VQone - User manual

Requirements

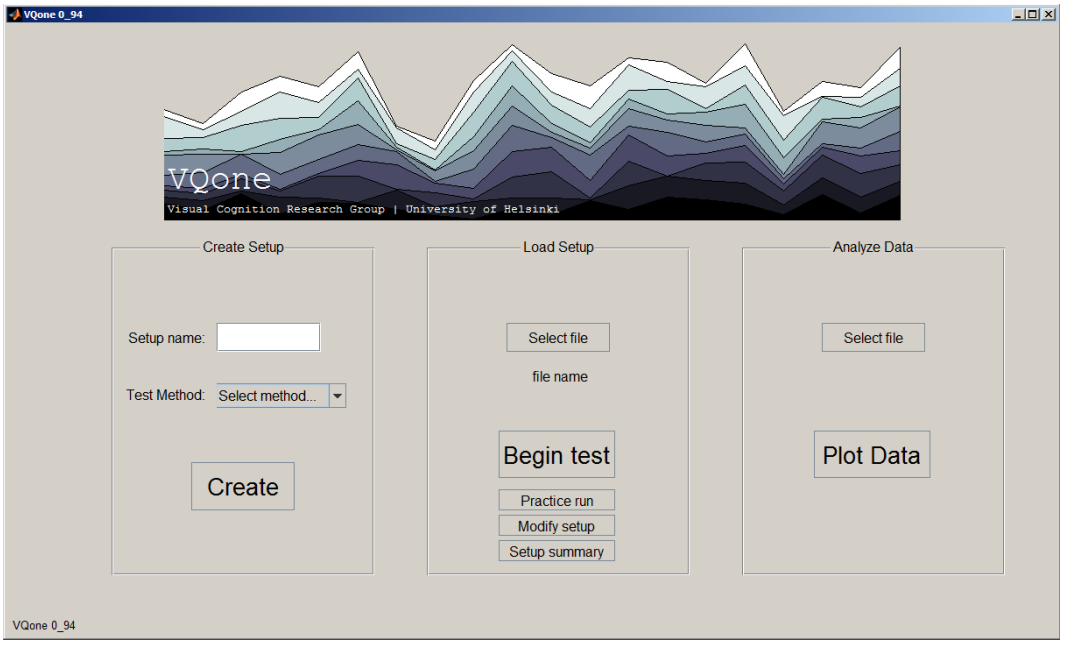
Before using VQone make sure the required programs are installed:

- MATLAB with Image Processing Toolbox
- Microsoft Excel
- Windows Media Player (for video experiments)
- codec packs for video and audio compression and the file formats

Start Menu

The program starts up with the MATLAB command ”VQone”, and launches into the main panel which can be seen below. From this main panel you can do the following things:

1. **Create a setup (Create Setup)**
   - Give the setup a unique name
   - Select the the test method on which the setup will be built
   - Create the setup (Create)
2. **Load an existing setup (Load Setup)**
   - Select the setup file (Select file)
   - Once selected, launch the setup (Begin test)
   - Launch the setup in practice mode (Practice run). Practice data is saved in its own file.
   - Edit the existing setup (Modify setup)
   - Check the summary of the test setup (Setup summary)
3. **Analyze evaluation data from an existing setup (Analyze Data)**
   - Select the setup file (Select file)
   - Plot the evaluation data (Plot Data)



Creating a setup

In the first selection the setup name and test method are defined. Enter the name of the setup into the ”Setup name” field. VQone enables you to create different kinds of test methods. Select the desired test method and click “Create”. The following standard test methods are available:

- ACR (Absolute Category Rating)
- Still PC (Pair Comparison for still images)

- Still triplet (Triplet Comparisons for still images)
- Video ACR (Absolute Category Rating for videos)
- Video PC (Pair Comparison for videos)
- Video SSCQE (Single Stimulus Continuous Quality Evaluation for video)
- Questions only

Moreover, VQone enables to create new methods or modifed versions from these standard methods.

