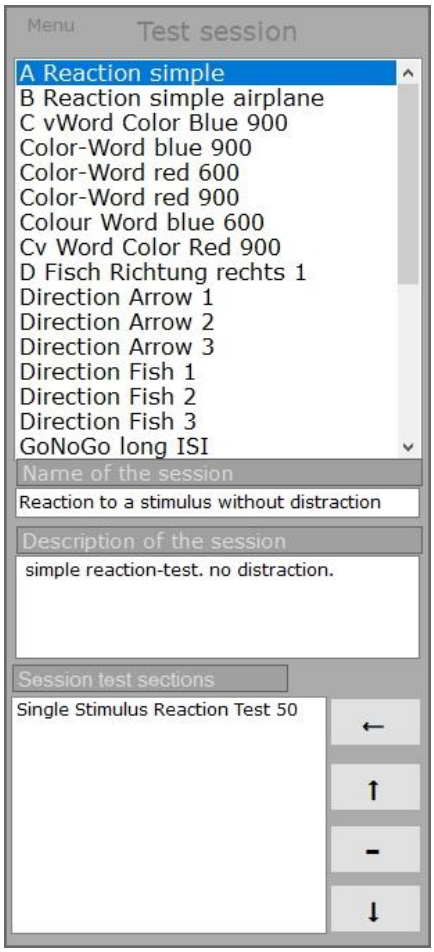
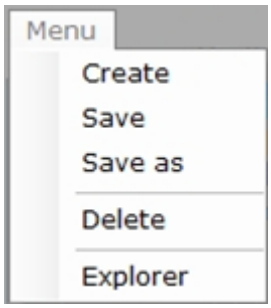


In the left column, there is a list of all available test sessions.

Click „Menu“ to open a Top-Down-Menu.



This dialogue window enables creating, saving and deleting new sessions as well as showing them in an extern Explorer tab.

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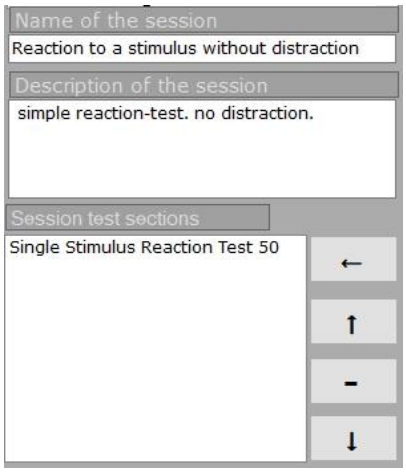

In the session list, there is a short description of the particular selected test session. In “Session test sections” there are listed all session related tests. The arrow buttons on the right enable moving and deleting them. Adding more tests is possible as well.

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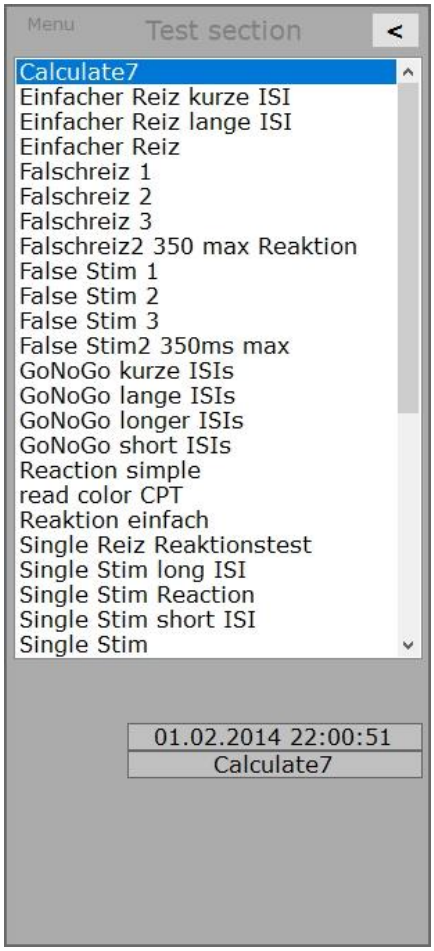
9 Create and change test sections

In the test section and session manager, there is a list of all available tests in the right column.

