

# Experiment HP-6: Cynicism/Hostility and the “Hot Reactor”

## Exercise 1: Baseline Heart Rate and Blood Pressure

Aim: To determine the resting heart rate and blood pressure of the subject.

### Procedure

1. Select a subject. Instruct the subject to sit down and relax, with both hands in his or her lap.
2. While the subject is relaxing, place the blood pressure cuff of the BP-600 around the upper portion of the left arm, just above the elbow. Place the PT-104 pulse plethysmograph on the volar surface (where the fingerprints are located) of the distal segment of the left middle finger or thumb. Wrap the Velcro strap around the end of the finger to attach the unit firmly in place.

**Note:** If the user clicks the Record button and there is no communication between the iWorx unit and computer, an error window will appear in the center of the Main window. Make sure the iWorx unit is turned on and connected to the USB port of the computer. Click OK and select the Find Hardware function from the LabScribe Tools menu.

3. Click on the Record button, located on the upper right side of the LabScribe Main window. The signals being recorded should begin scrolling across the screen.
4. Click on the AutoScale buttons at the upper margins of the Pulse and Heart Rate channels. The pulse signals and heart rate histogram should expand to fill the each window.
5. Click Stop to halt recording; your record should look like [Figure HP-6-L1](#). If the signal on the Pulse channel is upside down when compared to trace in figure, click on the downward arrow to the left of the channel title and select the Invert function. The trace should now look similar to.



Figure HP-6-L1: Pulse and heart rate data from a relaxing subject.

- Type Baseline HR/BP <Subject's Name> in the Mark box to the right of the Mark button.
- Click Record and press the Enter key on the keyboard to mark the recording. Continue recording.



*Figure HP-6-L2: The pulse waves and the pressure in the BP-600 recorded during the occlusion of the brachial artery as displayed in the Main window. Pulses disappear when the pressure in the cuff exceeds the pressure in the artery. The pulse wave reappears when the pressure in the cuff is released, The subject's heart rate is recorded on the bottom channel.*

- After recording for one minute, inflate the blood pressure cuff until the finger pulse wave on the Pulse channel disappears ([Figure HP-6-L2](#)).
- Once the pulse wave disappears, release the cuff pressure at the rate of ~10 mmHg/second. Continue to release the pressure in the cuff until the aneuroid gauge reads 20 mmHg.
- Click the Stop button. Make sure the blood pressure cuff is completely deflated and is not putting any unnecessary pressure on the subject's arm.
- The subject should continue to relax between Exercises 1 and 2. To improve circulation in his or her arm, the subject should flex and extend their fingers to encourage blood circulation.
- Select Save in the File menu.

### **Data Analysis - Baseline Heart Rate**

- Scroll through the recording and find the section of data recorded before the pressure in the cuff was blocking the pulse ([Figure HP-6-L1](#)).
- Use the Display Time icons to adjust the Display Time of the Main window to show a thirty-second, artifact-free section of the subject's pulse and heart rate while relaxing on the Main window. This section of data can also be selected by:

- Placing the cursors on either side of the section of data needed.
  - Clicking the Zoom between Cursors button on the LabScribe toolbar to expand the segment of data to the width of the Main window.
3. Click on the Analysis window icon in the toolbar ([Figure HP-6-L3](#)) or select Analysis from the Windows menu to transfer the data displayed in the Main window to the Analysis window.