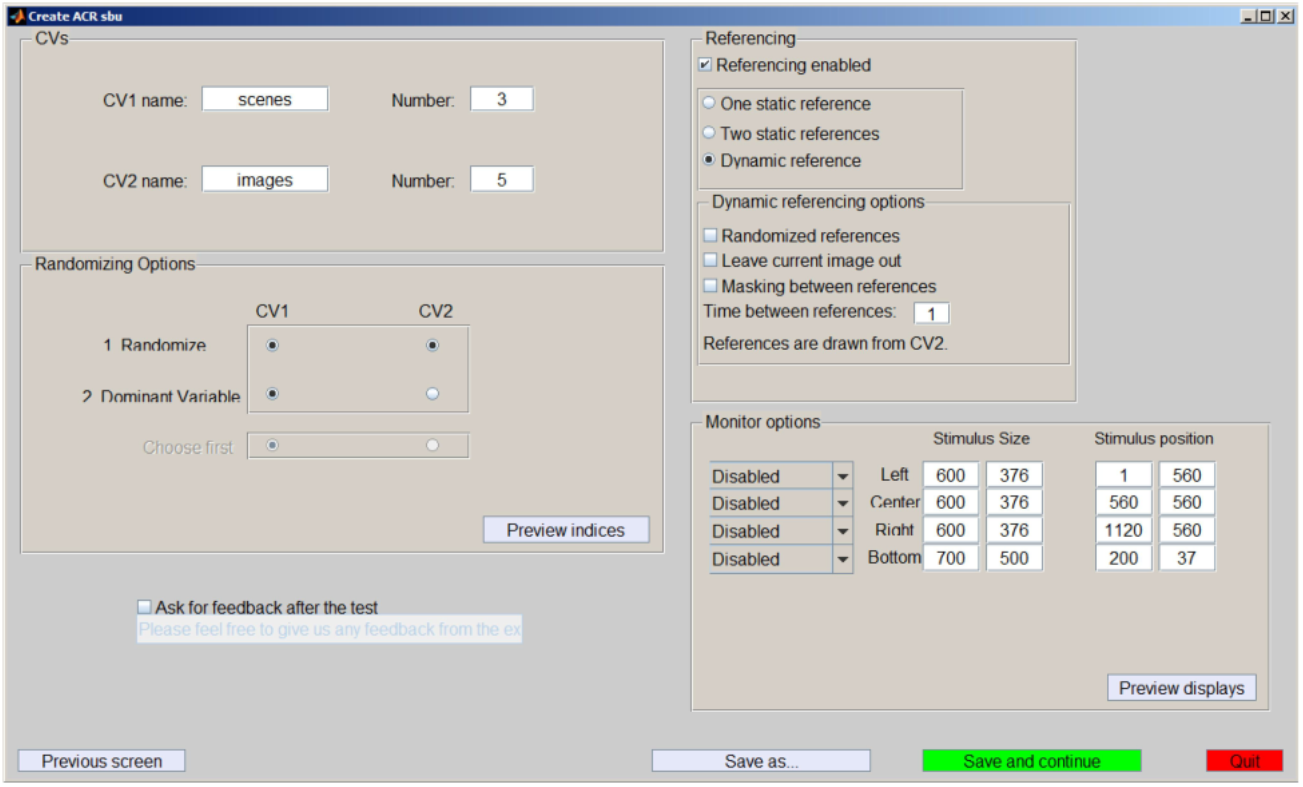
Experiment Builder Unit

When you have chosen the desired test method from the VQone main panel and clicked the “Create” button, the experiment builder panel appears. The content of this panel varies depending on the chosen test method (ACR, PC, triplet etc.). In the experiment builder panel you may determine factors such as the number of content variables CV1 (e.g. scenes) and CV2 (e.g. images), randomisation of the stimuli as well as reference stimuli options.

Moreover, the positions and sizes of the experiment windows can be set from the Monitor options subpanel. The VQone can show three images or videos at same time on three different experiment windows. These windows are named Left, Center and Right. In addition, the fourth window (Bottom) is reserved to show the response buttons or sliders. The fields of "Stimulus size" and "Stimulus position" determine the sizes and positions of experimental windows. By pressing the Preview displays button the positions and sizes of stimulus windows are shown and the experiment window options are easy to fine tune.

The creation of different kinds of test settings in the experiment builder panel is introduced later in this manual. Figure below shows an experiment builder panel if the still ACR test method is selected from the main panel.

If you would like to view the randomisation table created by the program, this is possible by choosing “Preview indices”.



Question Builder Unit (QBU)

The Question Builder Unit (QBU) panel is the final stage of the setup wizard and the tool used for generating the response method in the experiment. The interface of the QBU is the same regardless of the selected test method. When the desired options are selected from the Experiment Builder Unit the button "Save and Continue" opens the QBU panel.

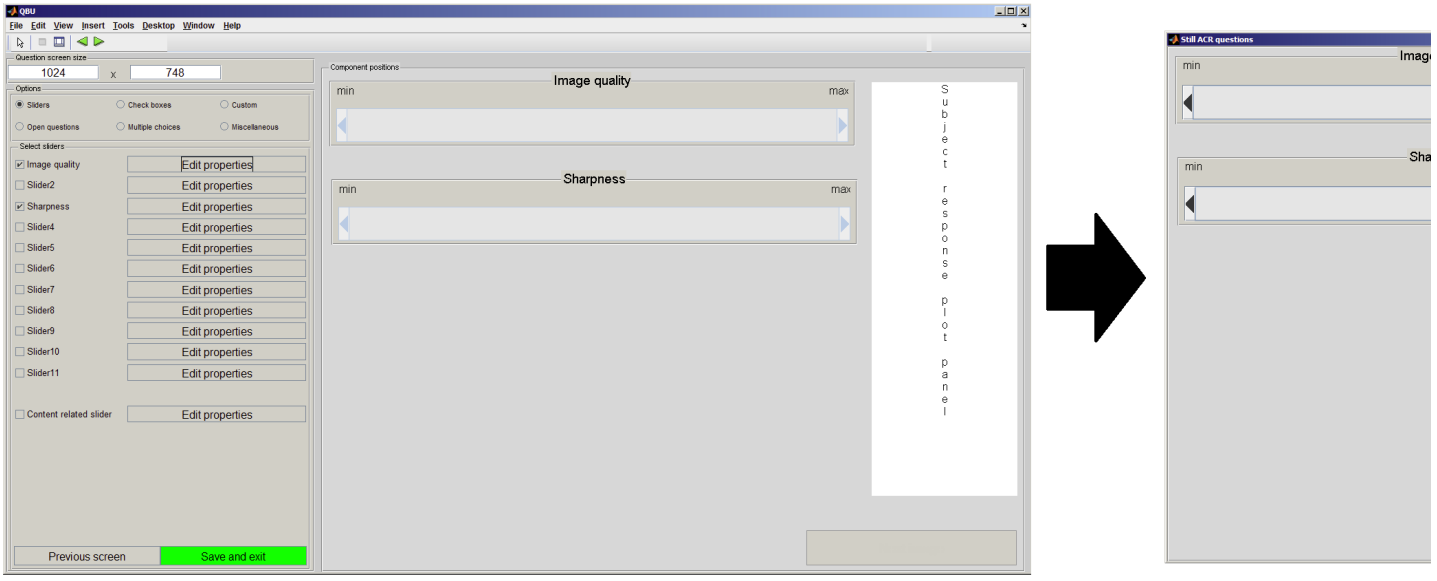
The Options subpanel of the QBU is used for choosing different forms of response methods, such as sliders, check boxes or open question forms. For example, the standard ACR evaluation method can be constructed using sliders. For the standard PC method the check boxes can be a viable selection. All elements of the question window can be edited by clicking "Edit properties" button. The properties also include the possibility for "flow control", which stops the participant from progressing e.g. if a slider has not been moved at all. This can be set for all elements separately.