Here you can view a Top-Down-Menu on the top left to create, save or delete tests.



Click a random test section.

On the manager´s right side appears information on the selected test.

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You can change the name and description of the selected tests here. But also you can change the number of trials, the countdown until the test starts, the maximal reaction time, the interstimulus interval and the percentage of how often the target stimuli should appear. Please keep in mind that a small number makes inhibitory control more difficult.

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10 Test types

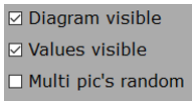
This function in CAPITO can be used if you want to do a stress test for example and want to measure the psychophysiological response in the EEG, the skin conductance, muscle tension (EMG) or heart rate.

10.1 A general function of the types image, sound and video

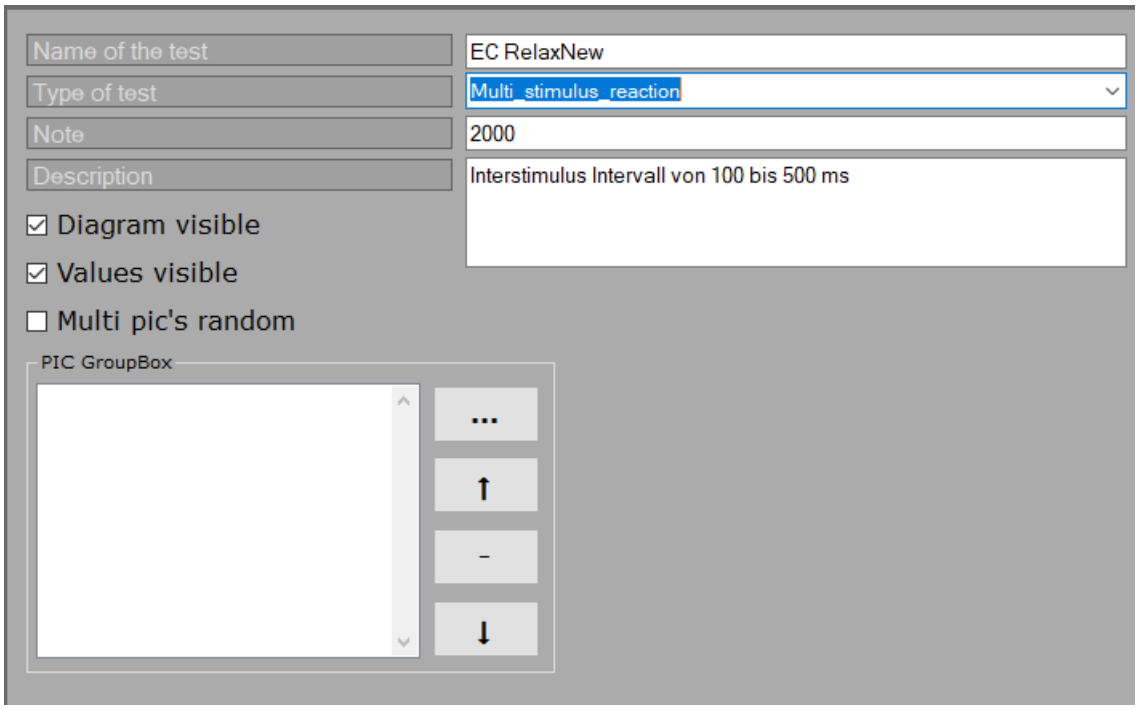
You can deposit which files should be presented. Moreover, their order can be changed and entries removed.

- The button ... enables the selection of files.
- The button ↑ enables the changing of order upwards.
- The button ↓ enables the changing of order downwards.
- The button - deletes the selected range from the list.

The option selection decides if a diagram and figures are displayed as well as if a list´s processing should be presented in order or randomly.



