

# Experiment HP-28: Sports Psychology – Music and EEG

## Exercise 1: EEG while Resting

Aim: To learn how to record an EEG and Heart Rate while resting and become familiar the EEG waveform.

Approximate Time: 20 minutes

### *Procedure*

1. Ask the subject to sit quietly and not move unless told to do so, and to keep his or her eyes open or closed during this phase of the experiment.
2. Click on the Record button, located on the upper right side of the LabScribe Main window ([Figure HP-28-L1](#)). The signal should begin scrolling across the screen.
3. Click on the AutoScale All button. Your recording should look like [Figure HP-28-L1](#).
4. Type the “Resting EEG” in the Mark box to the right of the Mark button. Press the mark button to attach the comment to the data. Continue recording.
5. Record data while the subject is in a relaxed state for approximately 5 minutes.
6. Click Stop to halt 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.

### *Data Analysis*

1. Scroll through the data recorded in this exercise and find an artifact-free section of data recorded while the subject was resting. Ideally, you want to be looking at a minimum of 1 to 2 minutes of data.
2. Use the Display Time icons in the LabScribe toolbar ([Figure HP-28-L2](#)) to adjust the Display Time of the Main window to show a one minute artifact-free section of data on the Main window. This section of data can also be selected by:
  - Placing the cursors on either side of a one to two minute section of data.
  - Clicking the Zoom between Cursors button on the LabScribe toolbar to expand the period to the width of the Main window.

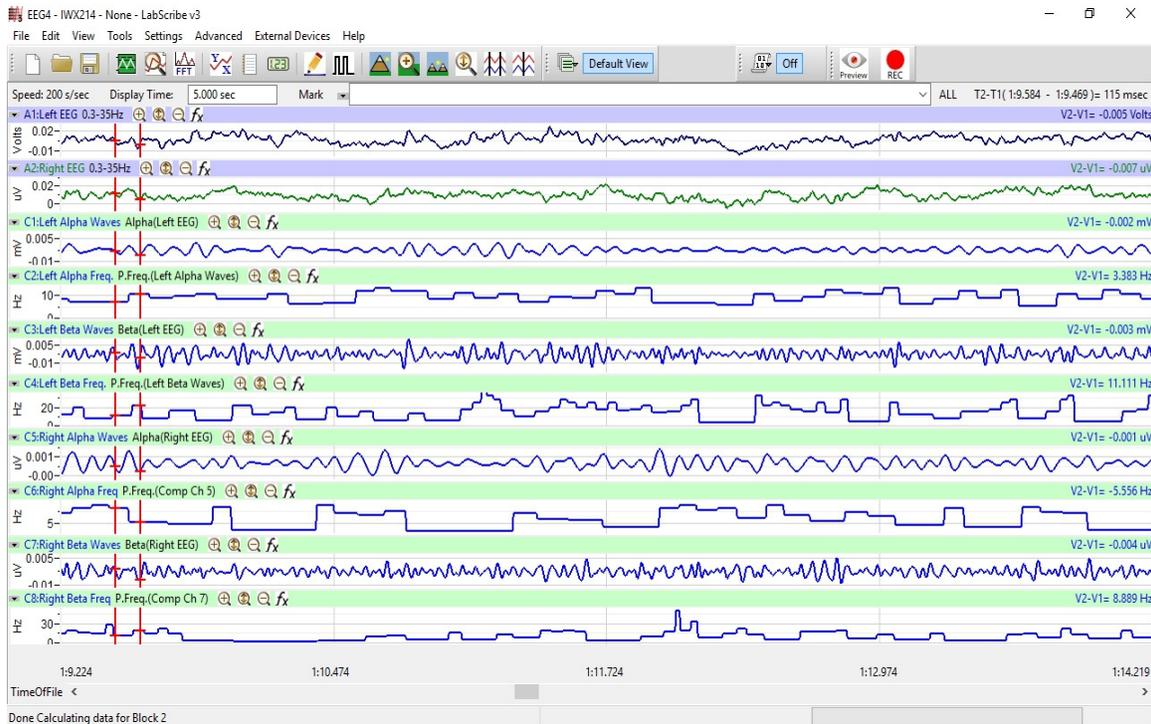


Figure HP-28-L1: Recording of EEG from the left and right temporal regions of the brain displayed on the Main window. The complete EEG signals are displayed in the two uppermost channels. The Alpha and Beta waves derived from the complete EEG signals and the frequencies of those waves from each temporal region are displayed on the lower channels