The editable elements in the QBU are as follows:

- Up to 11 sliders and a content spesific slider. These have customisable texts, fonts, positions, sizes and also the option for flow control. It is also possible to plot the answers given with one slider so that the participant can see his/her answers. The content spesific slider can have different texts for every content. The texts for content spesific slider are defined using the filenames.xlsx file.
- Up to 6 check boxes. Customisable texts, fonts and positions.
- Up to 4 Open questions. Customisable texts, fonts, positions and sizes. Option for flow control.
- Up to 3 multiple choice drop down menus. Customisable texts, fonts, positions and sizes. Option for flow control.
- Custom response methods for spesific test methods. Continuous measurement slider for Video SSCQE, Triplet slider group for Still triplet and Radio Button pair for Still PC.
- Miscellanous:
  - Editing the text of the button leading to next stimulus
  - Repeat references button for Video ACR
  - Repeat stimulus button for Video ACR
  - Repeat dynamic references button for Still ACR
  - Repeat stimuli button for Video or Still PC
  - Repeat stimulus button for Video SSCQE

All elements can also be edited graphically.

For the example presented in Figure below two sliders are selected, which are named "Image quality" and "Sharpness". The endpoints of the sliders are set to "min" and "max". In this example setting a subject response plot is also selected. It is a graph showing a record of evaluation scores, which helps observers to remember their previous answers and encourages them to use the whole scale. This reduces the variation coming from individual tendencies to use the scale.



Visual fine tuning

Please note that this option is not necessary when creating the most common setups!

Fine tuning of the all elements can be done choosing "View" -> "Property editor" from the top menu. Extra options become available at the bottom of the QBU window (Property Editor - Figure). You can edit fonts, colours and text fields. The settings shown in the Property Editor depend on which component is chosen in the preview window.

One can also add on-screen instructions for the observers by adding a text box from the top menu ("Insert" -> "TextBox").

The visual fine tuning can be closed from the upper menu by choosing "View" -> "Property editor" again and "Tools" -> "Edit Plot". The program will return to the ordinary QBU interface.

The Filenames.xlsx file

One of the most important things to take into account in creating a test setting is the "filenames.xlsx" file. Each test setting, except for "Questions only," uses this file. The file is used to retrieve the file names for the test stimuli, so it is important to make sure that the "filenames.xlsx" file is finalised before starting the experiments.

Please note that the root folder of the program has the file "filenames.xlsx", however, the version which should be modified for experiments is in the folder of the specific test setup. It is thus necessary to first create the test setup before editing the "filenames.xlsx" file.

One way to create a list of stimuli to be paste in the "filenames.xlsx" file is described next:

- Use the "Run…" command under the Windows start menu or press "Win+R", and write "cmd" in the appearing field.
- Navigate to the folder which contains the stimuli to be used in the experiment. This can be done by entering the command "DIR" followed by the folder path.
- Write the command "dir /b /a-d *.* >list.txt"
- The previous command creates a file "list.txt" in the chosen folder. This text file includes all filenames present in the folder.
- Make sure to remove the "list.txt" file itself from the list.
- Now you can copy the file names into the "filenames.xlsx" file.
- Do remember to enter the CV1 (e.g. image scene) numbers as well as CV2 (e.g. image) numbers next to the file names. The file names of the stimuli must be ordered (first CV1 and then CV2) that the randomisation of stimuli works as intended.

If the test uses fixed reference stimuli, their file names should be written into the "Reference 1 (optional)" and "Reference 2 (optional)" columns. The "CV1 (optional)" column should contain the number of CV1 for which each reference stimulus is intended.

If the test setting included CV1 (scene) specific questions, these should be written into the "CV1 related questions (optional)" column. The "Min (optional)" and "Max (optional)" columns are used to fill in the scale end texts for the minimum and maximum ends respectively. Figure below shows an example, in which the image files "im1D.png" and "im1B.png" are used as too dark and too bright reference stimuli for the CV1 related question for the scene 1. The image files "im2L.png" and "im2F.png" are used as too loud and too faded colors reference stimuli for the scene 2. In this example the scene specific sliders are named as "Lightness" for scene 1 and "Color saturation" for scene 2.

	A	B	C	D	E	F	G	H	I
1	CV1	CV2	Filename	CV1 (optional)	Reference 1 (optional)	Reference 2 (optional)	CV1 related questions (optional)	Min (optional)	Max (optional)
2	1	1	im10.png	1	im1D.png	im1B.png	Lightness	Too dark	Too Bright
3	1	2	im11.png	2	im2L.png	im2F.png	Color saturation	Too loud colors	Too faded colors
4	1	3	im12.png						
5	1	4	im13.png						
6	1	5	im14.png						
7	2	1	im20.png						
8	2	2	im21.png						
9	2	3	im22.png						
10	2	4	im23.png						
11	2	5	im24.png						
12									
13									

Creating the most common test setups

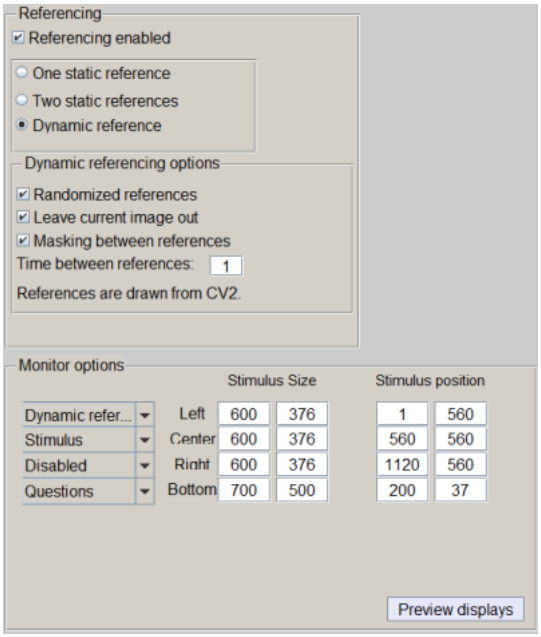
Still ACR

In the star menu name the setup (e.g. “example_still_acr”) and choose “ACR” as the test method. Click “Create”.