10.1.1 Images



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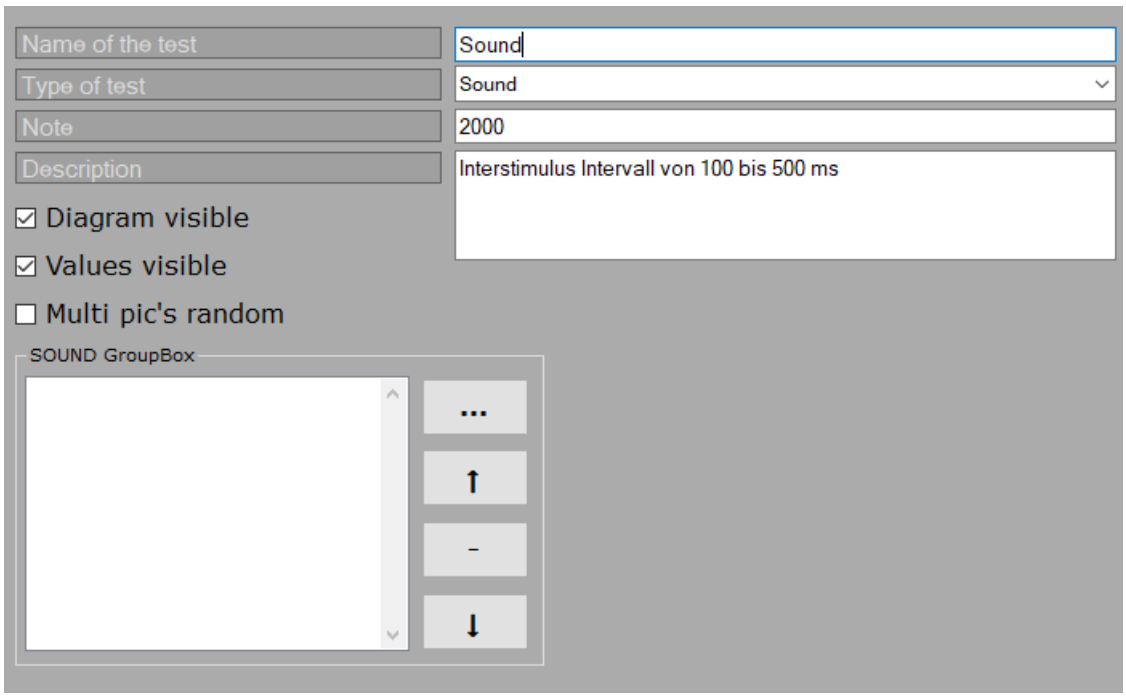
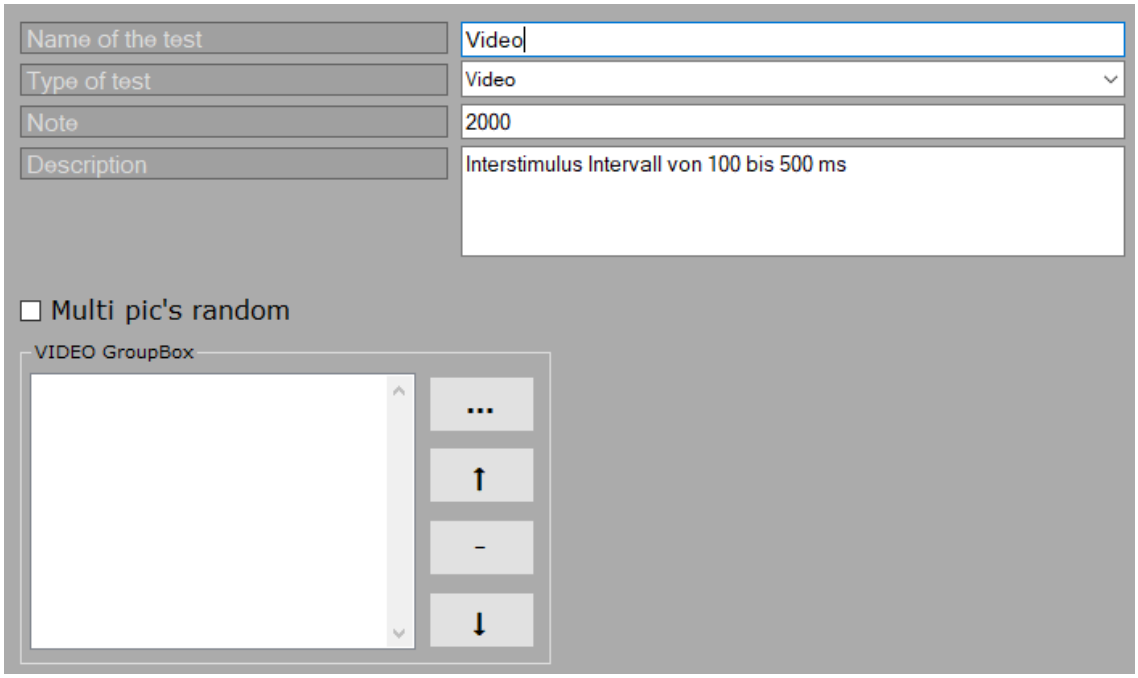
10.1.2 Sound