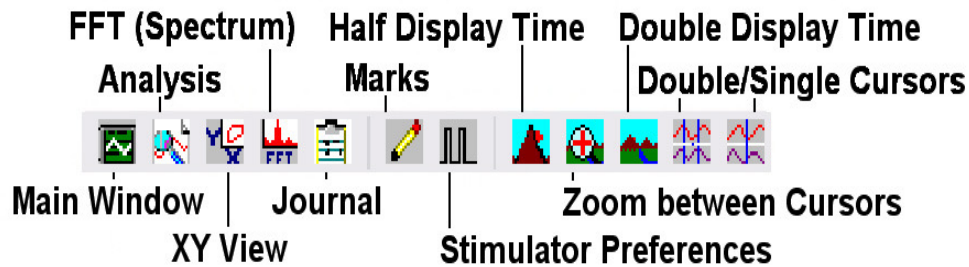


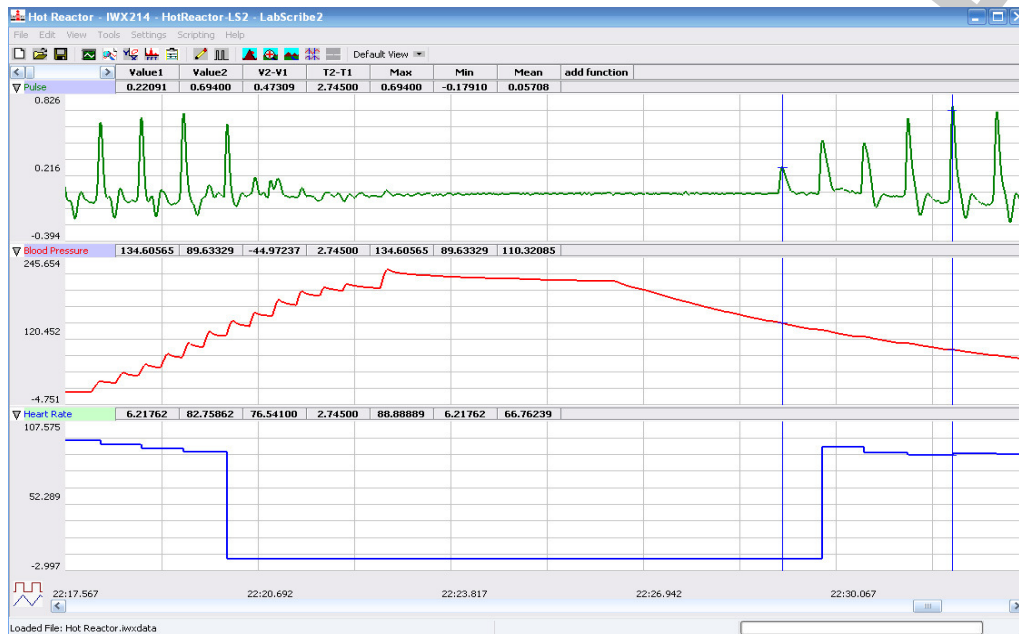
Figure HP-6-L3: LabScribe Toolbar

4. Look at the Function Table that is above the uppermost channel displayed in the Analysis window. The mathematical functions that are listed should include Value1, Value2, V2-V1, T2-T1, Max, Min, and Mean. The values for these parameters from each channel are seen in the table across the top margin of each channel.
5. Once the cursors are placed in the correct positions for determining the maximum, minimum, and mean heart rates, these rates can be recorded in the on-line notebook of LabScribe by typing the names and values directly into the Journal.
6. The functions in the channel menus of the Analysis window can also be used to enter the names and values of the parameters from the recording to the Journal. To use these functions:
- Place the cursors at the locations used to measure the cuff pressures from the Heart Rate channel.
  - Transfer the names of the mathematical functions used to determine the heart rates to the Journal using the Add Title to Journal function in the Heart Rate channel menu.
  - Transfer the value for the blood pressure to the Journal using the Add Ch. Data to Journal function in the Heart Rate channel menu.
7. On the Heart Rate channel, click and drag one cursor to the left margin of the data displayed in the Analysis window. Drag the other cursor to the right margin 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 while relaxing.
  - **Minimum Heart Rate.** The value for Min on the Heart Rate channel is the subject's minimum heart rate while relaxing.
  - **Mean Heart Rate.** The value for Mean on the Heart Rate channel is the subject's mean heart rate while relaxing.

