Experiment HP-20

Relaxation & Music
Lab/Research Study

Background | Set-up | Lab

Note: The lab presented here is intended for evaluation purposes only. iWorx users should refer to the User Area on www.iworx.com for the most current versions of labs and LabScribe Software.
How does music relate to relaxation?

Music therapy has been used for centuries as a way to relax and improve overall health.

Science has just recently come up with the 10 most relaxing songs on earth according to a study documented by Inc.com (https://www.inc.com/melanie-curtin/neuroscience-says-listening-to-this-one-song-reduces-anxiety-by-up-to-65-percent.html).

Neuroscientists from the UK have specified which music has the most relaxing effects on the human body. The study was conducted on participants who attempted to solve difficult puzzles as quickly as possible while connected to sensors. These puzzles are known to cause levels of stress and subjects were monitored to measure EEG, heart rate, blood pressure, and rate of breathing.

Subjects were asked to listen to music while performing these tasks and according to Dr. David Lewis-Hodgson of Mindlab International (http://themindlab.co.uk/), which conducted the research, one song produced a greater state of relaxation than any other music tested to date.

The song, "Weightless" by Marconi Union, resulted in a 65 percent reduction in participants' overall anxiety, and a 35 percent reduction in their usual physiological resting rates.

The song was composed to be a relaxation inducing sound and was made in collaboration with sound/music therapists. Its carefully arranged harmonies, rhythms, and bass lines help slow a listener's heart rate, reduce blood pressure and lower levels of the stress hormone cortisol.

This can be tested right in the lab by recording the subject’s baseline values and then recording while they are listening to the song “Weightless”. You can also compare these “Top 10” relaxing songs to see if one really does work better than the others.

10. "We Can Fly," by Rue du Soleil (Café Del Mar) (https://www.youtube.com/watch?v=rbzuesSeDmQ)
7. "Pure Shores," by All Saints (https://www.youtube.com/watch?v=dVNdTXEJv1A)
6. "Please Don't Go," by Barcelona (https://www.youtube.com/watch?v=COqx-TCxrSk)
5. "Strawberry Swing," by Coldplay (https://www.youtube.com/watch?v=isH1yy8I_dc)
4. "Watermark," by Enya (https://www.youtube.com/watch?v=NO5tb20QnA)
2. "Electra," by Airstream (https://www.youtube.com/watch?v=FTvZ8a2gHFc)

NOTE – Headphones are strongly recommended to get the full effect of the song’s music
**Experiment HP-20: Relaxation & Music ~ Lab/Research Study**

**Equipment Required**
PC or Mac Computer
IXTA, USB cable, power supply
iWire-B3G GSR amplifier and electrodes
PT-104 Pulse plethysmograph
RM-204 Respiration Monitor

**Start the Software**

1. Click on LabScribe
2. Click Settings → Human Psychophysiology → RelaxingMusic
3. Once the settings file has been loaded, click the Experiment button on the toolbar to open any of the following documents:
   - Appendix
   - Background
   - Labs
   - Setup (opens automatically)

**Sensor Setup**

*Note: Connect the iWire-B3G to the IXTA prior to turning it on.*

1. Locate the PT-104 pulse plethysmograph and plug it into the Channel A5 input of the IXTA (*Figure HP-20-S1*).
   - Place the pulse sensor on the volar surface of the subject's thumb.
2. Locate the iWire-B3G Galvanic Skin Response amplifier and GSR electrodes (*Figure HP-20-S2*) in the iWorx kit.
   - Attach the purple and orange GSR electrodes to the correct connectors on the iWire-B3G.
     - *Note – the GSR unit is precalibrated. No other calibration is needed.*
   - Attach the GSR electrodes to the pointer and ring finger of the subject's hand. Make sure the fingers are not too cold or too dry. Moisten them with saliva or GSR conductive paste.
Figure HP-20-S1: PT-104 pulse plethysmograph and Figure HP-20-S2: The iWire-B3G Galvanic Skin Response amplifier. The purple and orange GSR electrodes are shown in this image. This will be plugged into the iWire 1 port on the front of the IX-TA

3. Locate the RM-204 respiration monitor and plug the connector into channel A6 on the front of the IXTA unit (Figure HP-20-S3).
   - Wrap the elastic belt of the respiration monitor around the subject’s chest at a level that is below the sternum. Place the sensor inside the belt so that the sensor is in the center of chest at a level that is even with the subject’s elbows.
   - If the subjects are sitting during these exercises, they should sit erect so that the muscles involved in pulmonary ventilation are able to move with few restrictions.
   - Stop the experiment if the subject feels dizzy or nauseated.

