Richard Pflanzer, Ph.D.
Associate Professor Emeritus
Indiana University School of Medicine
Purdue University School of Science

William McMullen
Vice President, BIOPAC Systems, Inc.

V. DATA ANALYSIS

FAST TRACK Data Analysis

1. Enter the **Review Saved Data** mode.
   - Note channel designation:

Channel	*Displays*
CH 1	**Hand Switch**

   - Note measurement box settings:

Channel	*Measurement*
CH 1	**Delta T**

Data Analysis continues…

Detailed Explanation of Data Analysis Steps

If entering **Review Saved Data** mode from the Startup dialog or Lessons menu, make sure to choose the correct file.

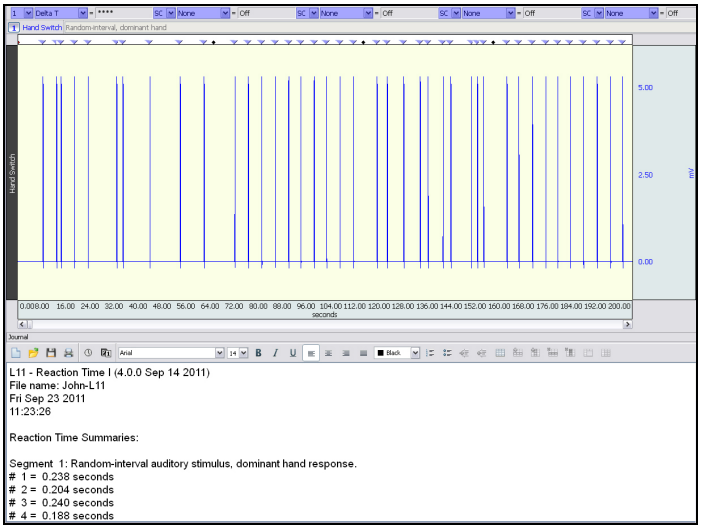

Fig. 11.7 Example Data and journal

The measurement boxes are above the marker region in the data window. Each measurement has three sections: channel number, measurement type, and result. The first two sections are pull-down menus that are activated when you click them.

Brief definition of measurements:

Delta T: Displays the amount of time in the selected area (the difference in time between the endpoints of the selected area).

The ñselected areaò is the area selected by the I-Beam tool (including the endpoints).

Note The Journal contains the reaction time summary. Use this to fill in your data report.

2. Set up your display window for optimal viewing of the first event marker and pulse of the first data recording (Fig. 11.8).

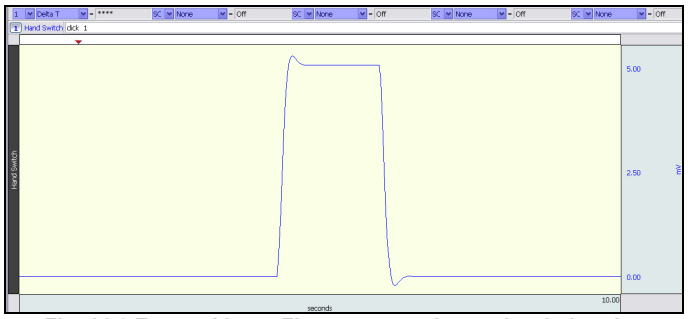

Fig. 11.8 Zoomed in on First event marker and switch pulse

Note: The append event markers mark the beginning of each recording. Click on (activate) the event marker to display its label.

Useful tools for changing view:

Display menu: Autoscale Horizontal, Autoscale Waveforms, Zoom Back, Zoom Forward

Scroll Bars: Time (Horizontal); Amplitude (Vertical)

Cursor Tools: Zoom Tool

Buttons: Show Grid, Hide Grid, -,+

3. Select an area from the first event marker to the leading edge of the first pulse (Fig. 11.9) and note the Delta T measurement.

A

The first event marker indicates the start of the stimulus click. The leading edge of the pulse indicates when the button was first pressed. The threshold that the program uses to calculate reaction time is 1.5 mV.

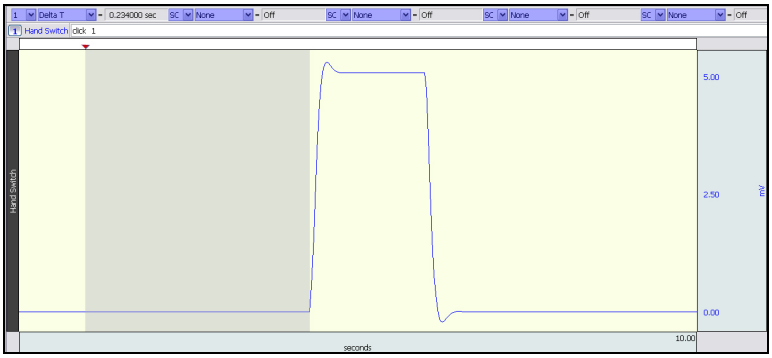

Fig. 11.9 Example reaction time measurement.

4. Look at the first reaction time result in the Journal and compare this to the Delta T measurement found above.

The two measurements should be approximately the same.

5. Repeat the steps above on other pulses until you are convinced that the Journal readings are accurate.

6. Transfer your data from the Journal to the Data Report.

B

This step may not be necessary if your Instructor allows you to print out your Journal and staple it to the Data Report.