Experiment builder unit

1. Material presentation settings
   - Choose the amount of CV1 (e.g. scenes) and CV2 (e.g. images). Enable randomisation for both variables and choose CV1 as the “Dominant Variable”. This way the displayed scene will be randomly chosen, and then the stimuli of the scene will be presented in random order. (After the whole setup is ready the material will be indicated through filenames.xlsx.)
2. Setting up the displays
   - Indicate the displays used in the experiment. E.g. the settings Left: ”Disabled”, Center: ”Stimulus”, Right: ”Disabled”, Bottom: ”Questions” will only use the center and bottom displays while two side displays remain inactive. Define the experiment window sizes and positions in the text field of "Stimulus Size" and "Stimulus position". Preview the selections by clicking the "Preview displays" button.
3. Setting up feedback
   - The choice of providing feedback at the end of the experiment is enabled by "Ask for feedback after the test" check box. You can write a desired question in the text field under the check box.
4. Then click the "Save and Continue" button and proceed to the Question Building Unit

Please note! Still ACR setup contains the option for dynamic reference ACR method. The DR-ACR method creates reference image series from test images. Reference images are presented to observers as a slide show before the evaluation. To do this choose ”Referencing enabled” and ”Dynamic reference”. From the settings of the dynamic reference choose ”Randomized references”, ”Leave current image out” and ”Masking between references”. The "Randomized references" check box randomizes the order of the reference stimuli. The "Leave current image out" check box shows the other stimuli from the scene as references and omits the evaluated stimulus from the slide show. The default masking image is a white noise stimulus with a center fixation point. The masking stimulus file (masking_image.jpg) is located in the image folder and users can change or modify it according to their research requirements. The text field "Time between references" defines the reference stimuli display time. If the reference stimulus display time is too short observers may probably not notice differences in quality and types of distortions between the test stimuli. A default value is 1 second. At the end, indicate the displays: for example Left: ”Dynamic References”, Center: ”Stimulus”, Right: ”Disabled” and Bottom: ”Questions”.



Question Builder Unit

ACR setups have often used sliders for evaluating different attributes of a stimulus. Choose “Sliders” and indicate the number of necessary sliders. Edit each slider by clicking “Edit properties”. The options for editing the sliders are as follows: Title text, Min value text, Max value text, Slider min value, Slider max value and Slider starting value.

If desired, scene specific evaluation scales can be added. The properties of the scene specific evaluation scales are not determined through QBU, but in the ”filenames.xlsx” file. The name for the evaluation scale is entered to the “CV1 related questions (optional)” column, while the minimum value text is entered to the “Min (optional)” column and the maximum value text to the “Max (optional)” column.

Still Pair Comparison

In the start menu name the setup and choose “Still PC” as the test method. Click “Create”.

Experiment builder unit

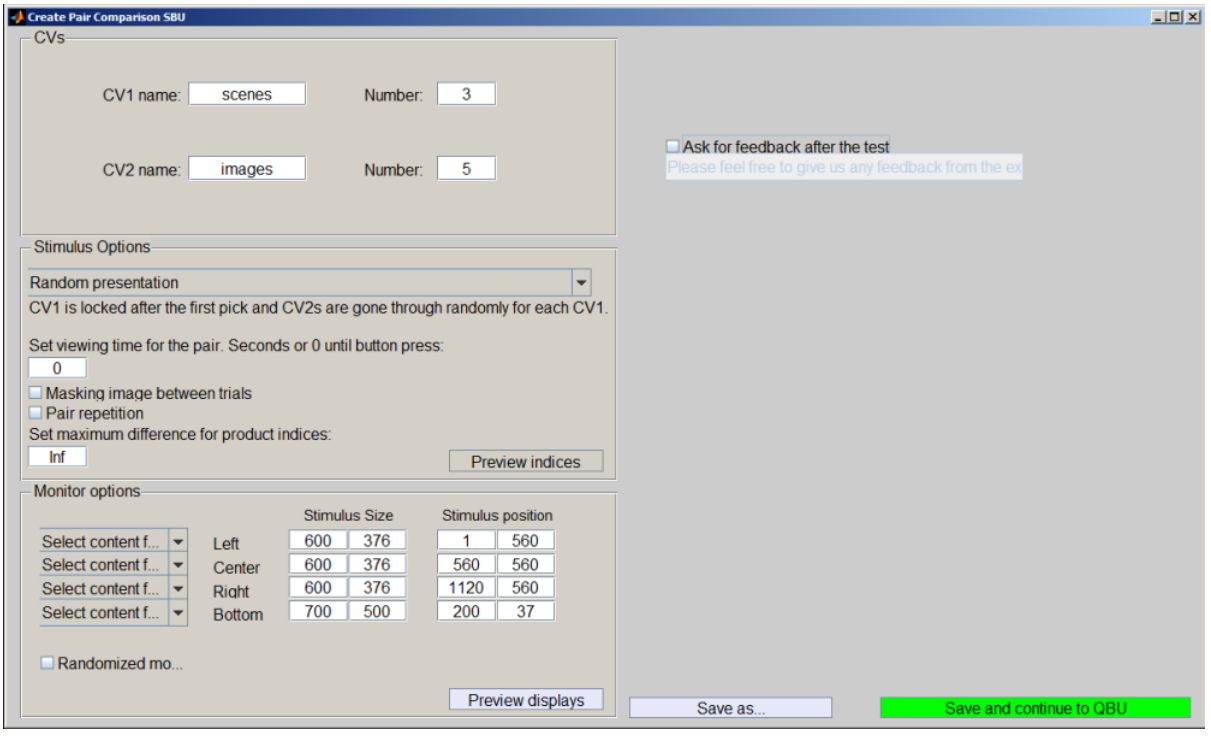
1. Material presentation settings
   - Choose the amount of CV1 (e.g. scenes) and CV2 (e.g. images). To randomise the presentation of stimuli, choose the “Random presentation” option. With this setting, a random scene (CV1) will be chosen and stimuli pairs of the setting (pairs of CV2) will be displayed in a random order before moving on to the next random scene. (After the whole setup is ready the material will be indicated through filenames.xlsx.)
   - You can determine the length of the time the stimuli are displayed ("Set viewing time for the pair"). If you choose 0, the stimulus will only change when the “Next image” button is used. If the selection is set to be e.g. 3, the stimulus pair will be shown on the display for 3 seconds.
   - Choose whether a mask stimulus will be presented between stimuli, and will each stimulus pair be repeated in the experiment. The default masking stimulus file (masking_image.jpg) is located in the image folder from where it can be modified according to the research requirements.

