HN-11: Red Light – Green Light: Visual Reflexes and Color Stimulation

Equipment Required

PC or Mac Computer

IXTA, USB cable, IXTA power supply

EM-220 Event marker

optional - 2nd EM-220 Event Marker

EM-220 Event Marker

1. Locate the EM-220 event marker and plug the connector into the EM1 Channel input on the back of the IXTA.
2. If using the 2nd EM-220 event marker, plug it into the EM2 input on the back of the IXTA.

Figure HN-11-S2:The EM-220 connected to the TA.

iWorx Lab

HN-11: Red Light – Green Light: Visual Reflexes and Color Stimulation

NOTE: All of these exercises can be a competition between 2 subjects. Use two event markers and watch the reactions of each of the subjects to the colored visual signals.

Exercise 1: Reaction Time and Single Color Visual Signals

Aim: To measure the reaction time of a subject to a visual signal.

Approximate Time: 15 minutes

Procedure

1. Instruct the subject to:
    - Hold the event marker in the their hand so they can click the button on the event marker as quickly as possible.
    - Watch the LCD screen on the IX-TA and quickly click and release the button on the event marker when the *green* colored signal appears.
2. Open the Macro menu. Select **Green** which is the proper pre-programmed sequence of colors stimuli that should be used in this exercise. This macro will run automatically when the Record button is clicked. If it does not – click the name of the macro and click Run.

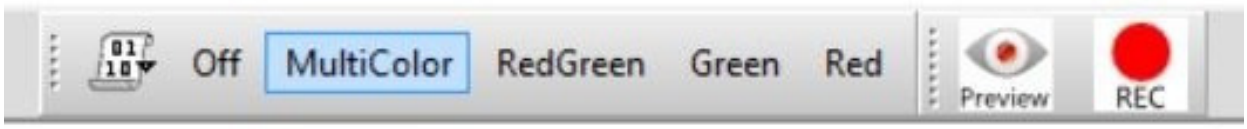

Figure HN-11-L1: The Macro menu containing the pre-programmed sequences used in this experiment.

3. Type **Green** in the Mark box.
4. Click on the Record button and click the mark button to mark the recording.
5. The macro will deliver 20 colored visual signals to the subject. The signals will be between one and six seconds apart.
6. After the last signal, click Stop to halt the recording.
7. Select Save As in the File menu, type a name for the file. Click on the Save button to save the data file.

IWorX Simple Lab

Data Analysis

1. Display the beginning of the data recorded for Exercise 1 on the Main window.
2. Use the Display Time icons to adjust the Display Time of the Main window to show both the visual signal, as shown in the Visual Cue Sensor channel, and the Response signal of the first trial on the Main window.

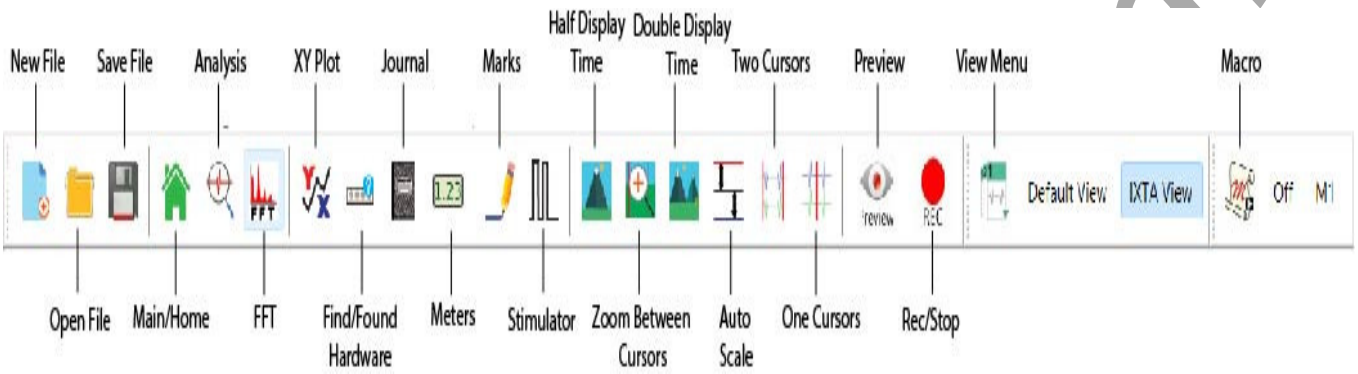

Figure HN-11-L2: The LabScribe toolbar.