- Record the values for these rates in the Journal using one of the techniques described in Steps 5 or 6, and in [Table HP-6-L1](#).

### Data Analysis - Baseline Blood Pressure

- Scroll through the recording and find the section of data recorded before, during, and after the pressure in the cuff was blocking the pulse ([Figure HP-6-L2](#)).
- Use the same procedures used in the previous section to position the blood pressure data in the Main window, display the selected data in the Analysis window, position the cursors to make measurements, and record the values of the parameters in the Journal and in [Table HP-6-L1](#).



*Figure HP-6-L4: The pulse waves and the pressure in the BP-600 recorded during the occlusion of the brachial artery as displayed in the Analysis window. The names and values of the parameters measured appear in the tables above the channels.*

- On the Pulse channel, use the mouse to click on and drag the cursors to specific points on the recording in the Analysis window ([Figure HP-6-L4](#)) to measure the following:
  - Systolic blood pressure. To determine the subject's systolic blood pressure, place a cursor on the first pulse wave that reappears after the pressure from the cuff of the BP-600 is released. The value for Value1 on the Blood Pressure channel is the subject's systolic blood pressure.
  - Diastolic blood pressure. To determine the subject's diastolic blood pressure, place the other cursor on the first of the largest pulse waves that reappear as the pressure from the cuff of the BP-600 is released. The value for Value1 on the Blood Pressure channel is the subject's diastolic blood pressure.
  - Pulse pressure, or difference between the systolic and diastolic pressures. To measure the pulse pressure, leave the cursors used to measure the systolic and diastolic pressures.

The value for V2-V1 on the Blood Pressure channel is the subject's pulse pressure.

- Record the values for these pressures in the Journal using one of the techniques described in Steps 5 or 6 of the previous section, and in [Table HP-6-L1](#).

**Table HP-6-L1: Baseline Heart Rates and Blood Pressures**

Subject_____	Baseline-Relaxation
Maximum Heart Rate (BPM)	
Minimum Heart Rate (BPM)	
Mean Heart Rate (BPM)	
Systolic Pressure (mmHg)	
Diastolic Pressure (mmHg)	
Pulse Pressure (mmHg)	

### Exercise 2: Physiological Response to Debating

Aim: To measure any change in the subject's heart rate and blood pressure during and after a 5-minute debate on social issues.

#### Procedure

- Ask the subject to draw, at random, one slip of paper with the title of a social issue taken from the list provided. Instruct the subject that he or she has two minutes to jot down ideas about his or her point of view on the issue. Meanwhile, the other members of your group should be thinking about possible alternative points of view with respect to the issue drawn.
- Type Begin Debate <Subject's Name> in the Mark box to the right of the Mark button.
- Click Record. Click AutoScale for the Pulse and Heart Rate channels to increase the displayed size of the signals.
- When the subject begins his or her presentation about the issue, press the Enter key on the keyboard to mark the beginning of the five minute debate period.
- When the subject's presentation is concluded, the remainder of the five minute period is a round-table debate on the issue. Give the subject the opportunity to respond to the alternatives being presented by other persons in the group.
- Type Debate End-BP in the Mark box. At the end of the five-minute debate period, press the Enter key to mark the recording. Continue recording.
- Take the subject's blood pressure at the end of the debate period. It is important to measure the subject's blood pressure as soon as possible.

8. Inflate the blood pressure cuff until the finger pulse wave on the Pulse channel disappears ([Figure HP-6-L2](#)).
9. Once the pulse wave disappears, release the cuff pressure at the rate of ~10 mmHg/second. Continue to release the pressure in the cuff until the aneroid gauge reads 20 mmHg. Make sure the blood pressure cuff is completely deflated and is not putting any unnecessary pressure on the subject's arm. Continue to record for two minutes.
10. Instruct the subject to relax during the two-minute recovery period. Type Begin Recovery in the Mark box. Press the Enter key on the keyboard.
11. Type End Recovery-BP in the Mark box. At the end of the two-minute recovery period, press the Enter key to mark the recording. Continue recording as you take the subject's blood pressure at the end of the two-minute recovery period.
12. Click Stop to halt the recording. Remove the cuff from the subject's arm. The subject should flex and extend his or her fingers to encourage blood circulation.
13. Select Save in the File menu.
14. Repeat this exercise for each member of the lab group. Open and save a new data file for each subject.