2. Setting up the displays
   - Indicate the displays used in the experiment. E.g. the settings Left: ”Stimulus 1”, Center: ”Stimulus 2”, Right: ”Disabled”, Bottom: ”Questions” will use the Left and Center displays for presenting the stimuli pairs and the Bottom display for questions. Define the experiment window sizes and positions in the text field of "Stimulus Size" and "Stimulus position". Preview the selections by clicking the "Preview displays" button.
   - It is also possible to choose that the monitors be randomised, and in this case the windows displaying stimuli will be random.

3. Setting up feedback
   - The choice of providing feedback at the end of the experiment is enabled by "Ask for feedback after the test" check box. You can write a desired question in the text field under the check box.

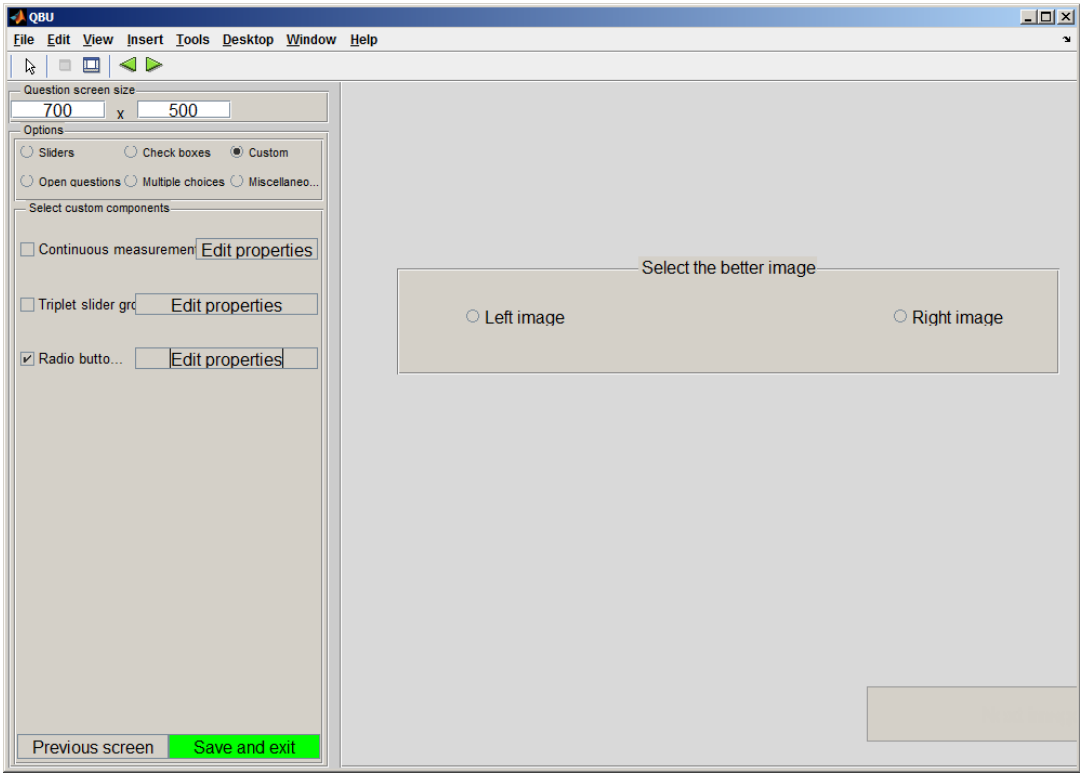
4. Then click the "Save and Continue" button and proceed to the Question Builder Unit

It is also possible to determine whether one stimulus will be compared to all the other stimuli, or for example only to the few most similar stimuli ("Set maximum difference for product indices"). If you would like each stimulus to be compared to all the other samples, leave the default choice of “Inf”; if you would rather the stimuli only be compared to a few others, determine the number of stimuli pairs for each sample. The closest stimuli will be determined according to the order of files in the “filenames.xlsx” file, which must be edited for the desired combinations. For instance, if you set the minimum difference for product indices to 3, the first sample in the “filenames.xlsx” list will be compared to the second and third samples listed, the second one will be compared to the first, third and fourth, and so forth.