3. Click on the Analysis window icon in the toolbar or select Analysis from the Windows menu to transfer the data displayed in the Main window to the Analysis window ([Figure HP-28-L3](#)).
4. Look at the Function Table that is above the uppermost channel displayed in the Analysis window. The names of the mathematical function used in the analysis, Max-Min and Mean appears in this table. The values for Max-Min and Mean on each channel are seen in the table across the top margin of that channel.

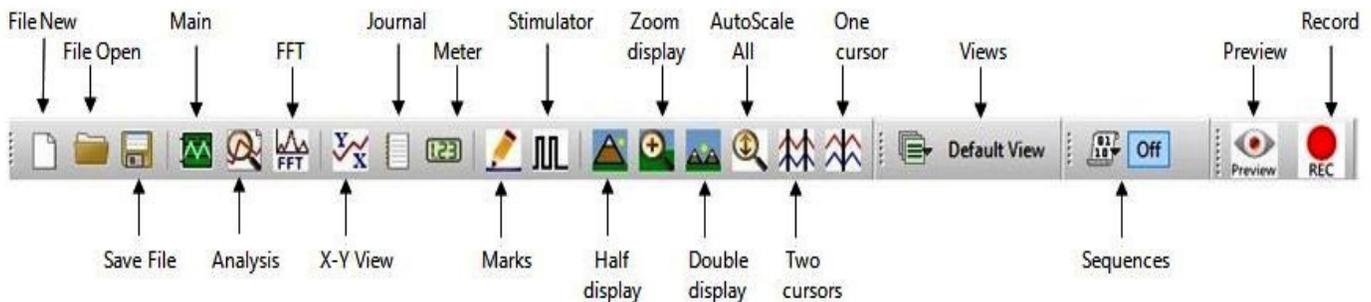


Figure HP-28-L2: The LabScribe toolbar.

- Once the cursors are placed in the correct positions for determining the difference between the maximum and minimum amplitudes and the mean frequency of the waves in a one minute section of data, the values of these parameters can be recorded in the on-line notebook of LabScribe by typing their names and values directly into the Journal, and on [Table HP-28-L1](#).