#### ***Data Analysis - Debate Period Heart Rate***

1. Scroll through the recording and locate the section of data recorded during the subject's debate period.
2. Use the Display Time icons or the Zoom between Cursors functions to adjust the Display Time of the Main window to show the complete five-minute recording of the subject's pulse and heart rate while debating on the Main window.
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.
4. On the Heart Rate channel, click and drag one cursor to the left margin of the data displayed in the Analysis window. Drag the other cursor to the right margin 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 while debating.
  - **Minimum Heart Rate.** The value for Min on the Heart Rate channel is the subject's minimum heart rate while debating.
  - **Mean Heart Rate.** The value for Mean on the Heart Rate channel is the subject's mean heart rate while debating.
5. Record the values for these rates in the Journal using one of the techniques described in Exercise 1, and in [Table HP-6-L2](#).

### ***Data Analysis - Debate Period Blood Pressure***

1. Scroll through the recording and find the section of data when the subject's blood pressure was recorded at the end of the debate period.
2. Use the same procedures used in the previous section to position the blood pressure data in the Main window, and display the selected data in the Analysis window.
3. On the Pulse channel, use the mouse to click on and drag the cursors to specific points on the recording in the Analysis window to measure the following:
  - Systolic blood pressure. To determine the subject's systolic blood pressure, place a cursor on the first pulse wave that reappears after the pressure from the cuff of the BP-600 is released. The value for Value1 on the Blood Pressure channel is the subject's systolic blood pressure.
  - Diastolic blood pressure. To determine the subject's diastolic blood pressure, place the other cursor on the first of the largest pulse waves that reappear as the pressure from the cuff of the BP-600 is released. The value for Value1 on the Blood Pressure channel is the subject's diastolic blood pressure.
  - Pulse pressure, or difference between the systolic and diastolic pressures. To measure the pulse pressure, leave the cursors used to measure the systolic and diastolic pressures. The value for V2-V1 on the Blood Pressure channel is the subject's pulse pressure.
4. Record the values for these pressures in the Journal using one of the techniques described in Exercise 1, and in [Table HP-6-L2](#).

### ***Data Analysis - Recovery Period Heart Rate***

1. Scroll through the recording and locate the section of data recorded during the subject's recovery period.
2. Use the same procedures used in the previous section to position the heart rate data from the recovery period in the Main window, and display the selected data in the Analysis window.
3. On the Heart Rate channel, click and drag one cursor to the left margin of the data displayed in the Analysis window. Drag the other cursor to the right margin 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 while recovering.
  - Minimum Heart Rate. The value for Min on the Heart Rate channel is the subject's minimum heart rate while recovering.
  - Mean Heart Rate. The value for Mean on the Heart Rate channel is the subject's mean heart rate while recovering.
4. Record the values for these rates in the Journal using one of the techniques described in Exercise 1, and in [Table HP-6-L2](#).