Question Builder Unit

VQone has a complete question form for pair comparison by default. Choose “Radio button pair” from the “Custom” menu to directly enable the form displayed below.



Still triplet

In the start menu name the setup and choose “Still triplet” as the test method. Click “Create”.

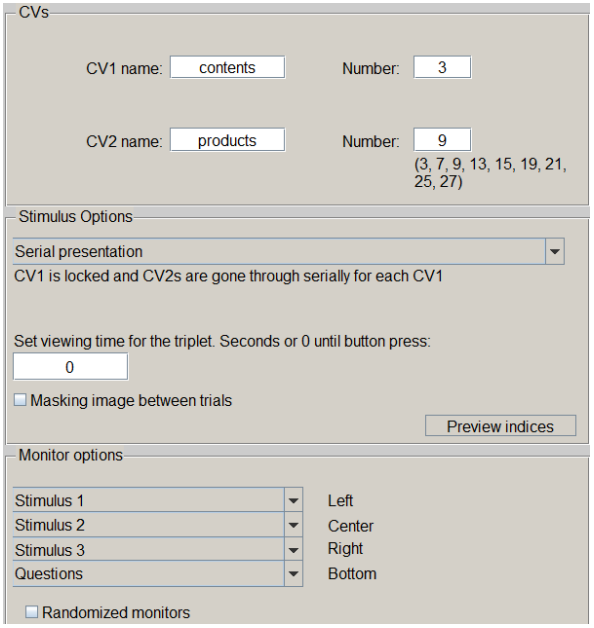
Experiment builder unit

1. Material presentation settings
   - Choose the amount of CV1 (e.g. scenes) and CV2 (e.g. images). With the setting “Serial presentation” the program will go through all the CV1 (scenes) in order and present the CV2 variables (images) in random order for each scene. With the setting “Random presentation” the choice of the CV1 variable will be random as well. (After the whole setup is ready the material will be indicated through filenames.xlsx.)
   - Take note of the restrictions on the number of images in the triplet setup: the numbers in the parentheses indicate the optimal amount of images for comparisons where each image can be compared to all other images an equal amount of times.
   - You can determine the length of the time the stimuli are displayed. If you choose 0, the stimulus will only change when the “Next image” button is used. If the selection is set to be e.g. 3, the stimulus pair will be shown on the display for 3 seconds.

2. Setting up the displays
   - Indicate the displays used in the experiment. E.g. the settings Left: ”Stimulus 1”, Center: ”Stimulus 2”, Right: ”Stimulus 3”, Bottom: ”Questions” will use the Bottom display for questions and all other displays for stimuli presentation. Define the experiment window sizes and positions in the text field of "Stimulus Size" and "Stimulus position". Preview the selections by clicking the "Preview displays" button.
   - It is also possible to choose that the monitors be randomised, and in this case the windows displaying stimuli will be random.

3. Setting up feedback
   - The choice of providing feedback at the end of the experiment is enabled by "Ask for feedback after the test" check box. You can write a desired question in the text field under the check box.

4. Then click the "Save and Continue" button and proceed to the Question Builder Unit

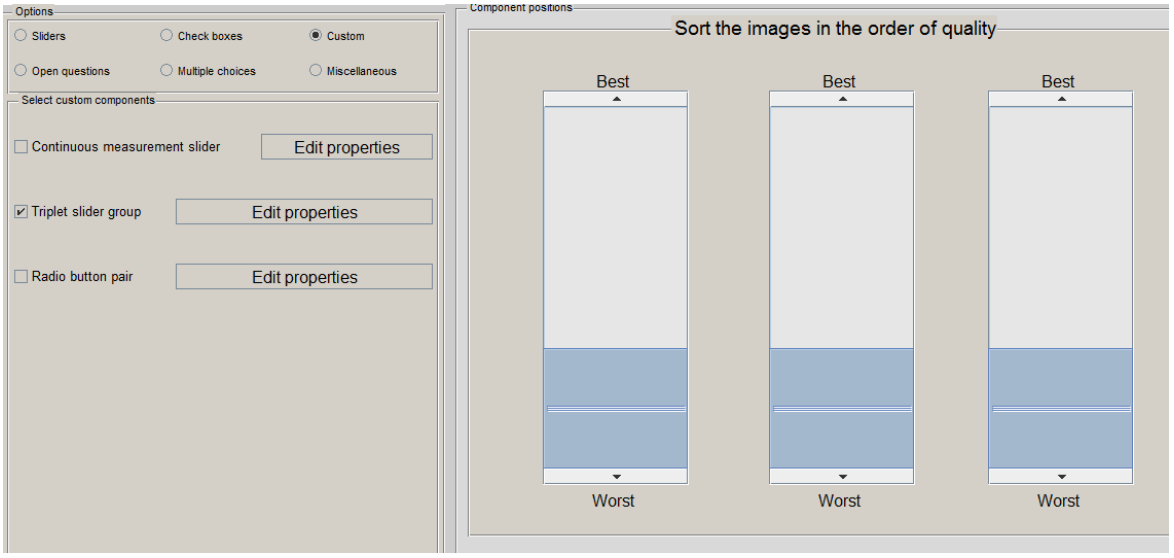


Question Builder Unit

The easiest way to create a question form for the triplet setup is to choose “Triplet slider group” from the “Custom” menu.

If you would like to differentiate between one or two of the best images it may be better to use check boxes. The properties of check boxes, as well as other objects, can be edited through the “Edit properties” button next to the desired object.

On the other hand, if it is desired that the participants describe the attributes of the samples, three question boxes should be enabled through the option “Open questions”.



Video ACR

In the start menu name the setup and choose “Video ACR” as the test method. Click “Create”.

