Psych 43: Galvanic skin response (GSR) and emotional responses

In front of you, you will find the iWorx recording module hooked up to a computer loaded with a program called LabScribe that will be used for data acquisition. The computer and recorder have already been set up for you (see Figure 1), so all you need to do is hook up your participant and begin recording! Follow the directions below to properly hook up a participant and use the recording software to record and save data.

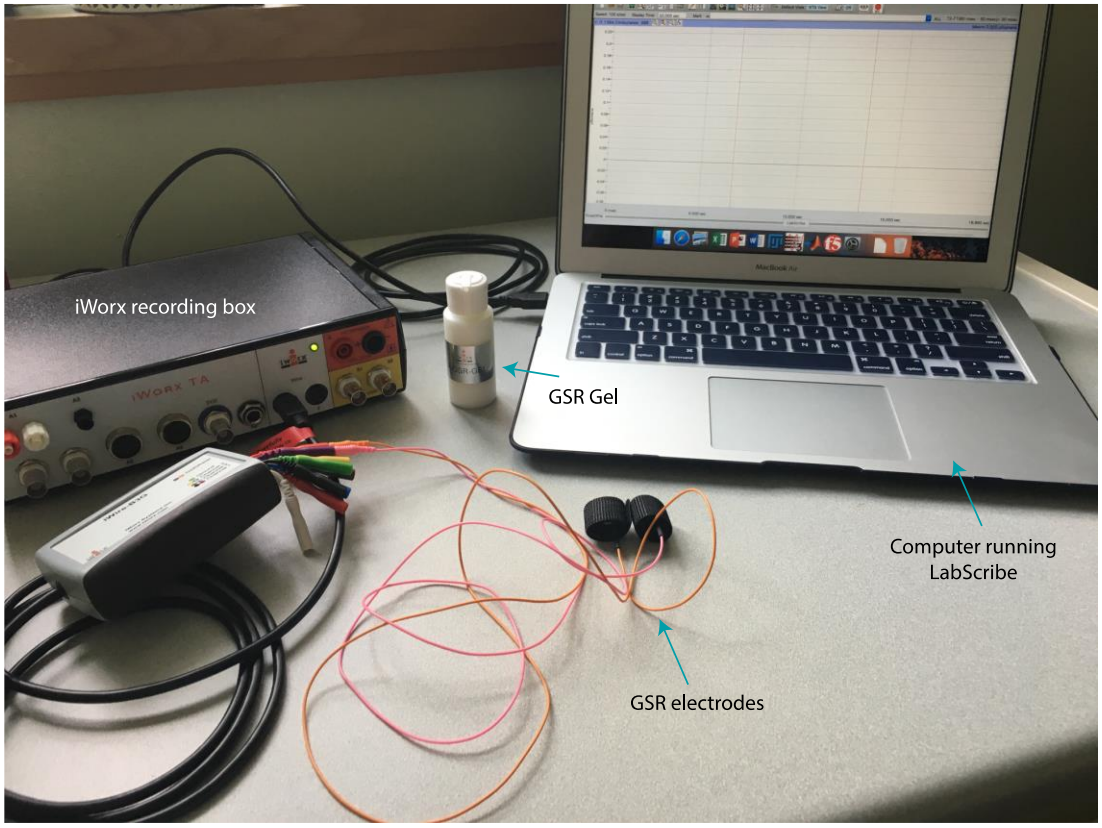

Figure 1. The iWorx physiology recording setup with labeled components.

Set-up

1. To begin, choose a person to be the Participant, Computer Operator, and the Question Asker (one person in each role).

2. Have the Participant remove all jewelry from her/his wrists and hands and then place one hand (left or right) on the table next to the iWorx module.

3. Attach the Galvanic Skin Response (GSR) electrodes to the volar surface (the part where the fingerprints are) of the pointer and ring finger of the Participant's hand. The electrodes should be placed at the base of the finger, not at the tip (see Figure 2), and the wires should extend out towards the tips of the fingers. Take care that the electrical wires leading to the electrodes are not tangled and that the wires are hanging freely. The Velcro should be snug, but not uncomfortable. It does not matter which color electrode goes on which finger.

a. Note: Make sure the Participant's fingers are not too cold or too dry. If the Participant's hands are very dry, use the GSR gel to moisten the surface where the electrode will contact the skin. Don't use too much gel, a little goes a long way! Be sure to rub in the gel as you would hand lotion.