Hint: Measurements and formulas can be pasted directly into the **Journal Data Report** table cells by right-clicking into the desired table cell and selecting the measurement from the contextual menu. (See below)

7. Collect data from at least five other students in your class as needed to complete the Data Report.

C, D, E

Data Analysis continues…

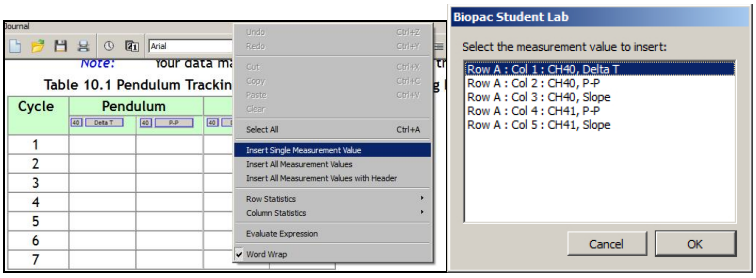

Fig. 11.10 Pasting measurements to Data Report

Note that the Variance and Standard Deviation calculations in Tables 11.4.and 11.5 are optional and depend on the requirements of your instructor.

8. **Save** or **Print** the data file.
9. Quit the program.

END OF DATA ANALYSIS

An electronically editable **Data Report** can be found in the journal (following the lesson summary,) or immediately following this Data Analysis section. Your instructor will recommend the preferred format for your lab.

END OF LESSON 11

Complete the Lesson 11 Data Report that follows

REACTION TIME

DATA REPORT

Studentôs Name: _____

Lab Section: _____

Date: _____

I. Data and Calculations

Subject Profile

Name:_____ Height:_____

Age:_____ Gender: Male / Female Weight:_____

A. **Manual calculation of reaction time**

Calculate the reaction time for the first click in initial recording: **Delta T = _____**

B. **Summary of Subject's Results** (copy from the software Journal)

Table 11.1

STIMULUS NUMBER	REACTION TIMES (ms)			
	Dominant Hand		Nondominant Hand	
	(Random)	(Fixed interval)	(Random)	(Fixed interval)
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
Mean				

C. **Comparison of reaction time to number of presentations**

Complete Table 11.2 with data from the first ñRandom Data (Dominant)ò and ñFixed Interval Data (Dominant)ò trial for 5 students . Calculate the mean for each presentation to determine if reaction times vary as each Subject progresses through the series of stimulus events.

Table 11.2 Comparison of Reaction Times

Student's Name	**Random Data** (Dominant Hand)			**Fixed Interval Data** (Dominant Hand)		
	Stimulus 1	**Stimulus 5**	**Stimulus 10**	**Stimulus 1**	**Stimulus 5**	**Stimulus 10**
1.						
2.						
3.						
4.						
5.						
Calculate the Means:						

D. **Group Summary**

Complete Table 11.3 with the mean for 5 students and calculate the group mean.

Table 11.3

Class Data **Student Means**	***Random trials***		***Fixed-interval trials***	
	Dominant Hand	**Nondominant Hand**	**Dominant Hand**	**Nondominant Hand**
1.				
2.				
3.				
4.				
5.				
Calculate the Group Means:				

E. **Variance and Standard Deviation (*Optional*)**

$$\text{Variance} = \frac{1}{n-1}\sum_{j=1}^{n}(x_j - \bar{x})^2 \qquad \text{Standard Deviation} = \sqrt{\text{Variance}}$$

Where

n = number of students

Xj = mean reaction time for each student

$\bar{X}$ = Group mean (constant for all students)

$\sum_{j=1}^{n}$ = Sum of all student data

Calculate the variance and standard deviation for 5 students with data from ***Random Trial 2*** (Table 11.4) and from ***Fixed Interval Trial 2*** (Table 11.5)

Table 11.4: ***Random Trial 2 Data (Nondominant hand)***

Student	ENTER Mean Reaction time for Student (X_j)	ENTER Group Mean $(\overline{X})$	CALCULATE Deviation $(X_j - \overline{X})$	CALCULATE Deviation^2 $(X_j - \overline{X})^2$
1				
2				
3				
4				
5				

	Sum the data for all students =	$\sum_{j=1}^{n} (x_j - \overline{x})^2$ =
Variance (σ^2) **=**	Multiply by 0.25 =	$\frac{1}{n-1}$ =
Standard Deviation =	Take the square root of the variance =	=

Table 11.5: ***Fixed Interval Trial 2 Data (Nondominant hand)***

Student	ENTER Mean Reaction time for Student (X_j)	ENTER Group Mean $(\overline{X})$	CALCULATE Deviation $(X_j - \overline{X})$	CALCULATE Deviation^2 $(X_j - \overline{X})^2$
1				
2				
3				
4				
5				

	Sum the data for all students =	$\sum_{j=1}^{n} (x_j - \overline{x})^2$ =
Variance (σ^2) **=**	Multiply by 0.25 =	$\frac{1}{n-1}$ =
Standard Deviation =	Take the square root of the variance =	=

II. Questions

F. What are the essential elements of a stimulus-response pathway? List them in correct sequence._____

G. Explain the difference between a voluntary reaction to a stimulus and a reflex response to a stimulus._____

H. Reaction time using a dominant, voluntary motor pathway is usually shorter than when using an equivalent nondominant pathway. Explain._____

I. Reaction times associated with repetitive fixed interval stimuli in a given stimulus-response situation usually decrease over a short time period to some minimal value and then remain stable. Explain.

III. OPTIONAL Active Learning Portion

A. ***Hypothesis***

B. ***Materials***

C. ***Method***

D. ***Set Up***

E. ***Experimental Results***

End of Lesson 11 Data Report