Experiment builder unit

1. Material presentation settings
   - Choose the amount of CV1 (e.g. scenes) and CV2 (e.g. videos). Enable randomisation for both variables and choose CV1 as the “Dominant Variable”. This way the displayed scene will be randomly chosen, and then the stimuli of the scene will be presented in random order. (After the whole setup is ready the material will be indicated through filenames.xlsx.)
   - The program can display two reference videos (e.g. one high and one low quality). When using reference videos, it is crucial to have the references properly indicated in the “filenames.xlsx” file. The “CV1 (optional)" column should include the scene number, “Reference 1 (optional)” the file name of the first reference and “Reference 2 (optional)” the file name of the second reference video.

2. Setting up the displays
   - Indicate the displays used in the experiment. E.g. the settings Left: ”Disabled”, Center: ”Stimulus”, Right: ”Disabled”, Bottom: ”Questions” will only use the center and bottom displays while two side displays remain inactive. Define the experiment window sizes and positions in the text field of "Stimulus Size" and "Stimulus position". Preview the selections by clicking the "Preview displays" button.

3. Setting up feedback
   - The choice of providing feedback at the end of the experiment is enabled by "Ask for feedback after the test" check box. You can write a desired question in the text field under the check box.

4. Then click the "Save and Continue" button and proceed to the Question Building Unit

Question Builder Unit

Choose “Sliders” and indicate the number of necessary sliders. Edit each slider by clicking “Edit properties”. The options for editing the sliders are as follows: Title text, Min value text, Max value text, Slider min value, Slider max value and Slider starting value.

If desired, scene specific evaluation scales can be added. The properties of the scene specific evaluation scales are not determined through QBU, but in the ”filenames.xlsx” file. The name for the evaluation scale is entered to the “CV1 related questions (optional)” column, while the minimum value text is entered to the “Min (optional)” column and the maximum value text to the “Max (optional)” column.

Video Pair Comparison

In the start menu name the setup and choose “Video PC” as the test method. Click “Create”.

Experiment builder unit

1. Material presentation settings
   - Choose the amount of CV1 (e.g. scenes) and CV2 (e.g. videos). To randomise the presentation of stimuli, choose the “Random presentation” option. With this setting, a random scene (CV1) will be chosen and stimuli pairs of the setting (pairs of CV2) will be displayed in a random order before moving on to the next random scene. (After the whole setup is ready the material will be indicated through filenames.xlsx.)

2. Setting up the displays
   - Indicate the displays used in the experiment. E.g. the settings Left: ”Stimulus 1”, Center: ”Stimulus 2”, Right: ”Disabled”, Bottom: ”Questions” will use the Left and Center displays for presenting the stimuli pairs and the Bottom display for questions. Define the experiment window sizes and positions in the text field of "Stimulus Size" and "Stimulus position". Preview the selections by clicking the "Preview displays" button.
   - It is also possible to choose that the monitors be randomised, and in this case the windows displaying stimuli will be random.

3. Setting up feedback
   - The choice of providing feedback at the end of the experiment is enabled by "Ask for feedback after the test" check box. You can write a desired question in the text field under the check box.

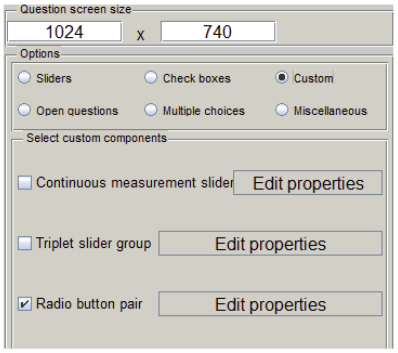
4. Then click the "Save and Continue" button and proceed to the Question Builder Unit

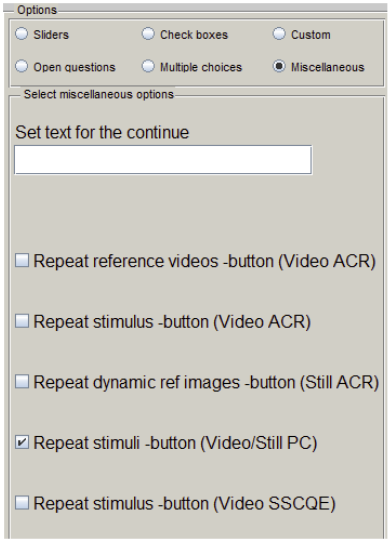
It is also possible to determine whether one stimulus will be compared to all the other stimuli, or for example only to the few most similar stimuli ("Set maximum difference for product indices"). If you would like each stimulus to be compared to all the other samples, leave the default choice of “Inf”; if you would rather the stimuli only be compared to a few others, determine the number of stimuli pairs for each sample. The closest stimuli will be determined according to the order of files in the “filenames.xlsx” file, which must be edited for the desired combinations. For instance, if you set the minimum difference for product indices to 3, the first sample in the “filenames.xlsx” list will be compared to the second and third samples listed, the second one will be compared to the first, third and fourth, and so forth.

Question Builder Unit

The creation of the question form is also practically identical to the Still PC question form. However, the questions should be phrased accordingly to the setting into “Which video is better?”.

If desired, a “Repeat stimuli” button can be added to the form. With this button, the participant is able to view the video samples several times. The button can be enabled through the “Miscellanous” menu.





Video SSCQE (Continuous video evaluation)

In the start menu name the setup and choose “Video SSCQE” as the test method. Click “Create”.

