Experiment HP-7: Interference of Stimuli on Associative Tasks - The Stroop Effect

Equipment Required

PC or Mac Computer

IXTA , USB cable, IXTA power supply

C-GSR-320 electrode cable

PPG-320 Pulse plethysmograph

RPD-320 Response Pad

Tables of words and symbols

Pulse Plethysmograph and GSR Setup

1. Locate the PPG-320 pulse plethysmograph and plug it into the PT channel.
2. Plug the RP-320 into the digital input port on the back of the IX-TA.
3. Locate the GSR electrodes cables and plug it into the GSR channel (A7)

Figure HP-7-S2: The TA with the RPD event marker, GSR and PPG-320 pulse sensor.

iWorx Sample Lab

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Exercise 1: Baseline Data while Resting.

Aim: To determine the subject's resting average GSR and Heart Rate.

Approximate Time: 15 minutesp

Select one person from your group to be the subject. Ask the subject to wash their hands with soap and water. Do not use alcohol to clean the fingers, alcohol dehydrates the skin. Using the non-dominant hand, attach each GSR electrode to the distal finger segment of two non-adjacent fingers; the index and the ring fingers are the ones usually used. Attach the electrodes with the Velcro straps so that the straps are snug, but not overly tight. Make sure the fingers are moistened with GSR conductive paste.
Place the pulse sensor on the volar surface (where the fingerprints are located) of the distal segment of the subject's middle finger.

Procedure

1. The subject should sit facing the computer monitor. Use the subject's hand which is closer to the iWorx equipment.
2. The subject should rest the hand with the GSR electrodes and pulse plethysmograph comfortably in their lap. The electrodes and transducer should be free from any extraneous pressure and their cables should be hanging freely. Instruct the subject not to move the hand during the recording process; movement will introduce artifacts into the recording.
3. Click on the Record button. Type "Baseline" in the Mark box and click Enter on the keyboard or the Mark button.
4. Click on the AutoScale All button. The signals on these channels should expand to fill the channel windows.
5. Instruct the subject to relax and record baseline information for approximately 5 minutes.

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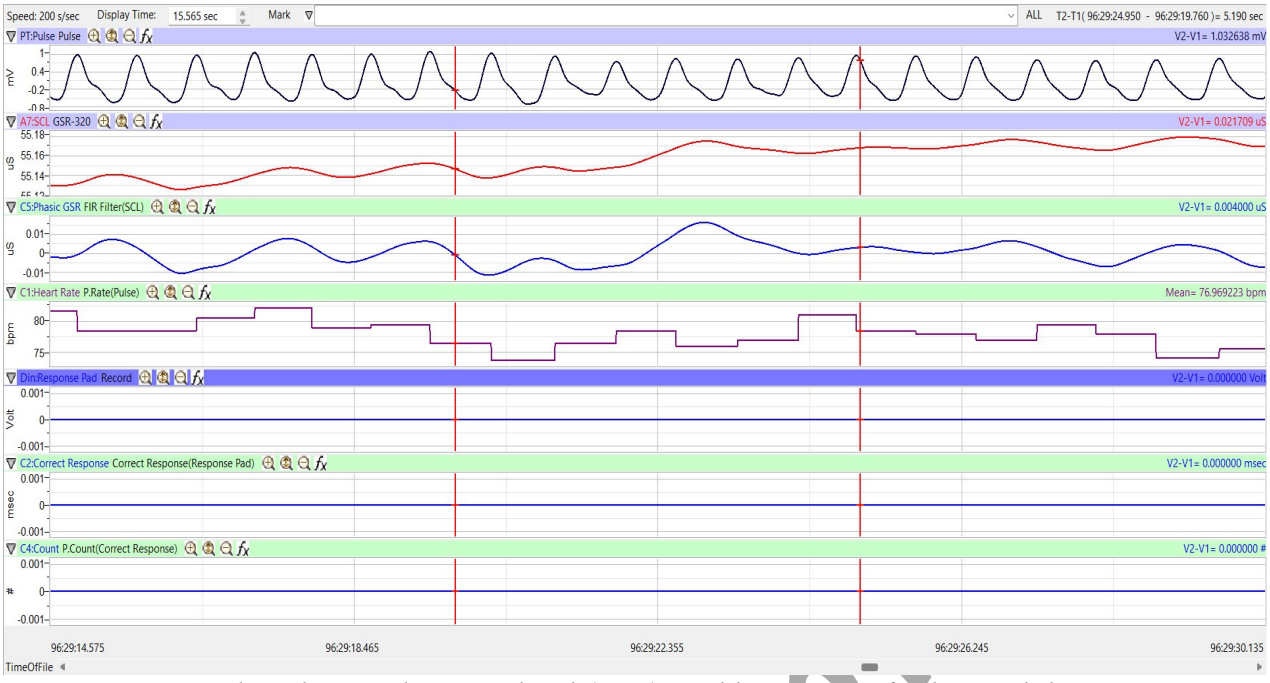