10.1.3 Video



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10.2 Text

This function enables presenting words and/or text phrases like shown in the work of Dr. Ron Bonnstetter/Thomas F. Collura for the assessment of Emotional Decision Making (Ipsative Testing)

Furthermore, their order can be changed and entries removed.

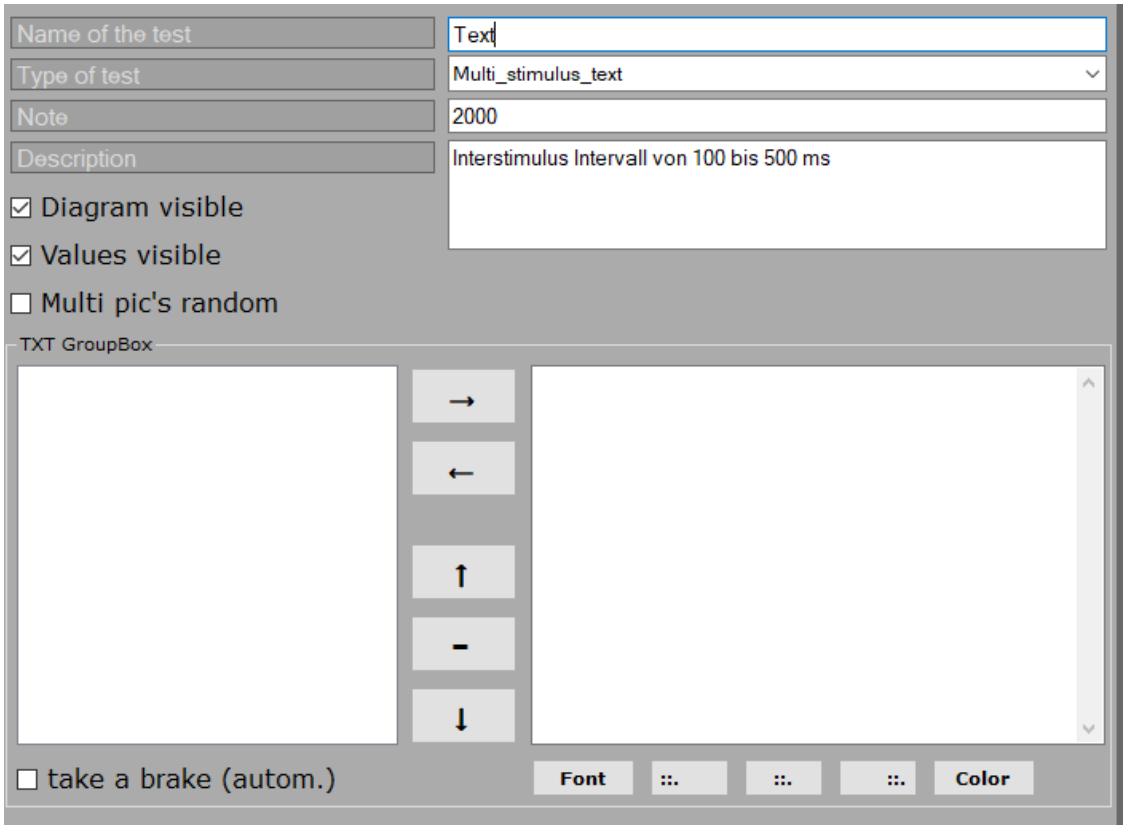
The basic structure is described in the following:

Left window: Existing texts, Process-selection-window.