Experiment builder unit

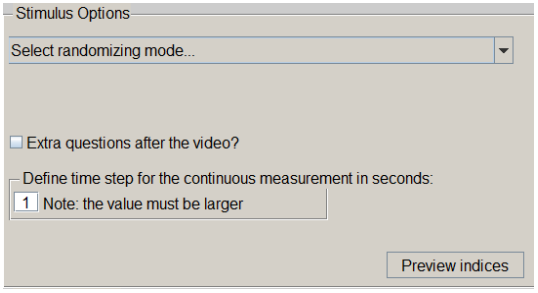
1. Material presentation settings
   - Choose the amount of CV1 (e.g. scenes) and CV2 (e.g. videos). To randomise the presentation of stimuli, choose the “Random presentation” option. With this setting, a random scene (CV1) will be chosen and stimuli pairs of the setting (pairs of CV2) will be displayed in a random order before moving

on to the next random scene. (After the whole setup is ready the material will be indicated through filenames.xlsx.)
- If further questions about the video are desired after the continuous evaluation, choose the option ”Extra questions after the video”.
- In continuous video evaluations it is crucial to determine the interval at which the evaluation is saved. The value must exceed 0.1 seconds.

2. Setting up the displays
   - Indicate the displays used in the experiment. E.g. the settings Left: ”Disabled”, Center: ”Stimulus”, Right: ”Disabled”, Bottom: ”Questions” will use the Center display for presenting the stimulus and the Bottom display for questions. Define the experiment window sizes and positions in the text field of "Stimulus Size" and "Stimulus position". Preview the selections by clicking the "Preview displays" button.

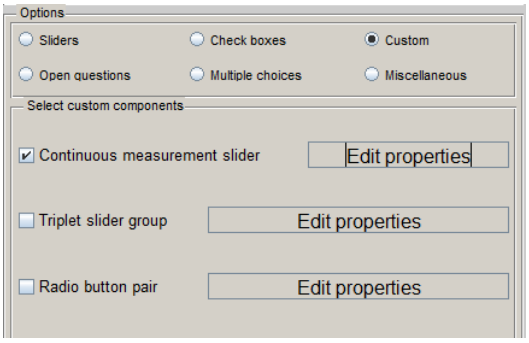
3. Setting up feedback
   - The choice of providing feedback at the end of the experiment is enabled by "Ask for feedback after the test" check box. You can write a desired question in the text field under the check box.

4. Then click the "Save and Continue" button and proceed to the Question Builder Unit



Question Builder Unit

Choose “Continuous measurement slider” from the “Custom” menu. Adjust the slider texts and other settings as desired by clicking "Edit properties" button. If you chose the “Extra questions after the video?” option from the main panel, click “Save and exit” and proceed to edit the question form to be as desired.



Questions only

In the start menu name the setup and choose “Questions only” as the test method. Click “Create”.

Experiment builder unit

Determine the amount of stimuli that will be the subject of questions from the ”Trial count” window.

Question Builder Unit

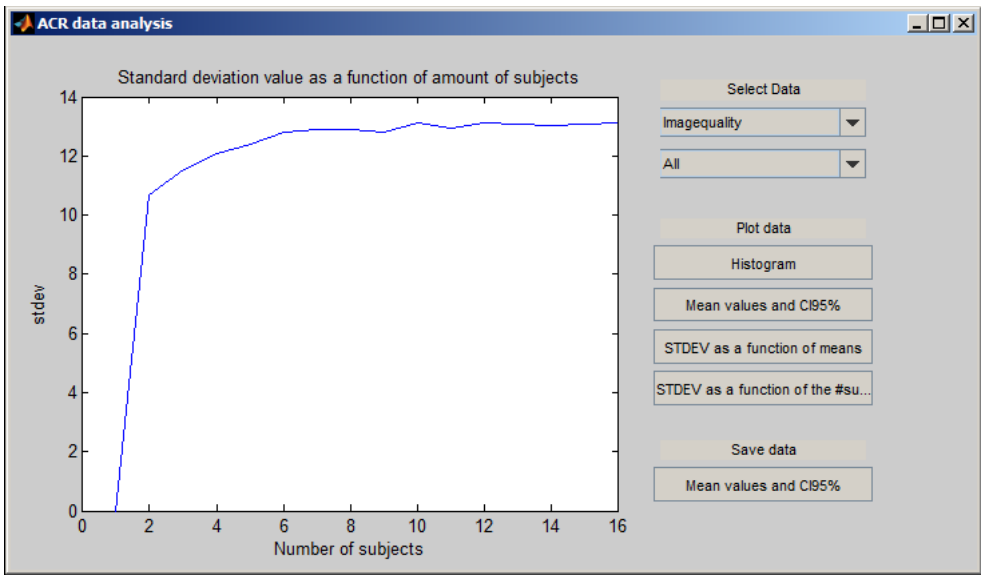
Create the desired question with the QBU

Analyzing evaluation data

When you have conducted image or video evaluation study using the ACR, PC or triplet test methods you can analyze data using the data analysing component. Choose the test setup from the VQone main panel and by clicking the “Plot Data” button, the Data analysis panel appears. Data analyzing panel offers simple tools which can be used to check e.g. that experiment setup functions as it should or when the number of observers is high enough.

For the ACR setup (still and video) the options for data histograms, mean values and 95 % confidence intervals and standard deviation values as a function of the number of observers or the mean opinion scores are available. For the PC and Triplet setups image probabilities are available. More demanding statistics analyses for raw data are recommended to do using statistics software packages.

The GUI for the ACR data analyzing panel is presented in Figure below in which standard deviation values as a function of the number of observers are plotted for the data of the ACR experiment. The analysis is calculated over all scenes (All is selected from the "Select Data" menu). By pressing the "Mean values and CI95%" button, the data mean values and the confidence intervals are saved in the "data_mean_ci.xlsx" file.



Change log

- 2015/04/29: VQone HTML manual updated
- 2014/10/20: VQone 0.94 Version 0.05 released

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