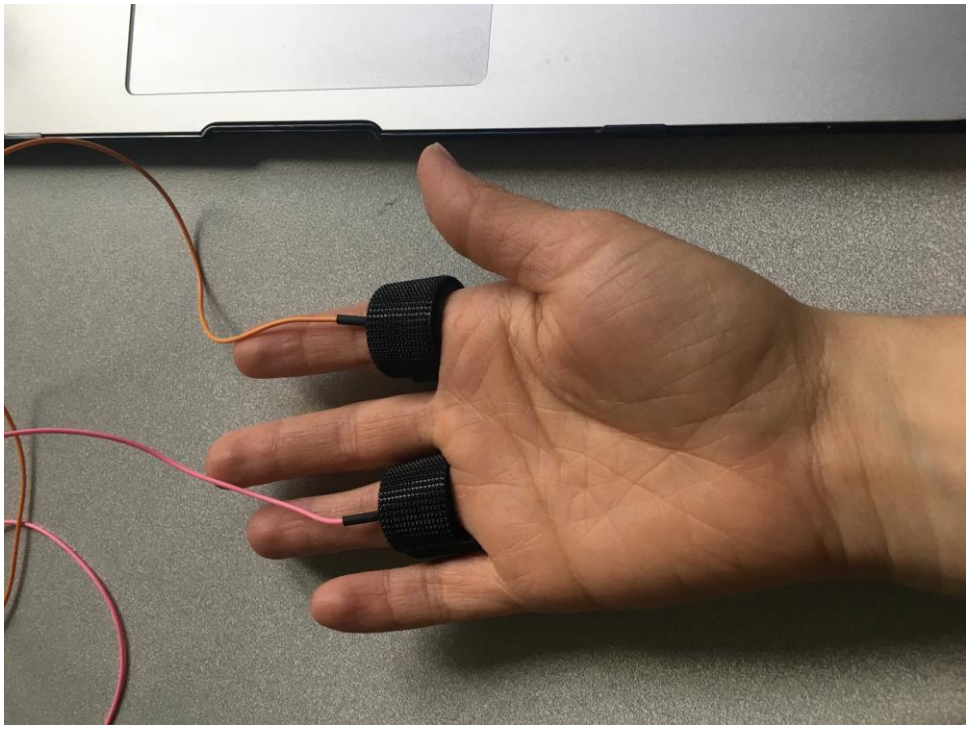

Figure 2. Correct placement of GSR electrodes.

4. The Participant should keep her/his hand resting palm up by the iWorx box, avoiding any extra pressure on the electrodes. The Participant should not move her/his hand during the recording as this can introduce large artifacts in the data (see Figure 5).

Recording data

5. Position the computer so that the participant cannot view the signals as they are being recorded (this can sometimes cause fluctuations in the data record). Have the Computer Operator hit the "Record" button on the top right side of the screen (see Figure 3). The recording will begin to scroll across the screen.

    a. To scale the channels, click the "Autoscale all channels" button (see Figure 3). This will change the zoom of the y-axis on each channel to optimally display the data. If you have any artifacts due to movement, you will need to wait until the section of the data containing the artifact has moved off of the screen and *then* hit "Autoscale all channels" again to have an appropriate view. You can hit this button at any time to more accurately see the data and it will not interfere with recording.

b. You may also need to change the scale of the x-axis by clicking the “Half display” or “Double display” buttons (See Figure 3) to speed up or slow down the scroll rate of the recording, respectively. You will notice that the time scale at the bottom of the screen changes when you do this.