3. Data should be collected from the Main window.
4. The mathematical function, T2-T1 should be in the upper right of the window.
5. Use the mouse to click on and drag a cursor to the onset of the visual signal on the Visual Cue Sensor channel. Drag the other cursor to the onset of the response.
6. Once the cursors are placed in the correct positions for determining the reaction time, record the value for T2-T1 in the Journal. The value can be recorded in the on-line notebook of LabScribe by typing its name and value directly into the Journal. You may also record any data on separate data tables.
7. If you choose to use the Analysis window, the functions in the channel pull-down menus can also be used to enter the name and value for T2-T1 into the Journal. To use these functions:
    - Place the cursors at the locations used to measure the reaction time.
    - Transfer the name of the T2-T1 function to the Journal using the Add Title to Journal function in the Response Channel pull-down menu.
    - Transfer the value for T2-T1 to the Journal using the Add Ch. Data to Journal function in the Response Channel pull-down menu.

IWorx Sample

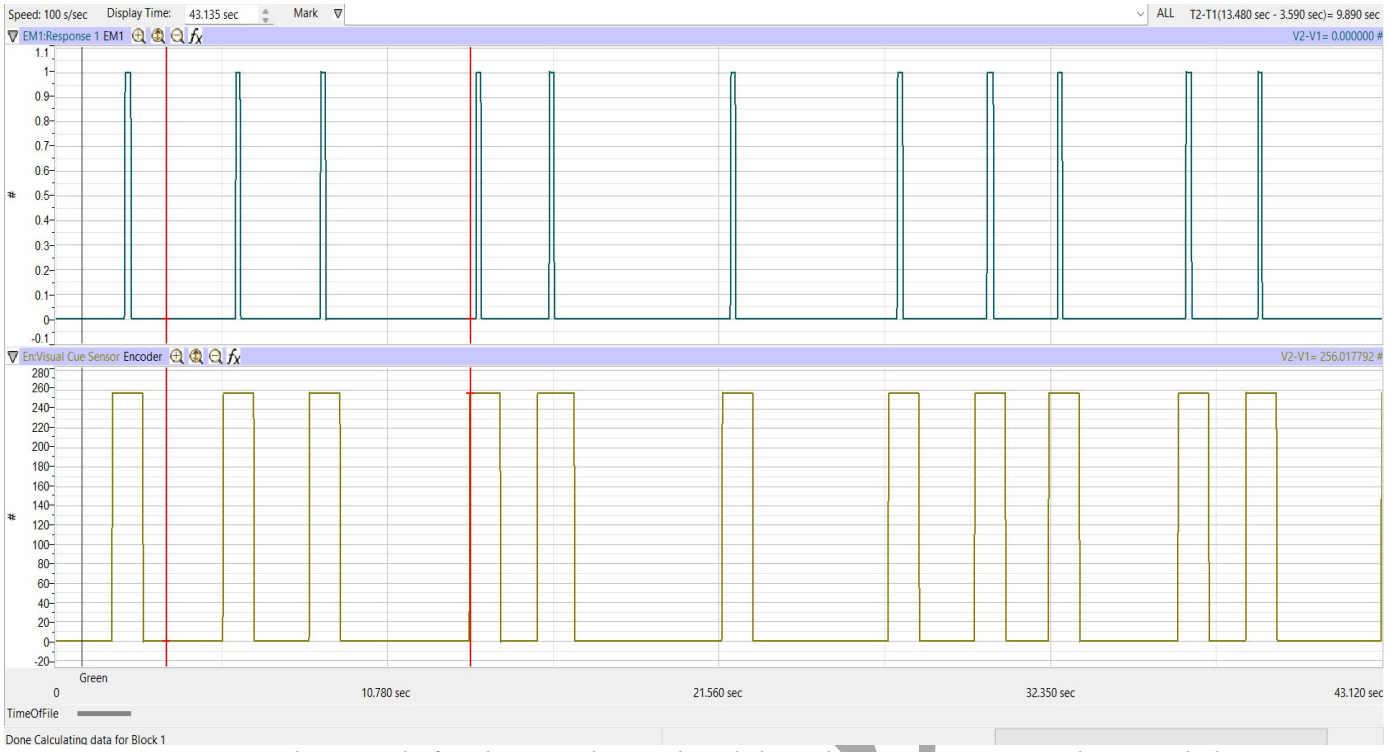

Figure HN-11-L3: The signals for the visual signal and the subject's response to the signal shown on the Main window. There is no second event marker channel because this was not a competition.