Figure HP-7-L1: Pulse, skin conductance level (SCL), and heart rate of subject while resting.

6. 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.
8. Begin Exercise 2 after allowing the subject to sit for 1 or 2 minutes.

Exercise 2: Interference of Word Stimuli on Naming.

Aim: To determine the effect of words on the subject's ability to name the colors in which the words are printed.

Approximate Time: 15 minutes

Disconnect the pulse sensor from the subject's hand.

Procedure

1. While the subject relaxes for 1 to 2 minutes, type "Stroop Effect" in the Mark box.
2. Highlight the "Stroop Effect" macro in the Macros menu.
3. Have the subject hold the response pad in their dominant hand.
4. Click Record to begin the "Stroop Effect" exercise.

IWorx Sample

5. Instruct the subject:
    - Images will show up after 5 seconds after the macro is started
    - Press the "A" button when the word and color match.

      Example: If the word "**BLACK**" appears in **black** print – click "A"
    - Press the "D" button when the word and color DO NOT match.

      Example: If the word "**BLACK**" appears in **red** print – click "D"
    - The subject should respond as quickly as possible while still being accurate.
6. The subject will be shown a series of 50 words. The words will automatically advance. The subject has 750 msec to respond upon seeing the word, then the recording will show the next word on the screen.
7. After all the words have been shown, **put the pulse sensor back on the subject and record heart rate for at least 1 minute.**
8. Click Stop to halt the recording.
9. Select Save in the File menu.

Data Analysis: Resting

1. Scroll through the data file and locate the recording that was made while the subject was resting.
2. Use the Display Time icons to adjust the Display Time of the Main window so that 2 minutes of data can be seen on the screen.
3. This section of data can also be selected by:
    - Placing the cursors on either side of a stable recording of the subject's skin conductance level and heart rate.
    - Clicking the Double Display time icon on the LabScribe toolbar until 2 minutes of data are on screen
    - Move the cursors to either end of the recording, one at the beginning and one at the end.

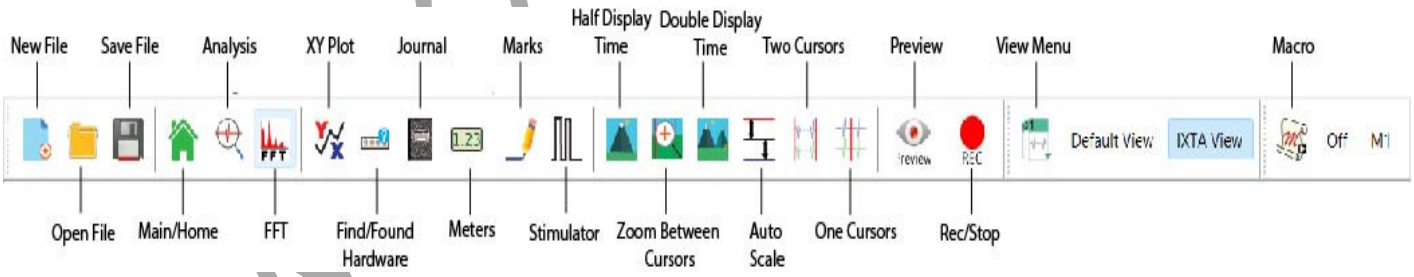

Figure HP-7-L2: The LabScribe toolbar.