### ***Data Analysis - Recovery Period Blood Pressure***

1. Scroll through the recording and find the section of data when the subject's blood pressure was recorded at the end of the recovery period.
2. Use the same procedures used in the previous section to position the blood pressure data in the Main window, and display the selected data in the Analysis window.
3. On the Pulse channel, use the mouse to click on and drag the cursors to specific points on the recording in the Analysis window to measure the following:
  - Systolic blood pressure. To determine the subject's systolic blood pressure, place a cursor on the first pulse wave that reappears after the pressure from the cuff of the BP-600 is released. The value for Value1 on the Blood Pressure channel is the subject's systolic blood pressure.
  - Diastolic blood pressure. To determine the subject's diastolic blood pressure, place the other cursor on the first of the largest pulse waves that reappear as the pressure from the cuff of the BP-600 is released. The value for Value1 on the Blood Pressure channel is the subject's diastolic blood pressure.
  - Pulse pressure, or difference between the systolic and diastolic pressures. To measure the pulse pressure, leave the cursors used to measure the systolic and diastolic pressures. The value for V2-V1 on the Blood Pressure channel is the subject's pulse pressure.
4. Record the values for these pressures in the Journal, using one of the techniques described in Exercise 1, and in [Table HP-6-L2](#).

### ***Calculations - Individual Data***

1. Calculate the subject's debate reactivity scores for the mean heart rate, systolic pressure, diastolic pressure, and pulse pressure by subtracting the baseline value of the parameter from the debate value of the same parameter. For example,

$$\text{mean HR}_{\text{debate}} - \text{mean HR}_{\text{baseline}} = \text{debate reactivity score}_{\text{mean HR}}$$

Subjects with debate values higher than baseline values will have debate reactivity scores that are positive; and, subjects with debate values lower than baseline values will have debate reactivity scores that are negative.

2. Calculate the subject's recovery reactivity scores for the mean heart rate, systolic pressure, diastolic pressure, and pulse pressure by subtracting the recovery value of the parameter from the debate value of the same parameter. For example,

$$\text{mean HR}_{\text{debate}} - \text{mean HR}_{\text{recovery}} = \text{recovery reactivity score}_{\text{mean HR}}$$

Subjects with debate values higher than recovery values will have recovery reactivity scores that are positive; and subjects with debate values lower than recovery values will have recovery reactivity scores that are negative.



**Table HP-6-L2: Heart Rate & Blood Pressure Results - Hot Reactor Conditions**

Subject ID _____	HO Score _____					
Experimental Condition	Max HR (BPM)	Min HR (BPM)	Mean HR (BPM)	Systolic Pressure (mmHg)	Diastolic Pressure (mmHg)	Pulse Pressure (mmHg)
Baseline Period (1)						
Debate Period (2)						
Recovery Period (3)						
Debate Reactivity Score (2-1)						
Recovery Reactivity Score (2-3)						

**Calculations - Class Data**

1. Use the same procedures explained in Exercises 1 and 2 to determine the heart rates and blood pressures of the other subjects during the baseline, debate, and recovery periods. Calculate the reactivity scores for each subject.
2. On the class data sheet, each subject should anonymously enter his or her information for each period of the experiment: mean heart rates; systolic, diastolic, and pulse pressures; and, debate and recovery reactivity scores for each parameter (mean heart rate, systolic pressure, diastolic pressure). The subject should enter his or her ID code and Cook-Medley Hostility (HO) Inventory score;
3. Divide the class into two groups using the median value from the class scores on the Cook-Medley Hostility (HO) Inventory. Subjects with scores above the median value are assigned to the high cynicism/hostility group, and subjects below the median value are assigned to the low cynicism/hostility group.
4. Calculate the group averages for the mean heart rate, systolic pressure, diastolic pressure, pulse pressure, debate reactivity score, and recovery reactivity score for each experimental condition in each cynicism/hostility group. For example, the average debate reactivity score for the mean heart rate in low cynicism/hostility group is equal to the sum of all the heart rate debate reactivity scores of the subjects in the group divided by the number of subjects in the group. The sign (+ or -) of each individual debate reactivity score is used when scores of the group are added together.

## Experimental Hypotheses

Aim: To test three experimental hypotheses regarding the effect of personality on changes in heart rate and blood pressure during a debate on social issues.

### *Hypothesis 1*

Hypothesis 1: The pressure of supporting one's point of view in a social context, in which contrary viewpoints are being expressed, will cause anxiety. Anxiety will be expressed by changes in the cardiovascular responses. It is predicted that the mean heart rate and blood pressure values of all subjects will be higher during a social issues debate than during the baseline recording.

