# ETK: ECX Evaluation Toolkit -- README

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## Overview

This toolkit is designed to run various types of psychophysical experiments on images from within a Qualtrics survey software framework. The toolkit consists of a series of modules, each with a different approach to doing an image-based cognitive/perceptual experiment. Each module includes a JavaScript, an HTML and a CSS script that would be added to a specific Qualtrics question or project. Example images are also included so the user can test and understand the functionality of each module. A screenshot of the survey flow is also included to demonstrate the necessary Embedded Data fields for output data.

The user is assumed to have some basic familiarity with Qualtrics survey software, [www.qualtrics.com](http://www.qualtrics.com). Qualtrics is generally available to researchers through an academic license. Key features of Qualtrics that a user needs to understand are:

* Project: Each project is an individual survey/study consisting of a series of blocks. Blocks can hold multiple questions.
* Look & Feel: the Look & Feel tab is under the project name. This controls the overall appearance of a survey (colors, font, etc.). The custom CSS code will be added under the Advanced tab -> + Add Custom CSS. Another useful item is the Next Button Text under the General tab.
* Question Edit modes: Clicking on a question text will bring up a series of question edit mode tabs. Clicking on HTML View will allow the user to input the necessary HTML code.
* JavaScript API: To the left of each question is the settings gear. Clicking on that will open the menu including the “Add JavaScript” option. The JavaScript needs to be added after the Qualtrics onload call.
* Survey Flow: the Survey Flow tab is under the project name. This encapsulates the “programming” functions to control the flow of the survey: branch points, display logic, etc. This is where the user will need to create the Embedded Data variables used in writing out information from the ETK modules.

Qualtrics has excellent resources to help a new researcher come up to speed on its full functionality.

## ETK Modules

The ETK focus is on image-based perceptual experiments. There are currently four modules which allow a researcher to manipulate and/or compare an array (or arrays) of images. These modules are designed to allow one or more classic psychophysical approaches. The four modules are:

* 2 Alternative Forced Choice (2AFC): the 2AFC module is used to find a discrimination threshold. In this experiment, the first image in the array, imgs[0], is assumed to be the baseline image. A typical use might be to find the threshold when some effect becomes perceptually visible. In this implementation, all images in the array are each compared to the baseline image, including a comparison of the baseline image to itself. Each pair of images is randomly presented as baseline vs. stimuli image or stimuli image vs. baseline (A vs. B or B vs. A). The overall order in which the pairs of images are shown is also randomized.
* Method of Adjustment (MoA): the method of adjustment module is also used to find a discrimination threshold by allowing the user to cycle through a “carousel” of images (one at a time) and choose the one that meets the stated criteria. By embedding the MoA module within a Qualtrics multiple choice question, a researcher could allow a user to make multiple choices among the images. The carousel is also useful as a training module to allow users to see a series of images and make choices prior to the start of a study with the actual stimuli images. There is no randomization in the MoA module. Images are shown in the specific order given in the array.
* Round Robin Comparison (RRC): the round robin comparison module shows all unique comparisons between the images in the array. The module is useful for direct comparison of two images (e.g., which image shows the stimuli) when there is no underlying sequence defining an order to the set of images. Image pair presentation is randomized and image pair order is randomized. There is also the ability to add one pair of “validation” images as an attention check on study participants.
* Compare Two Arrays (C2A): the compare two arrays module compares two arrays where each array element in a “base” array is compared to the same element in the “diff” array. This module could be used as a modified RRC module where the pairs of images to be compared are explicitly listed. It could also be used to create a 2AFC experiment where each image in the sequence has its own baseline image (e.g., images sequences where a size factor is changing).
* Click Counting: this is a script that counts the number of clicks on an image (contained within a canvas). It allows more clicks than available in a standard Qualtrics Heat Map question.

More details on the variables which are written out for each module are given in the individual README files.

## Building a Study within Qualtrics

A generic study within Qualtrics might consist of:

1. An IRB consent block/question.
2. An introduction block/question to explain the task.
3. A study block with a module question. For multiple image sequences, multiple question blocks might be included. The presentation order of these question blocks can be randomized in the Survey Flow.
4. A demographic block containing any relevant demographic questions.

## Amazon Mechanical Turk

Amazon Mechanical Turk, <https://www.mturk.com/mturk/welcome>, is a crowdsourcing site that can provide a convenient source of study participants for online studies. A URL link to a Qualtrics study can be input into an Mturk HIT to launch a study. More information can be found on the Mechanical Turk website.

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