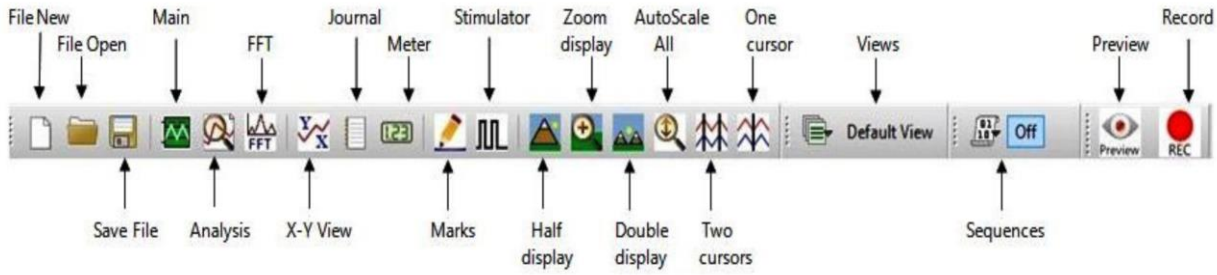

Figure 3. The LabScribe tool bar labeled.

6. The data scrolling on the screen is a measurement of the conductance of the Participant’s skin, sometimes called skin conductance level (SCL), and is measured in µSiemens. The SCL value should be less than 1,000 µSiemens, ideally between 200 and 300 µSiemens; if it is much higher or lower, adjust the electrodes, try applying the GSR gel, or attach the electrodes to a different participant. See Figure 4 below for example data (note the y-axis scale!).

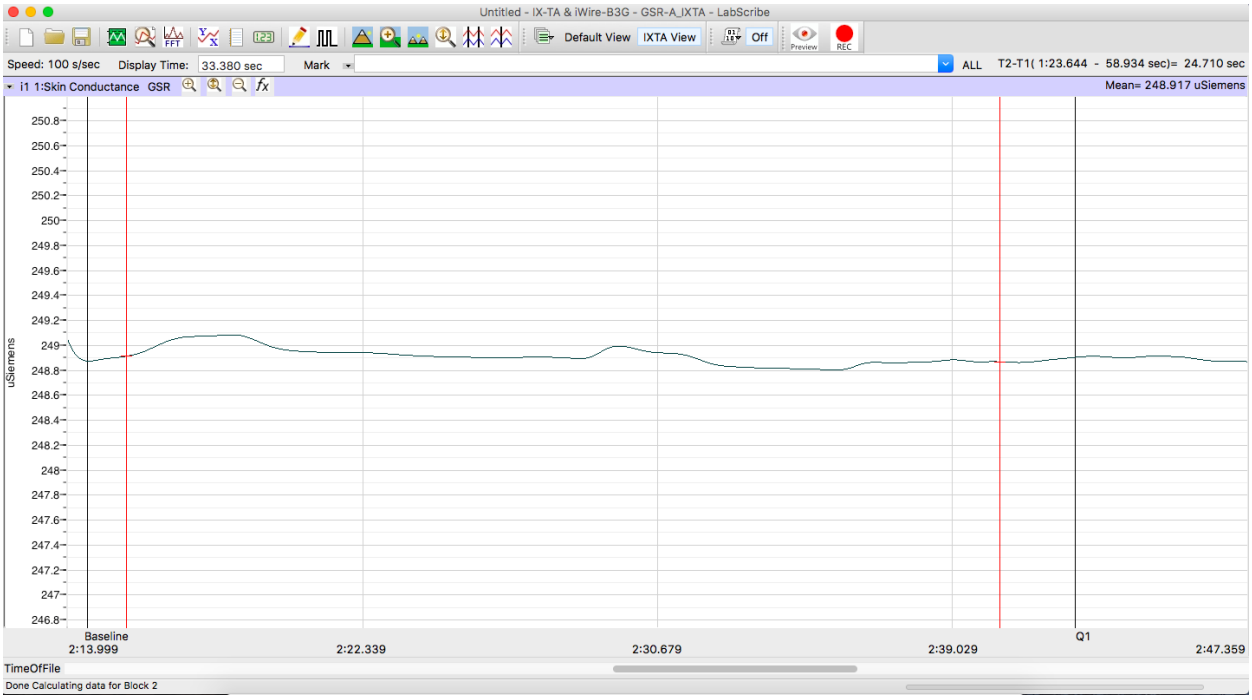

Figure 4. Example data for baseline skin conductance level (SCL).