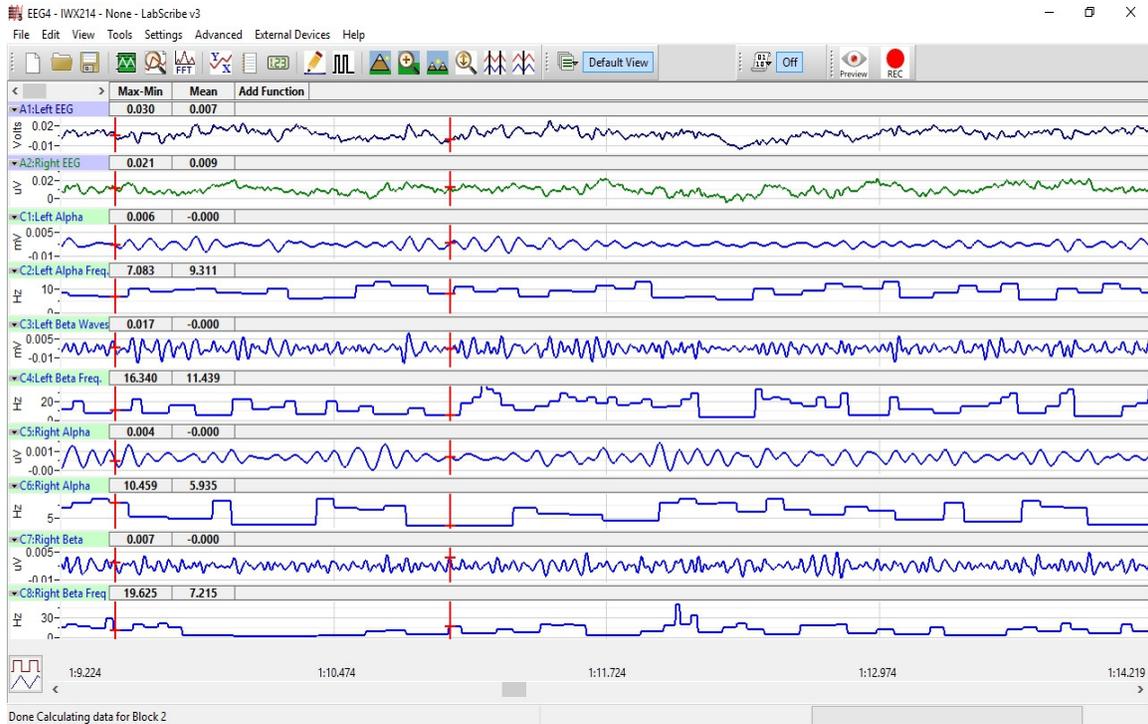


Figure HP-28-L3: Recording of the complete EEG signals, derived Alpha and Beta waves, and the wave frequencies displayed in the Analysis window.

- The functions in the channel pull-down menus of the Analysis window can also be used to enter the names and values of the means into the Journal. To use these functions:
  - Place the cursors at the locations used to measure the values for the parameters of the EEG waves in the selected region of data.
  - Transfer the name of the mathematical function used to determine the values of the parameters to the Journal using the Add Title to Journal function in the pull-down menu of any channel.
  - Transfer the values of the parameters of the EEG waves to the Journal using the Add Ch. Data to Journal function in the Left EEG Channel pull-down menu.
- Use the mouse to click on and drag a cursor to each margin of the data displayed on the Analysis window. The values for the following parameters should be recorded:
  - The differences between the maximum and minimum wave amplitudes (Max-Min) of the waves displayed on the Left Alpha, Left Beta, Right Alpha, and Right Beta Wave channels.

- The mean frequency (Mean) of the waves displayed on the Left Alpha, Left Beta, Right Alpha, and Right Beta Frequency channels.
- The mean heart rate (Mean) of the Heart Rate channel will generate the subject's average heart rate while resting.

8. Select Save in the File menu.

**Table HP-28-L1: EEG Frequencies & Amplitudes and Heart Rate – Resting and After Music**

	Max-Min Amplitude (mV) Resting	Mean Frequency (Hz) Resting	Max-Min Amplitude (mV) After Music	Mean Frequency (Hz) After Music
Left Alpha Waves				
Left Beta Waves				
Right Alpha Waves				
Right Beta Waves				
Mean Heart Rate				

**Exercise 2: The “Fight Song”**

Aim: To determine if listening to a “fight song” will alter the subject’s EEG or heart rate indicating arousal.

Approximate Time: 20 minutes

**Procedure**

1. Before beginning this exercise, inform the subject of the experimental conditions:
  - The subject should sit quietly with eyes closed throughout the recording period.
  - Let the subject know they will be listening to one or two songs that represent the “fight song” mentality.
  - Encourage the subject to “get into the zone” and enjoy listening.

2. Type “Music” in the Mark box to the right of the Mark button. Click on the Record button. Press the mark button.
3. Start the music for the subject. It is best to use headphones.
4. Click on the AutoScale All button. Continue recording while the subject is sitting quietly with his or her eyes closed. Record until the song or songs have ended.
5. Click Stop to halt recording.
6. Select Save in the File menu.

### ***Data Analysis***

1. Scroll through the recording and find the section of data that was recorded while the subject was listening to music
2. Repeat the analysis as explained for Exercise 1 and place the data in [Table HP-28-L1](#).

### **Questions**

1. What hemisphere has a higher level of Alpha wave activity during Rest? While listening to the music?
2. What hemisphere has a higher level of Beta wave activity during Rest? While listening to the music?
3. What was the subject’s heart rate at rest? While listening to the music?
4. Do these results demonstrate that the subject had an increased state of arousal when he or she was listening to music? Give the reasoning.
5. Do these results demonstrate one hemisphere had a higher state of arousal than the other? Give the reasoning.