ECG and Peripheral Pulse in a Variable-Foreperiod Reaction-Time Task with Faces as Warning Stimuli

OVERVIEW

In this lab, you will engage in a visual reaction-time task while your ECG and finger pulse are recorded. On each of 72 trials, the appearance of a face will serve as a warning that a Go! stimulus is about to be presented. Your goal is to press a button as quickly as possible when the Go! appears. The foreperiod (i.e., the warning face - Go! intervals) will vary from trial to trial. Your reaction times will be recorded to the nearest millisecond.

The run itself requires less than 20 minutes. You should allow a generous amount of extra time, however, to ensure that you can set up at the beginning and clean up at the end in an unhurried fashion.

MATERIALS

- Disposable Ag/AgCl electrodes (3)
- Alcohol pad
- Spectra 360 electrode gel (if needed)
- 80” pinch-clip electrode leads (2)
- 40” pinch-clip electrode lead
- Finger pulse transducer
- Subject response box
- Light-weight headset

EQUIPMENT CONFIGURATION

Bioamplifier (Bio-C 03)
- High pass filter = 10 Hz
- Low pass filter = 30 Hz
- Gain = 1 mV f.s.d. (adjust if necessary)
- Hum filter on
- Calibrate and impedance buttons out (subject side)

The bioamp will be used to measure ECG. The bottom output socket of Bio-C should be connected to the analog waveform input of interval timer (IT 12). The positive (+) output of Bio-C should go to the rectifier to its immediate left (R/I-C).

Rectifier/Integrator (R/I-C)
- Output control = Raw

The rectifier is not used in this experiment, but it is normally connected to the bioamp and will remain in the signal chain for convenience. The output of R/I-C must be connected to address 3 of the PC32-1 A/D converter. Make sure the R/I-C output control is set to "Raw."
**Interval Timer (IT 12)**
- Auto trigger adjustment = 3

The interval timer will be used to measure the heart period (or inter-beat interval) from the ECG wave fed to it by the bioamp. A constantly-advancing millisecond timer is reset to 0 (zero) each time the ECG voltage exceeds a threshold value. Normally, the R-wave is the only component of the ECG wave to reach the trigger voltage, and what is sent continuous to the A/D converter is the interval between successive R-waves. The lower output socket of Bio-C should be connected to the analog waveform input of IT (12).

**Finger Pulse Amplifier (FPA 14)**
- High pass filter = 0.3Hz
- Gain = adjust to prevent clipping pulse wave

This amplifier represents the arrival of the pulse wave at the finger tip as a voltage that is proportional to the amount of red light reflected from blood cells inside the finger. Both the red light and the photocell that responds to its reflection are mounted in the **transducer** worn by the subject. One output of FPA (14) should be connected to address 14 of the PC32-1 A/D converter.

**Communications Module (COMM)**
- Subject volume (adjust as desired)
- Operator volume (adjust as desired)
- Squelch (adjust to middle value)
- Mode toggle = Norm

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**SUBJECT PREPARATION**

**Disposable Ag/AgCl Electrodes for ECG**

We will use a modified Lead II configuration. You will place electrodes on the following sites: a) at the base of the neck on the right side; b) the left ankle; and c) the right ankle.

Clean each site with an alcohol pad and allow it to dry, then apply the disposable electrodes. (Note: Examine the contact sponge on each electrode to insure that it is moist, and re-wet it with a drop of Spectra 360 gel if necessary.) Attach an 80" pinch-clip lead to each ankle electrode, and a 40" pinch-clip lead to the neck electrode. Then plug the leads into the following inputs of Bio-C: a) right neck to **negative (white)**; b) left ankle to **positive (red)**; and c) right ankle to **ground (black)**. This arrangement will produce an upward deflection of positive ECG components (i.e., P, R, and T) on the Psylab monitor.

**Make sure that there is no stress on any of the electrode leads**, especially those on the ankles. It is very easy for the subject to forget that his/her legs are "tied up," so it's a good idea to place a pillow against the subject's lower legs as a tactile reminder of that fact.