7. Now you need to take a baseline measurement of the Participant’s SCL. Allow the Participant to rest quietly for about 30 seconds. After this rest period, the Computer Operator should type “Baseline SCL <Participant’s Name>” in the “Mark” field to the right of the “Mark” button. Then, hit return/enter to add this label to the data.

Continue to record for 30 more seconds.

8. After this 30 second baseline period, the Computer Operator should type “End Baseline” in the “Mark” field to the right of the “Mark” button. Then, hit return/enter to add this label to the data. Now, the Question Asker will begin asking questions.

9. Your group has been given two lists, one of neutral questions and another of emotional questions. The Question Asker will ask these questions of the Participant and the Participant should answer without moving. Before the Question Asker asks the question, the Computer Operator should type “NQ<Number of Question>” for neutral questions, and “EQ<Number of Question>” for emotional questions in the “Mark” field to the right of the “Mark” button. Then, hit return/enter to add this label to the data. This should be repeated for each question so that a label is placed on the record just prior to each question being asked.

10. The Question Asker should not ask the next question until the SCL response has returned back to baseline.

11. An example timeline for this procedure is thus:

    a. Computer Operator labels the record with “NQ1”

    b. The Question Asker reads question 1, “Is your name Jenny?”

    c. The Participant answers out loud “Yes” or “No”.

    d. The SCL record will change and then return back to baseline.

    e. The procedure repeats.

12. Do this until the Question Asker has asked all of the questions. Then, the Computer Operator should hit the “Stop” button on the top right side of the screen and then save the data. To save the data, select “Save As” in the File drop-down menu. Name the file with your Participant’s initials and the course number (i.e. “EKS_Psych43”). Save the file to a folder located on the desktop called “Psych 43”. Designate the file type as *.iwxdata. Click on the “Save” button to finish.

Data Analysis

13. Scroll through the data file and locate the 30 second section of the recording containing the Participant’s baseline SCL. Avoid areas with movement artifacts (see Figure 5). These will be a section of data with a large fluctuation in the record that is not related to a question or prompt to the Participant.