Right window: Editing-Window for new contents.

An overwriting of existent entries is not possible in the CAPiTO Basic. There will always be created a new entry.

- The button → moves contents into the editing window.
- The button ← moves the Editing window´s content into the Process-selection-window.
- The button ↑ enables the changing of order upwards.
- The button ↓ enables the changing of order downwards.
- The button - deletes the selected range from the list.



As far as a break is desired after every text and/or word it can be introduced with the option ☐ take a brake (autom.). The client then has to approve the text

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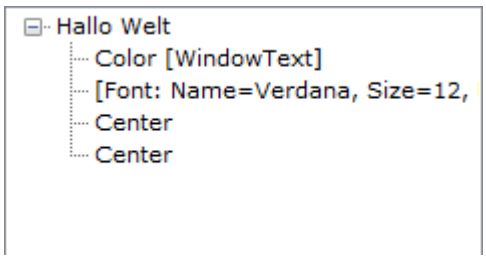
10.2.1 Presented in the process-selection-window

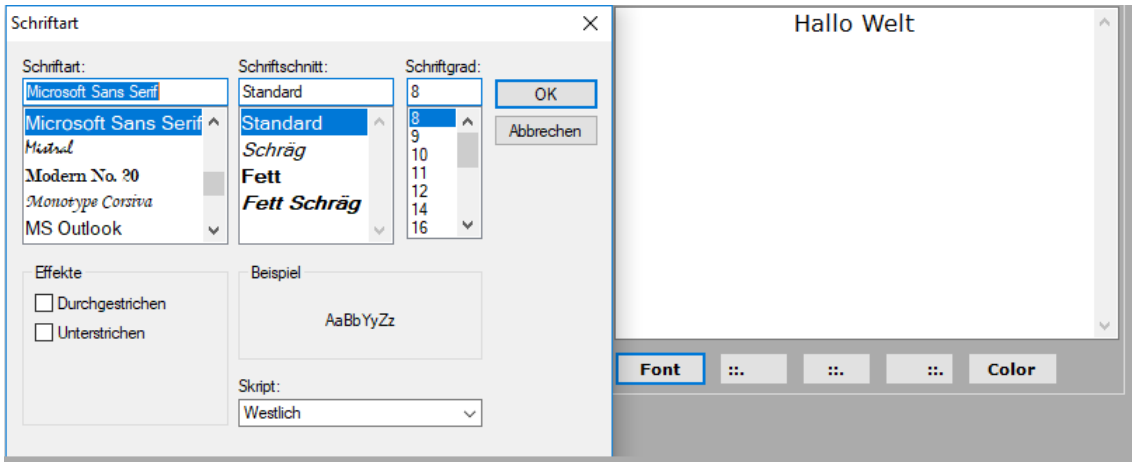
All text´s and/or word´s attributes are displayed as long as a mouse-clic k expands the selection. The deposited options which were selected in the Editing window make up the attributes´ basis.



The readout displays (besides text and/or word) the attributes color, font, and its size as well as the vertical and horizontal alignment. CAPITO Basic just enables adjusting the horizontal alignment.

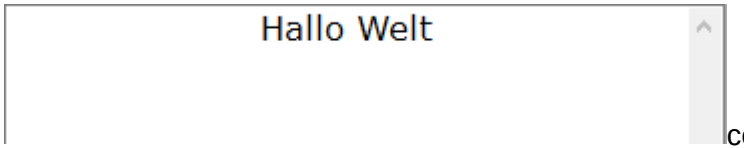
10.2.2 Use Editing-Window

- You can change the font by clicking Font.



- The alignment can be adjusted with the three options . the options are aligned left, center or right.

left aligned



center aligned

right aligned

- The text´s and/or word´s color can be adapted with Color .