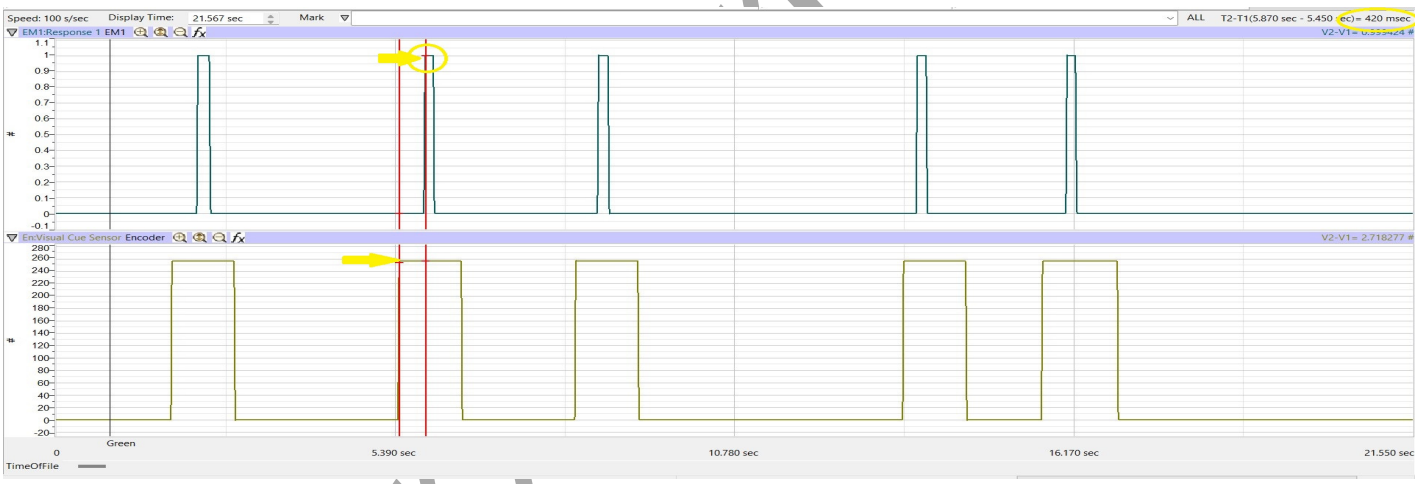

Figure HN-11-L4: The signals of the visual signal and the subject's response to signal. The cursors are placed to measure the subject's reaction time. The subject's reaction time is 420 msec.

8. Repeat Steps 5 through 7 on the data for the remaining 19 trials.
9. Once the reaction times in all trials have been measured and recorded, determine the mean reaction time of the subject. Discard the longest and shortest times from the data set, and determine the average of the remaining reaction times. Record the mean reaction time for this exercise in Table 1.

Working Draft

Exercise 2: Reaction Time and Repetition of Red Visual Signals

Aim: To measure the reaction time of a subject to a visual signal after being habituated to the signal color.

Approximate Time: 30 minutes

Procedure

1. Instruct the subject(s) to prepare themselves as in Exercise 1. In this exercise, the subjects will be responding to only red colored signals.
2. Select the **Red** macro. The macro will run automatically when the Record button is clicked. If not, click the name of the macro as in Exercise 1.
3. Type **Red1** in the Mark box.
4. Click on the Record button and click the mark button to mark the recording.
5. The macro will deliver 20 Red colored visual signals to the subject. The signals will be between one and six seconds apart.
6. After the last red signal, click Stop to halt recording.
7. Let the subject rest for 1 minute.
8. Repeat steps 2-7. Type **Red2** and **Red3** for these sets.
    - You will be running the same Red sequence 2 more times.
9. Select Save in the File menu.

Data Analysis

1. Use the same techniques explained in Exercise 1 to measure and record the reaction times of the subject presented with red colored visual signals in the "Red1" macro.
2. Repeat the analysis on the data recorded in the "Red2" and "Red3" macro.
3. Enter the mean reaction times for each set of trials in this exercise on Table 1.

Questions

1. How does the subject's mean reaction time for the green visual signals in Exercise 1 compare to the mean reaction time for the red visual signals in "Red1" of Exercise 2?
2. How do the mean reaction times for the three sets of trials in Exercise 2 compare to each other?
3. What could cause differences in reaction times for different sets of trials?
4. How do your subject's mean reaction times to green and red colored signals compare to those of other subjects?

IWorX Sample Lab

Exercise 3: Reaction Time and Specific Color Visual Signals

Aim: To measure the reaction time of a subject to a specific colored visual signal.

Approximate Time: 20 minutes

Procedure

1. Instruct the subjects to prepare themselves as they did in Exercises 1 and 2. In this exercise, the subjects will be responding only to **red** colored stimuli in two sets that are combinations of RedGreen colored signals and Multi-colored signals
2. Select the **RedGreen** macro. This sequence will run automatically when the Record button is clicked. If not, click the name of the macro and Run.
3. Type **RedGreen** in the Mark box.
4. Click on the Record button and click the mark button to mark the recording. The subject should respond as quickly as possible ONLY to the **red** colored signals.
5. The macro will deliver 20 visual signals to the subject. The signals will be between one and six seconds apart.
6. After the last signal, click Stop to halt recording.
7. Let the subject rest for 1 minute.
8. Repeat steps 2-7. Use the **MultiColor** macro and enter the **MultiColor** mark for this set of trials.
9. Click Stop and select Save in the File menu.