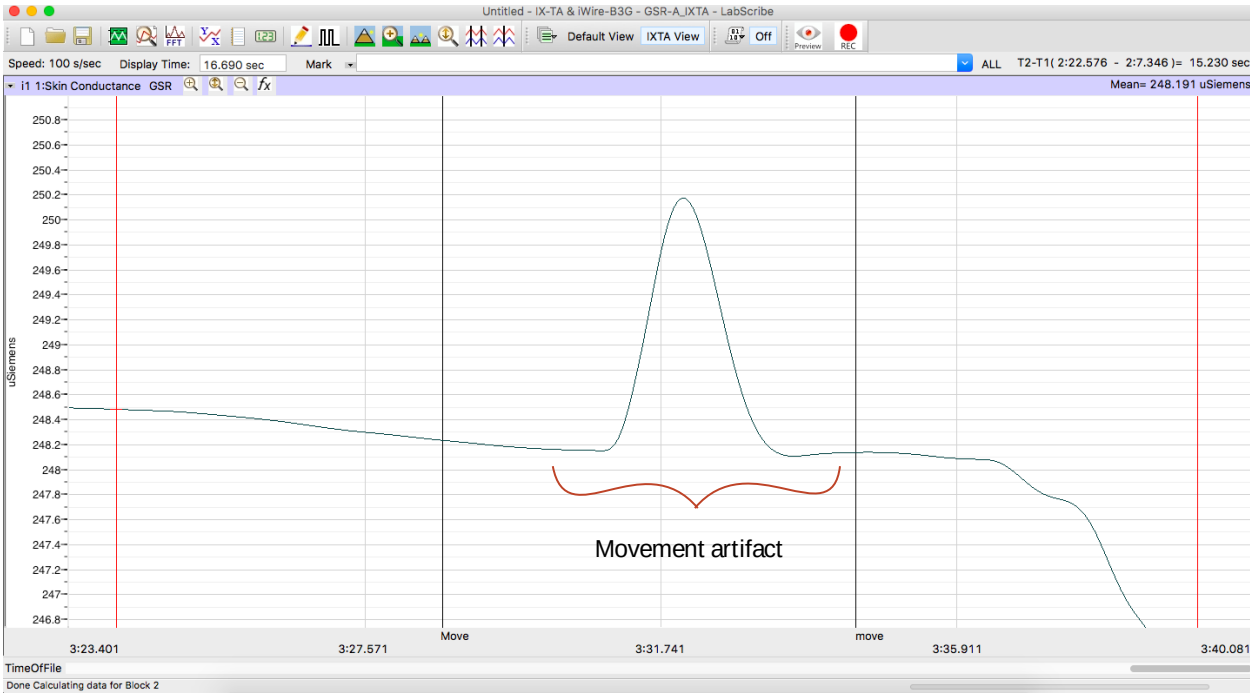

Figure 5. An example of a movement artifact on the SCL recording.

14. Using the “Half display” or the “Double display” icons in the LabScribe toolbar (see Figure 3), adjust the display time of the Main window to show this 30 second section of data all in one view.

15. Click on the “Analysis” icon in the toolbar or select “Analysis” from the “View” drop-down menu to open up the analysis toolbar.

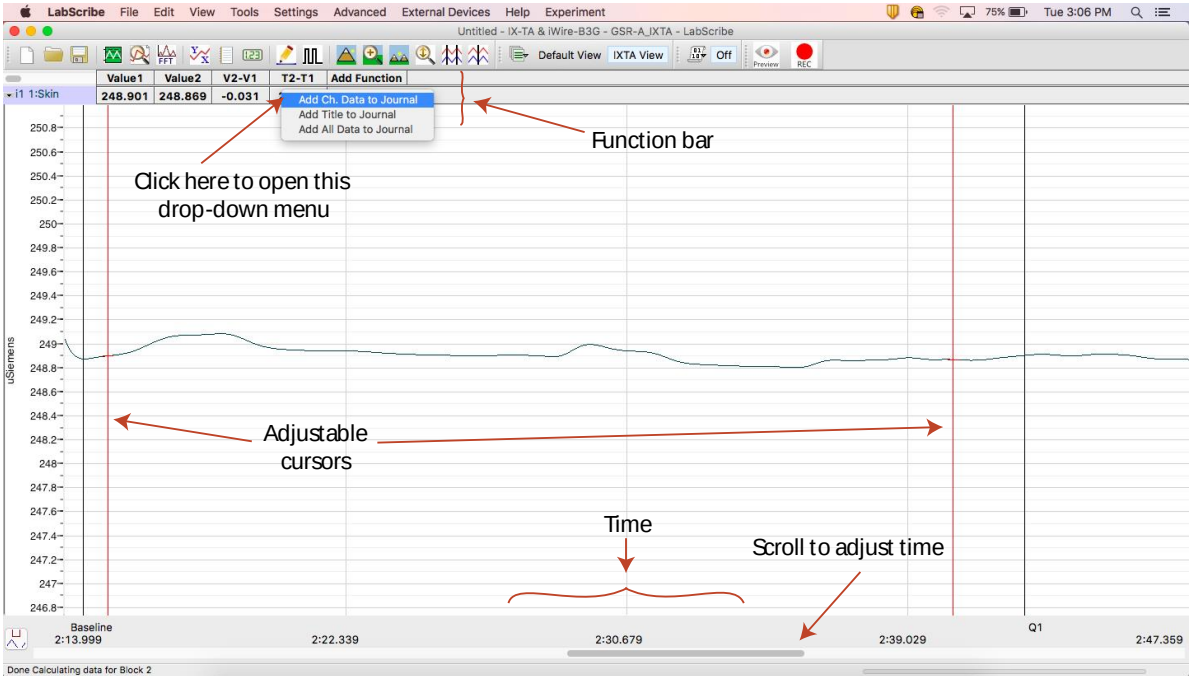

Figure 6. A labeled diagram of LabScribe showing the Analysis window.

16. Click the “Journal” button to open up the in-program journal. The Journal will appear on the right side of the program as a blank text are.