Figure HP-20-S3: RM-204 respiration monitor belt.
Figure HP-20-S4: The IXTA with the PT-104 and RM-204 plugged into the correct channels.

Figure HP-20-S5: The IXTA showing the proper connection for the iWire-B3G GSR unit.
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This lab is meant to be a lab where students will determine how they want to test a study that has already been completed by someone else. Students can choose to test baseline against relaxing music; one relaxation song against another; provide a subject with a known stress-inducing situation and then record data while being stressed and then while being stressed and listening to one of the songs; or any other hypothesis about how the music can lessen stress.

Sample Exercise: Measuring Pulse, Heart Rate, Galvanic Skin ResponseRespiration and Breathing Rate Before and While Listening to “Weightless” by Marconi Union

Aim: To measure the subject’s skin conductance, heart rate and breathing rate before and while listening to relaxing music.

Approximate Time: 30 minutes or more

Procedure

1. Select one person from your group to be the subject. Ask the subject to go to the sink, wash his or her hands with soap and water, and dry them thoroughly. Washing the hands insures that surface oils or other substances, which might lower skin conduction, are removed. Do not use alcohol to clean the fingers, alcohol dehydrates the skin.

2. Connect the GSR electrodes as stated in the set up document.

3. Connect the pulse sensor and respiration monitor as outlined in the set-up procedure.

4. Using the non-dominant hand, attach each GSR electrode to the volar surface of 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. You may need to slightly moisten the finger tips for good conduction.

5. Attach the pulse sensor to the volar surface of the subject’s thumb of the same hand.

6. The subject should rest his or her hand with the sensors attached comfortably. The GSR electrodes should be free from any extraneous pressure and the electrode cable should be hanging freely. Instruct the subject not to move the hand during the recording process; movement may introduce artifacts into the recording.

7. Attach the respiration monitor to the subject’s chest. This works best if it is placed under the shirt, so the subject may want to put this on themselves.

8. Connect headphones to the computer audio jack. This is recommended to get the best out of the music.

9. Click on the Record button. Enter the subject's name in the Mark box and press the mark button. Since the GSR amplifier is already calibrated, the value displayed on the Skin Conductance Level channel is the baseline skin conductance level (SCL) of the subject (Figure HP-20-L1). Record the subject’s baseline SCL for approximately one minute until the recording stabilizes.

10. Click Stop to halt the recording.
11. Select Save As in the File menu, type a name for the file. Click on the Save button to save the data file.

12. Click on the Record button. Record the subject’s baseline for approximately 5 minutes.

13. Click Stop and save the data file.

14. Click record and have the subject start listening to one of the songs chosen from the list.

15. Continue recording until the song is over. Click Stop.

16. Click on the Save button to save the data file.

17. Repeat this exercise on other subjects in your lab group.

Data Analysis

1. Scroll through the data file and locate the recording of the subject’s baseline values.

2. Use the Display Time icons to adjust the Display Time of the Main window to display the one minute recording of the subject’s baseline SCL on the Main window. This section of data can also be selected by:
   - Placing the cursors on either side of one minute of baseline data recording of the subject’s SCL, HR and BR.
• Clicking the Zoom between Cursors button on the LabScribe toolbar (Figure HP-20-L2) to expand or contract the one minute recording to the width of the Main window.

3. On the right hand margin of the Skin Conductance, Heart Rate and Breathing Rate channels, the mathematical function, Mean, should appear. The value for mean baseline skin conductance level, mean heart and breathing rates are displayed on each of the corresponding channels.

Figure HP-20-L2: The LabScribe toolbar.

4. These values can be recorded in the on-line notebook of LabScribe by typing the name and value of the parameter directly into the Journal.

5. Move the cursors to the section of data where the subject was listening to music. Position the cursors to have at least 1 minute of data on screen.

• Note – you may want to look at different 1 minute periods of data while the subject was listening to determine if time has any affect on relaxation.

6. Repeat step 3 to record the mean skin conductance, HR and BR while listening to music.

Table HP-20-L1: Baseline SCL & Temperature vs. SCL & Temperature after Imagery

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<tr>
<th>Name</th>
<th>Mean Baseline SCL (µS)</th>
<th>Mean Baseline HR (bpm)</th>
<th>Mean Baseline BR (bpm)</th>
<th>Relaxing Music SCL (µS)</th>
<th>Relaxing Music HR (bpm)</th>
<th>Relaxing Music BR (bpm)</th>
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