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4. Click on the Analysis window icon.
5. Look at the Function Table that is above the Pulse channel in the Analysis window. The mathematical functions, Max, Min, Mean, T2-T1 and V2-V1, should appear in this table on the top margin of each channel.
6. Use the mouse to click on and drag a cursor to the left margin of the data displayed on the Analysis window. Drag the other cursor to the right margin of the same data.
7. Once the cursors are placed in the correct positions for determining the values for these functions in a stable section of the recording, the values can be recorded in the on-line notebook of LabScribe by typing the names and values of the functions directly into the Journal.
8. The functions in the channel menu of the Analysis window can also be used to enter the names and values of the functions from the recording to the Journal. To use these functions:
    - Place the cursors at the locations used to measure the maximum, minimum, and mean tonic skin conductance levels and resting heart rates.
    - Transfer the names of the functions to the Journal using the Add Title to Journal function in the Skin Conductance Level channel menu.
    - Transfer the values for those functions on all channels to the Journal using the Add All Data to Journal function in the Skin Conductance Level channel menu.
8. Record the values for Max, Min, and Mean on the Skin Conductance Level (SCL or Phasic GSR)and Heart Rate channels in the Journal using the one of the techniques described in the steps above and on Table 2.

Data Analysis: Stroop Effect

1. Scroll through the data file and locate the recording that was made during the Stroop Effect sequence.
2. Use the Display Time icons to adjust the Display Time of the Main window so that all data recorded during the sequence can be viewed on the screen.
3. Click the 2-Cursor icon so that two vertical lines appear on the Main window. Use the cursors, or the Zoom between Cursors function, to select the complete set of data.
4. Click on the Analysis window icon to transfer the data displayed in the Main window to the Analysis window.
5. Place the cursors at the beginning and end of the data recorded during the Stroop Effect sequence. Measure the values for the following parameters:
    - Maximum, Minimum, and Mean Skin Conductance Levels, which are determined by using the Max, Min, and Mean computed functions on the data in the Skin Conductance Level channel.
    - V2-V1 on the Count Channel will be the number of correct responses.

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6. Transfer the values for these parameters to the Journal using either of the techniques described in the previous analysis section. Record the values for these parameters on Table 1. Calculate the difference between the maximum and minimum skin conductance levels, and the maximum and minimum heart rates. Record these values in the Journal, and Table 1.
7. Once these values have been recorded, use the display time to only show the heart rate at the end of the recording after the Stroop Test was completed. Measure the following:
    - Maximum, Minimum, and Mean Heart Rate, which are determined by using the Max, Min, and Mean computed functions on the data in the Heart Rate channel.
8. Report these values in the Journal, and Table 1.