Data Analysis

1. Use the same technique explained in Exercise 1 to measure and record the reaction times of the subject presented with red colored visual signals. Measure only the reaction times for the trials where the subject responded correctly to the red colored visual signal. Do not measure the reaction times of trials where the subject responded incorrectly.
    - For example, a set of trials contains ten red signals to which the subject is supposed to respond. If the subject only responds correctly to eight of the ten red signals, only the reaction times for the eight correct responses are measured.
2. Calculate the mean reaction time for correct responses to the red signals in each set of trials. Enter the mean reaction times for the correct responses in each set of trials in Table 2.
3. For each set of trials, calculate the percentage of *correct* responses. Enter these values in the table.
4. For your subject, compare the mean reaction time from each set of trials in Exercise 2 to the mean reaction time from each set of trials in Exercise 3.

IWorx Sample Lab

Questions

1. How does the subject's mean reaction time in Trial 1of Exercise 3 (responding only to red signals) compare to his or her mean reaction time in Set 1 of Exercise 2 (responding to all signals)?
2. Compare the different sets in Exercises 2 and 3. Do you see any temporal relationship?
3. What would cause a longer reaction time when asked to react to only one specific color signal in sets that contain signals of different colors?
4. Did you detect any differences in reaction times between the trials using red/green signals and the trials using multi-color signals?
5. Do the mean reaction times of the sets in Exercise 3 differ?
6. How do your subject's percent correct scores compare to those of other subjects?
7. How do your subject's mean reaction times compare to the class average?

Exercise 4: Reaction Time and Specific Color Visual signals

Aim: To measure the reaction time of a subject to a specific colored visual signal.

Approximate Time: 20 minutes

Procedure

1. Instruct the subjects to prepare themselves as they did in Exercise 1, 2, and 3.
2. Repeat Exercise 3, but in this exercise, the subjects will be responding only to **green** colored stimuli in two sets that are combinations of **RedGreen** colored signals and **Multi-colored** signals
3. Type **GreenOnly** in the Mark box..
4. Click on the Record button and click the mark button to mark the recording. The subject should respond as quickly as possible ONLY to the **green** colored signals.
5. Repeat Steps 7 and 8 of Exercise 3 – responding only to the green color.
6. After the last signal, click Stop to halt recording.
7. Select Save in the File menu.

Data Analysis

1. Use the same technique explained in Exercise 1 to measure and record the reaction times of the subject presented with green colored visual signals. Measure only the reaction times for the trials where the subject responded correctly to the green visual signal. Do not measure the reaction times of trials where the subject responded incorrectly.
2. Calculate the mean reaction time for correct responses to the green signals in the set of trials. Enter the mean reaction times for the correct responses for the set in Table HN-11-L2.
3. Calculate the percentage of correct responses. Enter this value in Table HN-11-L2.

IWorx Sample Lab

4. For your subject, compare the mean reaction time from each set of trials in Exercise3 to the mean reaction time from Exercise 4.

Questions

1. To which colored visual signal did your subject respond most quickly, the red signals from Set 1 in Exercise 3 or green signals in Exercise 4?
2. Is there any difference in mean reaction times between the red signals in Set 2 of Exercise 3 and green signals of Exercise 4?
3. What could explain a subject responding more quickly to one color as compared to another?
4. Did your subject respond more quickly or more slowly to same colored signal as the other members of the class?

Table HN-11-L1: Mean Reaction Times for Different signals.

Signal	Mean Reaction Time Your Subject (ms)	Mean Reaction Time All Subjects (ms)	Shortest Mean Reaction Time in Class (ms)	Longest Mean Reaction Time in Class (ms)
Green Color signal				
Red Color signal Set 1				
Red Color signal Set 2				
Red Color signal Set 3				
Averages of the 3 Sets of Red Color signals				

Iworx Sample Lab

Table HN-11-L2: Mean Reaction Time and Latency

Signal	Number of Correct Responses	Percent Correct Response (%)	Mean Reaction Time Correct Responses Your Subject (ms)	Mean Reaction Time Correct Responses All Subjects (ms)
Response to Red signal Only Set 1				
Response to Red signal Only Set 2				
Averages of the 2 Red signal Only Sets				
Response to Green signal Only Set 1				
Response to Green signal Only Set 2				
Averages of the 2 Green signal Only Sets				

IWorX Sample Lab