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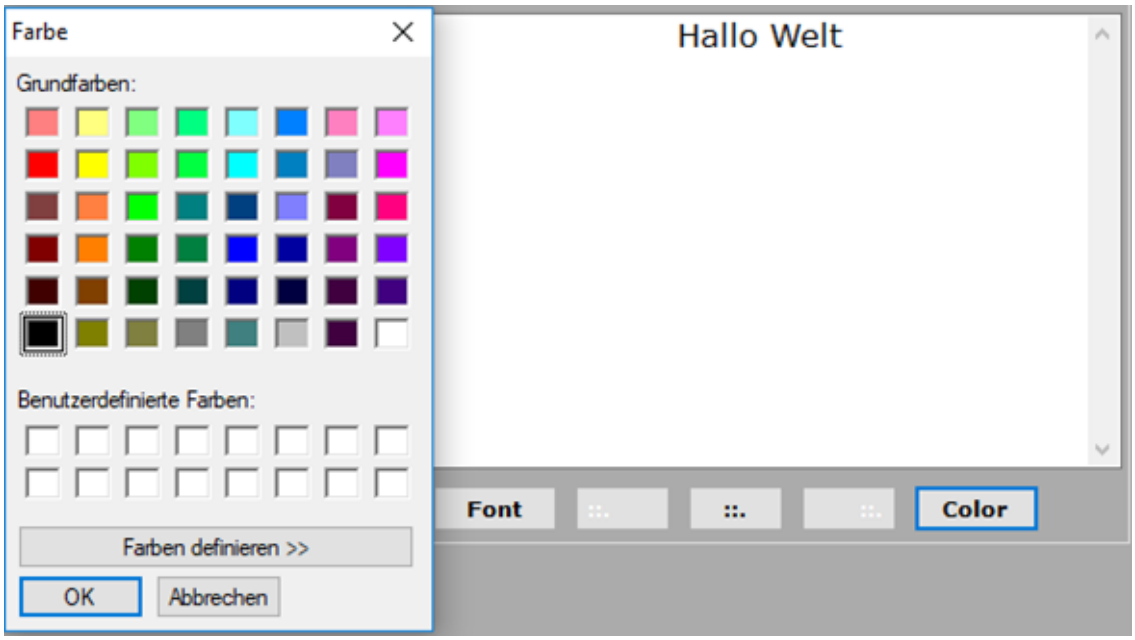
Farbe
Grundfarben:
Benutzerdefinierte Farben:
Farben definieren >>
OK
Abbrechen
Hallo Welt
Font
Color

11 Access to the evaluation report

Access to the evaluation report is in the upper part of the evaluation´s graphical processing.

Image 1: Access to the evaluation report

In this report, relevant information are displayed edited. They always refer to the selected client and the selected data.

11.1 Description

Every report has a distinct file name which is created by a time stamp.

