

Instructions for Arduino Controller
Action vs Perception Study
By Jay Ravaliya

1. Compatibility Determination
 - a. Make sure that Psychtoolbox is installed on the computer that is being used. This can be done by typing “ver” in the Command Window. Scroll through the installed toolboxes and be sure that “Psychtoolbox” appears in this list.
2. Initialization of Configuration File
 - a. Open the “configBasicPilot.xls” file in Excel. Enter all of the pertinent information in fields:
 - i. Subject Age
 - ii. Dominant Eye
 - iii. Dominant Hand
 - iv. Stereopsis Result
 - v. Acuity Test Result
 - b. The Relay Delay, Light On Delay and Light On Duration are constant variables that can remain 0.00002, 0.00001 and 2, respectively.
 - c. Select the motion that the participant will be engaging in during the trial.
 - i. 1 = Point
 - ii. 2 = Grab
 - d. Save this file using the first initials of the first and last name. (i.e. Jay Ravaliya = JR)
3. Initialization of Program
 - a. Open “start_forcedBasic.m” in MATLAB.
 - b. Check the value of the debug variable on line 15 of the program. This variable has two possible values: 0 or 1. If this value is 1, this means that the program can run without connecting to the Arduino to debug the code. If this value is 0, this means that the program will attempt to connect to the Arduino upon beginning the program.
 - c. To prepare for a study, be sure that the variable reads
`debug = 0;`
 - d. At this time, plug in the USB cable leading to the Arduino.
 - e. Press the “Run” button, which resembles a small green play button on the top of the Editor window.
 - f. If you are in the wrong directory, MATLAB will give you the option to change folders so that you are located in the correct directory. If a window titled “MATLAB Editor” pops up, be sure to click “Change Folder”.
 - g. A window titled “Select a config file for this experiment” will appear. Choose the configuration file that was saved in Step 2.d. This file will correspond to the subject.
4. Running the Program
 - a. First, you will see the “Welcome to the Motor Visual experiment” introduction. Below this, you will see: “Please enter the number of additional questions you wish to ask the subject:” At this time, if the administrator has any information regarding the subject that he or she wishes to record, it can be done by entering the number of additional questions to be asked.
 - i. If the response is 1, he or she will have the opportunity to enter the question asked at the “Enter question” prompt, and will have a subsequent “Enter

answer” prompt that will appear. This will occur for as many questions as were requested in Step 4.a.

- ii. If the response is 0, no prompts will appear.
- b. Next you will see the prompt “Ready to begin session. This session has a total of 55 trials. Press enter to start.” Simply press enter here to continue.
- c. Pre-Training Trials
 - i. Next, the pre-training trials will begin. You will see a prompt which says “Trial 1: Ask subject to reach towards the center pole. Press enter to begin trial.” It is important to wait until the subject is ready, because once “Enter” is pressed, the switch will be active and will be awaiting the subject’s release from the switch to activate the relays that switch off the lights and retract the mechanism.
 - ii. After the subject has conducted the trial, type either “1” or “2” for a successful trial, or “3” for a failed trial. Then press enter to continue.
 - iii. Repeat Steps 4.c.i and 4.c.ii for the remainder of the Pre-Training Trials
 - iv. After they have all been completed, press enter to continue to the Training Trials
- d. Training Trials
 - i. Once again, a prompt will let you know that you are now entering the Training Trial phase of the study. Press enter to proceed to the trials.
 - ii. You will see that the prompt for these trials is different:
 - 1. Training Trial 1 Parameters: Slow, Point, Midline Away - 2
 - a. First parameter: Speed
 - b. Second Parameter: Action
 - c. Third Parameter: Stimulus
 - 2. The first two parameters will be conveyed to the subject. (i.e. “Slowly point at the target.”) However, the third parameter will be silently conveyed to the administrator who is adjusting the stimuli. This will be done so by number of raised fingers. “1” refers to - Midline Towards and “2” refers to Midline Away. In this case, the controller would signal “2” to indicate Midline Away. A reminder of the number assignments is also provided.
 - iii. Once again, remember to wait before pressing enter at the prompt “Press enter to begin trial” as the switch will then begin attempting to detect a change in state as a result of the subject’s hand leaving the switch box.
 - iv. After the trial is over, simply press “1” or “2” for successful trials and “3” for failed trials. As of now, we are not utilizing the question of target being behind or in front of the midline so we will not worry about that. “1” or “2” will simply indicate that the trial went as planned.
 - v. Repeat Steps 4.d.iii - 4.d.iv until all trials are completed.
 - vi. Note: If any trials were skipped, they will be addressed again after all remaining trials are completed.
 - vii. After all trials have been completed (including previously failed trials) you will be prompted to continue to the Main Trials

- e. Main Trials
 - i. Once again, a prompt will let you know that you are now entering the Training Trial phase of the study. Press enter to proceed to the trials.
 - ii. Parameter Prompt:
 - 1. Main Trial 1 Parameters: Point; Reverspective - Illusory - Pop Out - 2; Fast
 - a. First Parameter: Action
 - b. Second Parameter: Stimulus
 - c. Third Parameter: Speed
 - 2. Once again, for the stimulus, the appropriate number is given to signal the administrator responsible for the stimuli.
 - iii. Remember to wait before pressing enter at the prompt "Press enter to begin trial" as the switch will then begin attempting to detect a change in state as a result of the subject's hand leaving the switch box.
 - iv. After the trial is over, simply press "1" or "2" for successful trials and "3" for failed trials. As of now, we are not utilizing the question of target being behind or in front of the midline so we will not worry about that. "1" or "2" will simply indicate that the trial went as planned.
 - v. Repeat Steps 4.e.iii - 4.e.iv until all trials are completed.
 - vi. Note: If any trials were skipped, they will be addressed again after all remaining trials are completed.
 - vii. After all trials have been completed (including previously failed trials) you will be prompted to press one more time. This marks the conclusion of the trials.

In order to "practice" or test this system, please feel free to set the debug variable in line 15 to "1" (i.e. debug = 1;) and run through the entire program without activating the Arduino system. It will work exactly the same. However, at the designated points, the program will not await any response from the Arduino system and will skip directly to the subsequent part, which is unrelated.