**Finger Pulse Transducer**

The **finger pulse transducer** opens like a spring-loaded clothespin. Place it on the first, second, or third finger (whichever is most comfortable) of the hand not being used by the subject for reaction time responses. Insert the finger deep enough to center the subject's fingerprint over the sensor openings inside the transducer. Connect the lead plug to the finger pulse input on the **input panel**.

**Response Box and Headset**

Connect the headset to the appropriate sockets on the **input panel**. Adjust the armature on the headset so that the microphone is about 1 inch out from the left corner of the subject's mouth. Place the response box on the subject's lap.
RUN INSTRUCTIONS

Operator
1. Prepare the subject and help him/her get comfortably seated. Hand him/her the response box.
2. Turn on all equipment including the subject's monitor and boot the Psylab and Control computers.
3. Launch DirectRT from the Start menu on the Control computer.
4. Choose Select and run an input file from the File menu of DirectRT. Navigate to the Psyc305\Lab1 folder and launch Lab1.csv.
5. Enter the subject's lab ID number in the Subject ID window and click OK.
6. A "Welcome to Lab 1" screen will appear. This screen will persist until you press the enter key to begin the run. DirectRT is now staged.
7. Switch to the Psylab computer and use the second button from the left on the taskbar to launch Lab1.pcc, the measurement program for this lab. (The full path to the program is: c:\cpi\psyc305\lab1\Lab1.pcc.) Open the lab1\rawdata folder and name the data file xxlab1 (where xx is the subject's lab ID number).
8. Enter the subject's ID number when prompted to do so, but do NOT hit the enter key. Psylab is now staged.
9. Tell the subject that data recording is about to begin. Hit the enter key on Psylab to begin recording physiological data.
10. Switch to the Control computer and hit the enter key. DirectRT will control the rest of the run.
11. During the 3-minute adaptation period, make any adjustments to the equipment that are necessary to obtain good signals. Start with the suggested settings and adjust the gain of Bio-C and FPA so as to obtain clear waves that do not "clip" (i.e., get chopped off at the peak). Make sure that the R wave and only the R wave triggers the interval timer. The green trigger light on the timer should blink in synchrony with the subject's heart beat, and the IBI channel on the Psylab monitor should be artifact-free (no sudden, dramatic shifts or dropouts).
12. When the 3-minute baseline period is over, task instructions will begin displaying automatically. Turn off the Control monitor at this point to prevent being pre-exposed to the stimuli!
13. Although the run is on "autopilot," you and your partner should neither lapse into a coma nor become lost in conversation. First: BE QUIET! The subject can easily hear you. Second: PAY ATTENTION! If something doesn't look right on the Psylab monitor, it probably isn't. Try to rectify problems if they arise. If IBI dropouts develop, increase the Bio-C gain. If either the ECG or the pulse wave begins to clip, reduce the gain on Bio-C or FPA, respectively.
14. At the end of the run, DirectRT will terminate data acquisition and reboot the Psylab computer. The End of Experiment screen can be cleared from the Control computer by hitting the Esc key.
15. After all subjects have been run, terminate DirectRT by pressing Ctrl-Q or selecting Exit from the File menu.

Subject
1. Behave like a "real" subject: i.e., concentrate on the stimuli and do your best at the reaction time task.
2. During the 3-minute adaptation period at the start of the exercise, just relax. Don't talk to your partners and don't go to sleep. A countdown clock will display the time remaining in the adaptation period.
3. At the end of the adaptation period, your monitor will display instructions for the reaction-time task.
4. During the task itself, do your best to remain alert and to respond as quickly as possible.

5. ECG and finger pulse are vulnerable to movement artifact, so remain still during the run. If you must adjust your position in the chair, try to do so during one of the inter-trial intervals.

6. Once the measurement run has begun, there's no stopping: The program can't be interrupted without starting over.

CLEANUP

Take a few minutes to straighten up the lab for the next users. Remove the neck lead from the bioamp to prevent a subsequent subject from sitting on it and breaking the plug. You may leave the finger pulse transducer plugged in, but move it off of the seat of the recliner.

Check the lab calendar to determine when the equipment will next be in use. If the next scheduled user will be in within 30 minutes, leave everything powered up. Otherwise, shut down the computers in the prescribed manner (i.e., click Start, Shut Down...). Then turn off the power to the monitors, amplifiers, and peripherals with the MASTER switch on the power console.