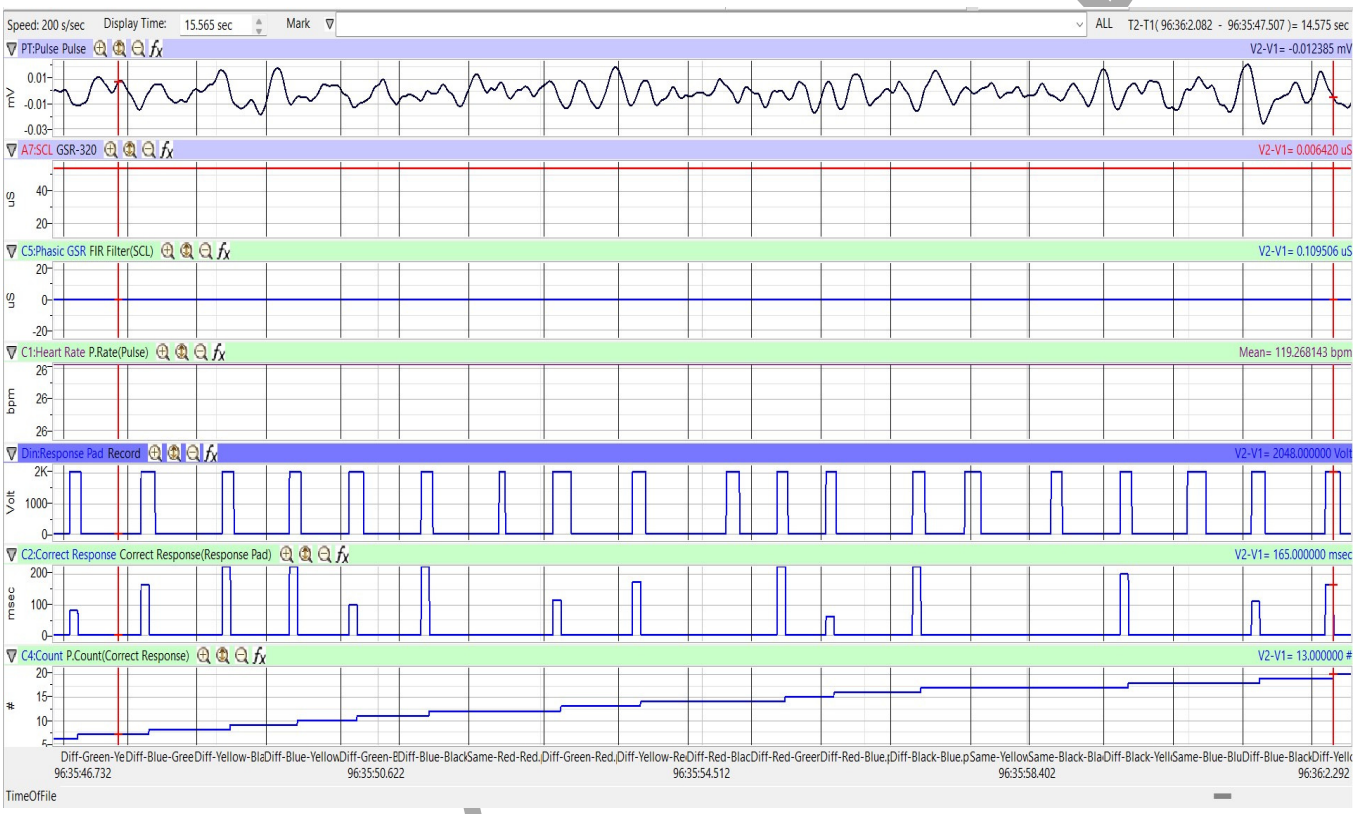

Figure HP-7-L3: Recording showing the responses to the colored words. Note that the pulse sensor has been removed from the finger.

Questions

1. Is there a difference between the changes in the subject's skin conductance level (SCL) during resting and when doing the Stroop Effect? Is there a difference between the subject's heart rate?
2. What could account for any differences seen?
3. Explain what is happening physiologically to cause these changes.
4. If the subject repeats the test, do any of the parameters change? Why or why not?

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Optional Exercises

Create your own Stroop Effect exercise using different parameters:

- numbers – roman numeral vs cardinal numbers
- squares of color vs triangles of color
- others can be found doing a simple Google search

Table HP-7-L1: Resting and Stroop Effect Responses

	Skin Conductance (µS)				Heart Rate (BPM)				Number Correct
Task	Max	Min	Mean	Max-Min	Max	Min	Mean	Max-Min	Completion of Task
RESTING									
STROOP EFFECT									

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