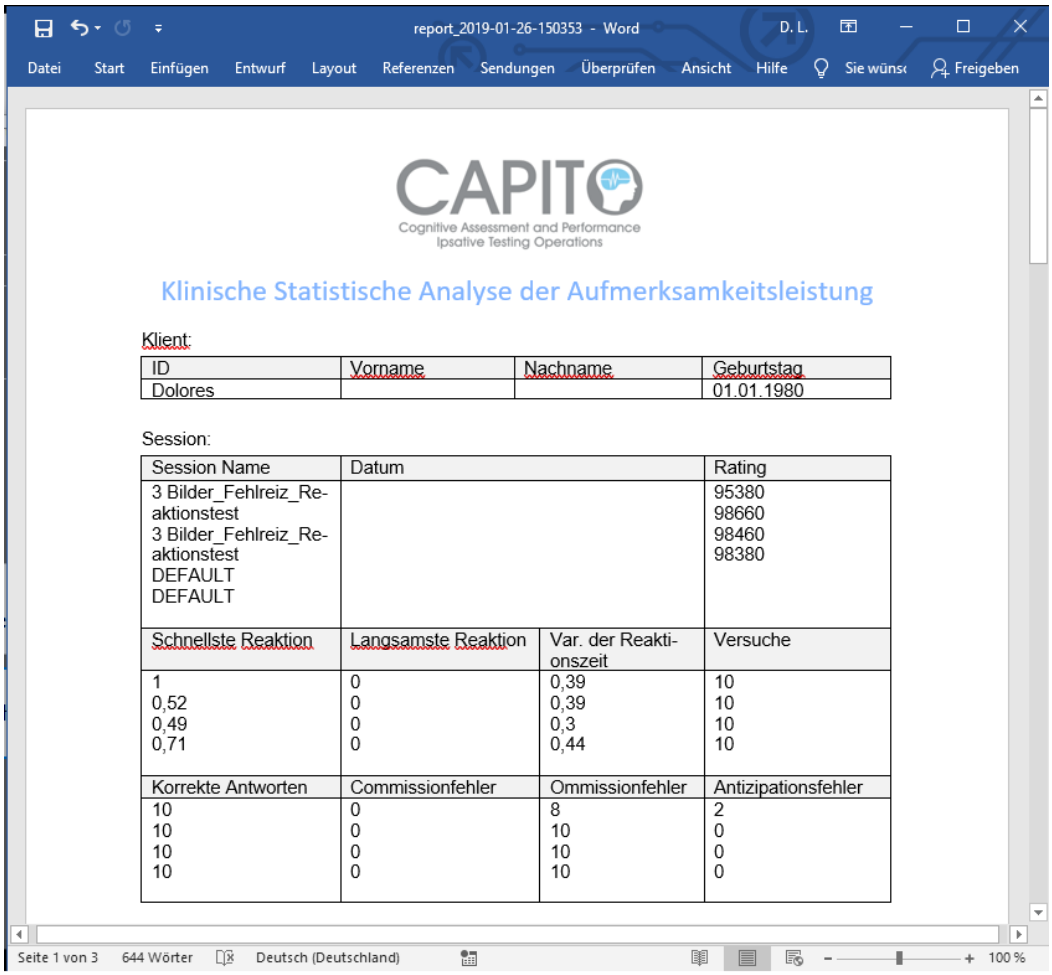

Image 2: Example of a report with sample data

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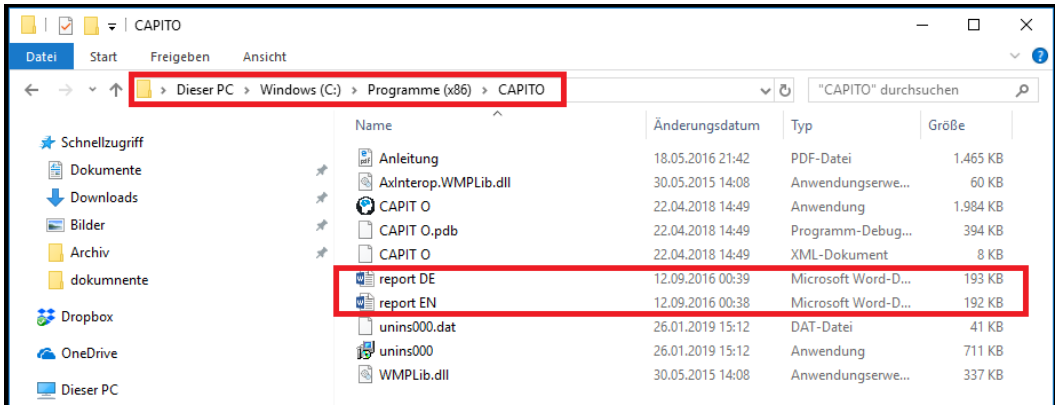
11.2 Adjusting templates

A report uses a model to build up the contents. These templates can be adjusted to the end user's requirements.

These files are stored in the installation file of CAPiTO. The data are provided in the versions DE and EN.

If the end-user uses only one language, it is sufficient only to adjust the respective suitable template.



Picture 3: Path to the templates

The templates are write-protected. Before changing something, the write-protection has to be removed. It is recommended to activate it after changing something.

The document uses bookmarks. If the layout should be adjusted the bookmarks need to be moved appropriately. These bookmarks are needed to transfer data from CAPITO into the document. If they are missing the data will not be displayed. Changes of the document (e.g. in the header or footer) can be implemented directly with the means of Microsoft WinWord.