17. You will now make some measurements of the data. Place the cursors at the beginning and the end of the 30 second baseline period (see Figure 6). This tells the program the section of data that you would like to analyze. Place your cursor over the number display on the Function bar and click to reveal a dropdown menu where you can select “Add Title to Journal” (see Figure 6). This will bring the title of the Functions into the Journal so that you can better organize your data.

18. Repeat the above step, but instead of adding the channel title, select “Add Ch. Data to Journal” to transfer the data from the Participant’s SCL that you just measured to the Journal. This will transfer all of the values into the Journal, even though for the Baseline we will only use the mean data.

19. Now you will measure the SCL response of the Participant as he/she was questioned by the Question Asker. Scroll through the data file and locate the section of data where the Computer Operator marked the timing of the first question.

20. Use the Display icons as above to appropriately zoom the record so that you can see the entire SCL response of the Participant when Question 1 was asked.

21. Following a question, there may be an observable change in the Participant’s SCL. To measure this, place one cursor at the label on the data indicating when the question was asked. Place the second cursor to at the peak of the SCL response (see Figure 7).

    a. Note: For some questions, especially the neutral questions, there may not be much of an SCL response after the question was asked. In these cases, place the cursor just before the next question was asked.

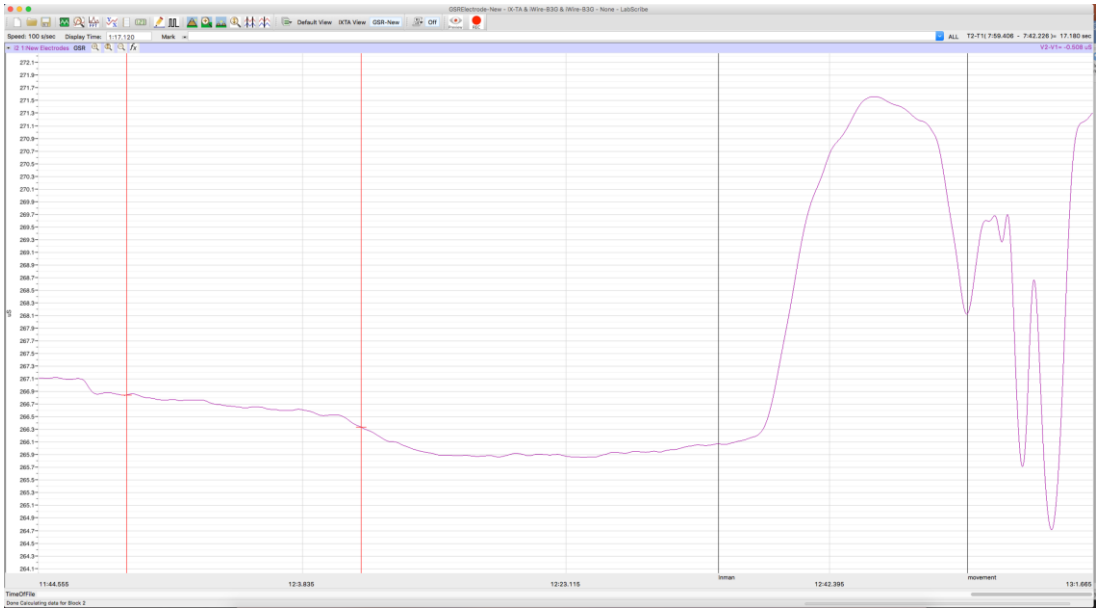

Figure 7. Example positive SCL response. Note large deflection of SCL on right side of record after mark.

22. Add the data to the Journal by selecting “Add Ch. Data to Journal”. All of the values for this response will be transferred to the Journal.

    a. V1 is the Baseline SCL value

    b. V2 is the magnitude of the SCL following the question

    c. V2-V1 is the difference between the SCL response and the baseline

    d. T2-T1 is the rate of change of the SCL response

    e. Area is a mathematical representation of the area on the graph encompassed by line created by the SCL response (calculated using an integral function). This also gives you an understanding of the magnitude of the response. (Thought question: How is this different from the mean of the selected data? Why would you use one of these values versus the other in your analysis?)

    f. Mean is the mean of the data represented by the line on the SCL record.

23. Repeat steps 19-22 for the remaining questions.