Experiment HP-5C: Vigilance and Reaction Time

This lab is part 3 of a series of 4 labs. All labs can be done individually, but it is best to do them in this order:

1) Heart Rate, Blood Pressure, and Vagal Tone
2) Personality and Vagal Tone
3) Vigilance and Reaction Time
4) Hot Reactor

Equipment Required

PC or Mac Computer

IXTA, USB cable, IXTA power supply

EM-220 Event Marker – used in the Vigilance-Reaction Time lab

PT-320 Pulse plethysmograph – also used in the Personaly & Vagal Tone, Vigilance-Reaction Time and Hot Reactor labs

BP-220 or BP-220A Non-invasive blood pressure transducer – also used in the Hot Reactor lab

Black tygon tubing

RM-204 Respiration monitor – used in the Personality-Vagal Tone and Hot Reactor labs

RM-220 Nasal Cannula – used in the Personality-Vagal Tone and Hot Reactor labs

Blood Pressure and Pulse Transducers Setup

1. Locate the EM-220 event marker and PPG-320 pulse plethysmograph.
2. Plug the connector of the EM-220 into the event marker channel on the back of the IXTA.
3. Plug the PPG-320 into the PT port.

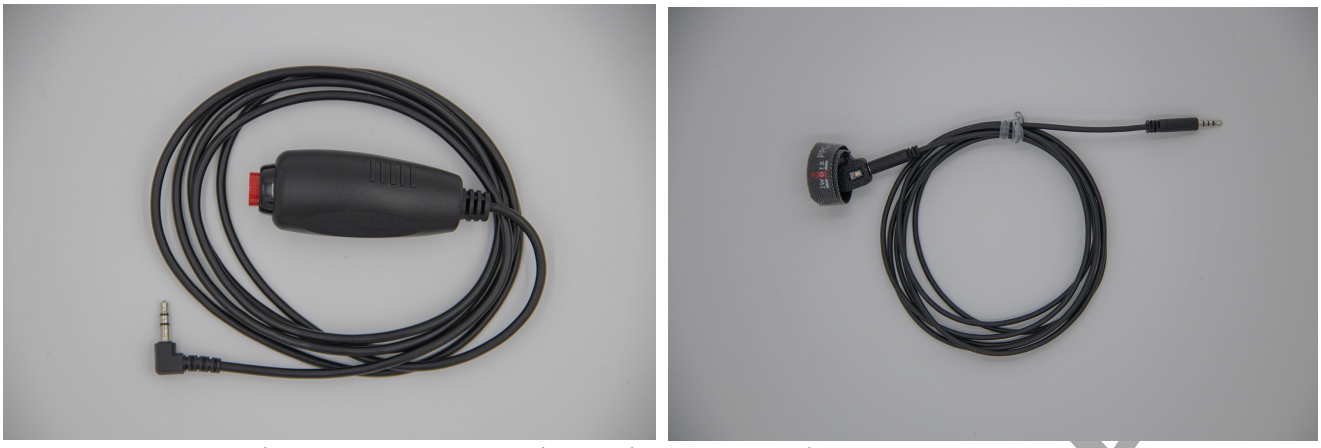

Figure HP-5-S1: The EM-220 event marker and PPG-320 pulse sensor

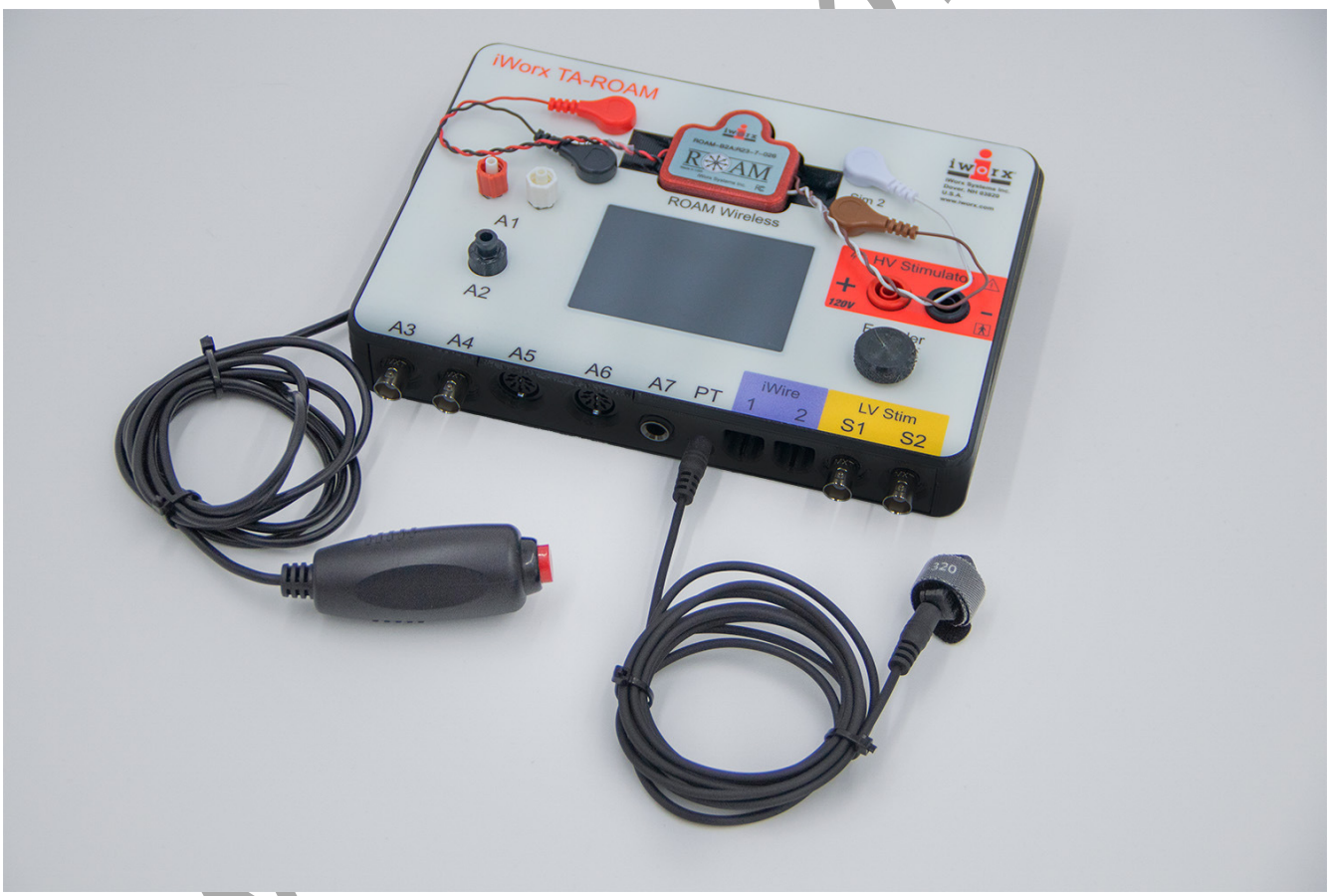

Figure HP-5-S2: The PPG-320 pulse transducer and the EM-220 event marker connected to an IXTA.

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Exercise 1: Vigilance-Reaction Time Task

Aim: To determine if vigilance or careful monitoring of the environment has any effect on heart rate.

Approximate Time: 15 minutes

Procedure

1. Ask the subject to sit quietly as the rest of your group prepares for this exercise.
2. One person will be pressing the event marker and running the computer. The other person is the subject and will be clicking the F1 key on the keyboard.
3. Before beginning the exercise, inform the subject of the experimental conditions:
    - When the event marker is pressed and released quickly, a signal will appear in the Event Marker channel.
    - The subject should watch for appearance of the signal at the right margin of the computer screen. As soon as the subject sees the signal pulse, the subject should press the F1 key on the keyboard to place a mark on the data record.
    - The signals from the event marker will appear on the computer at intervals between four and eight seconds. A total of ten signal pulses will appear on the screen.
3. Record a new baseline heart rate for the subject, since their resting heart rate may have changed over the course of the experiment if you are doing this after HP-5 – HeartRate,BP&VagalTone.
4. Type **Baseline HR** in the Mark box.