1. Compare your subject's mean heart rate and systolic, diastolic and pulse pressure for the baseline period to the subject's same parameters from the debate period.
2. Does your subject show higher anxiety during a debate on a social issue by having higher heart rate and blood pressures during that period in comparison to the parameters from the baseline period?
3. Does your subject's data support Hypothesis 1?
4. Does your class show higher anxiety during a debate on a social issue by having higher average of the mean heart rate and higher average blood pressures during that period in comparison to the parameters from the baseline period?
5. Does the class data support Hypothesis 1?

### *Hypothesis 2*

Hypothesis 2: The debate reactivity scores for the four parameters (mean heart rate, systolic pressure, diastolic pressure, and pulse pressure) are higher for subjects in the high cynicism/hostility group than for subjects in the low cynicism/hostility group.

1. Compare the group averages for the four debate reactivity scores (mean heart rate, systolic pressure, diastolic pressure, pulse pressure) from the high cynicism/hostility group to the group averages of the low cynicism/hostility group.
2. Does the high cynicism/hostility group have higher debate reactivity scores than the low cynicism/hostility group? Does this mean that subjects with high cynicism/hostility scores are "hotter reactors"?
3. Does the class data support Hypothesis 2?

### *Hypothesis 3*

Hypothesis 3: The recovery reactivity scores for the four parameters (mean heart rate, systolic pressure, diastolic pressure, pulse pressure) are lower for subjects in the high cynicism/hostility group than for subjects in the low cynicism/hostility group.

1. Compare the group averages for the four recovery reactivity scores (mean heart rate, systolic pressure, diastolic pressure, pulse pressure) from the high cynicism/hostility group to the group averages of the low cynicism/hostility group.

2. Does the high cynicism/hostility group have lower recovery reactivity scores than the low cynicism/hostility group? Does this mean that subjects with high cynicism/hostility scores are “slower to cool down”?
3. Does the class data support Hypothesis 3?

## References

- Barefoot, J. C., Dodge, K. A., Peterson, B. L., Dahlstrom, W. G., & Williams, R. B. (1989). The Cook-Medley Hostility Scale: Item Content and Ability to Predict Survival. *Psychosomatic Medicine*, 51, 46-57.
- Carroll, D., Smith, G. D., Sheffield, D., Shipley, M. J. & Marmot, M. G. The Relationship between Socioeconomic Status, Hostility, and Blood Pressure Reactions to Mental Stress in Men: Data from the Whitehall II study. *Health Psychology*, 16(2), 131-136.
- Cook, W. & Medley, D. (1954). Proposed Hostility and Pharasaic-Virtue Scales for the MMPI. *Journal of Applied Psychology*, 38, 414-418.
- Hardy, J. D., & Smith, T. W. (1988). Cynical Hostility and Vulnerability to Disease: Social Support, Life Stress, and Physiological Response to Conflict. *Health Psychology*, 7, 447-459.
- Houston, B. K. (1994). Anger, Hostility, and Psychophysiological Reactivity. In A. W. Siegman & T. W. Smith (Eds.), *Anger, hostility, and the heart* (pp. 97-115). Hillsdale, NJ: Erlbaum.
- Lepore, S. J. (1995). Cynicism, Social Support, and Cardiovascular Reactivity. *Health Psychology*, 14(3), 210-216.
- Powch, I. G. & Houston, B. K. (1996). Hostility, Anger-in, and Cardiovascular Reactivity in White Women. *Health Psychology*, 15(3), 200-208.
- Smith, T. W. (1992). Hostility and Health: Current Status of a Psychosomatic Hypothesis. *Health Psychology*, 11, 139-150.
- Suls, J., & Wan, C. K. (1993). The Relationship between Trait Hostility and Cardiovascular Reactivity: A Quantitative Review and Analysis. *Psychophysiology*, 30, 615-626.