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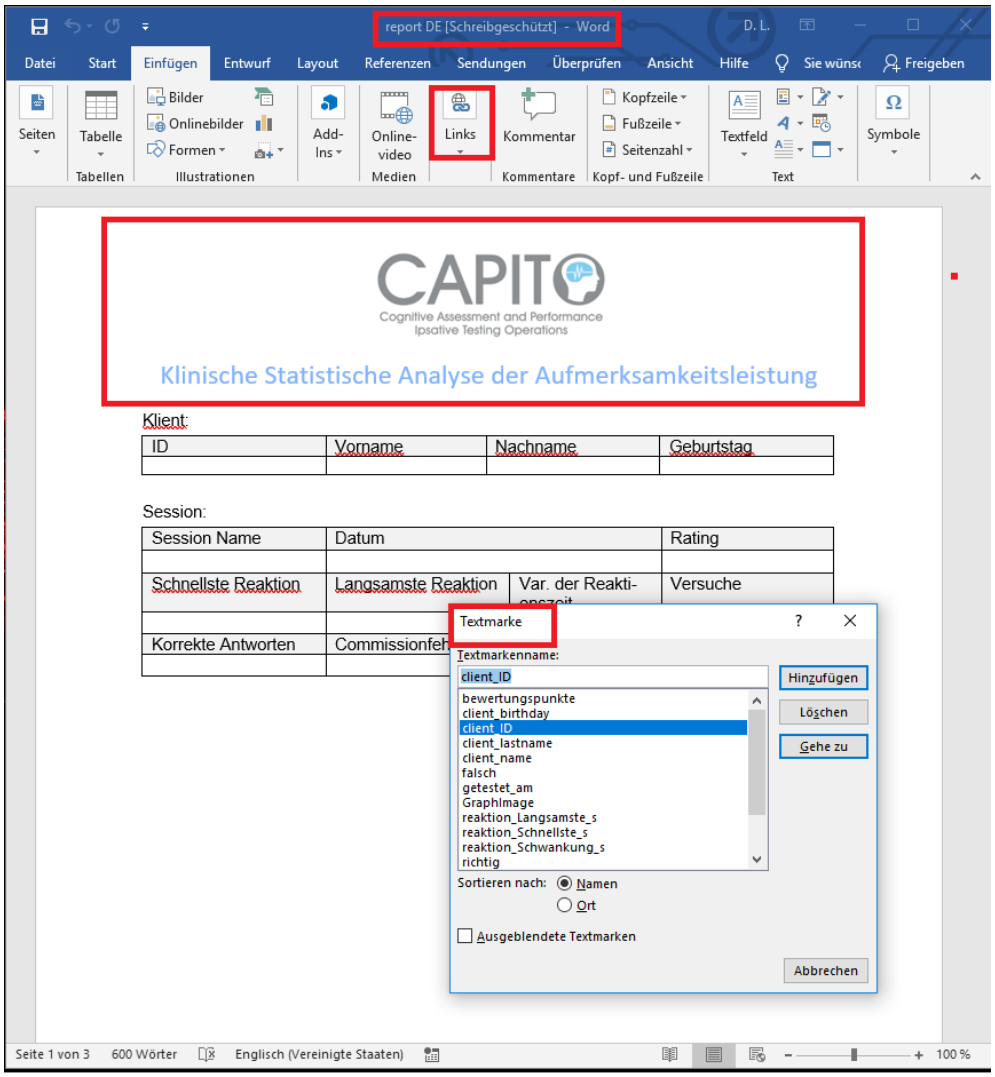

Image 4: Adjusting the template as an option; shown as an example

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12 Licensing

For licensing the program, you need a license code. You can purchase it on our website. The licensing takes place after the purchase.

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Other CAPITO Versions. Upgrades:

CAPITO EXPERT

- Event Related Potentials (ERPs including P300 P3a and P3b
- Post Processing the Data for evoked Imaging in BrainAvatar
- Test sections and session for visual and auditory stimuli

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13 Legal Information

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