5. Click Record to begin recording the finger pulse of the subject. Click AutoScale All to increase the size of the signals. Click the mark button. Record for one minute.
6. Click Stop to halt the recording.
7. Type **Reaction Time 1** in the Mark box. Instruct the subject to place their finger on the F1 key of the keyboard, and to watch the trace on the Event Marker channel.

PPG-320 should be on the subject's hand that is not pressing the F1 key.

8. Click Record. Quietly press the button of the event marker to create a signal on the Event Marker channel. The subject should press the F1 key as soon as possible after the event marker waves appears on the computer screen. Continue recording as nine more event mark signals are delivered to the subject and the subject responds to the signals by pressing the F1 key.
9. After the subject's response to the tenth event mark signal, click Stop to halt the recording.
10. Select Save in the File menu.
11. Repeat the experiment two more times. Wait 5 minutes between each trial.

Data Analysis

1. Scroll through the data file and find the recording of the subject's baseline heart rate.
2. Use the double display time icon to position the heart rate data taken during this period in the Main window and click the Analysis button.
3. Click and drag one cursor to the beginning of the data displayed. Drag the other cursor to the end of the same data and measure the following:
    - **Maximum Heart Rate.** The value for Max on the Heart Rate channel is the subject's maximum heart rate during the baseline recording.
    - **Minimum Heart Rate.** The value for Min on the Heart Rate channel is the subject's minimum heart rate during the baseline recording.
    - **Mean Heart Rate.** The value for Mean on the Heart Rate channel is the subject's mean heart rate during the baseline recording.
4. Record the values for these rates in the Journal and in Table 1.
5. Scroll through the recording and locate the section of data recorded during the subject's reaction time period.
6. Repeat Steps 2 through 4 for the reaction time data.

Questions

1. Is the subject's mean heart rate higher or lower in the vigilance-reaction time period than in the baseline period?
2. Does your data support the hypothesis that heart rate decreases when tasks that require the careful monitoring of the environment are performed?

Table HP-5-L1: Heart Rates for Reaction Times

Subject_____			
Experimental Condition	Maximum Heart Rate (BPM)	Minimum Heart Rate (BPM)	Mean Heart Rate (BPM)
Reaction Time			

References

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