

Experiment HP-9: Visual Evoked Potentials (VEP)

Exercise 1: Recording the Subject with Eyes Closed

Aim: To learn how to record from the subject while the eyes are closed.

Procedure

1. Ask the subject to sit quietly and not move unless told to do so, and to keep his or her eyes closed during this phase of the experiment.
2. Click on the Record button, located on the upper right side of the LabScribe Main window ([Figure HP-10-L1](#)). The signal should begin scrolling across the screen.

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. Type the <Subject's Name>-Eyes Closed in the Mark box to the right of the Mark button. Press the Mark button or the Enter key on the keyboard to attach the comment to the data. Continue recording for approximately ten seconds.
4. Click Stop to halt recording.
5. Select Save As in the File menu, type a name for the file. Choose a destination on the computer in which to save the file, like your lab group folder). Designate the file type as *.iwxdata. Click on the Save button to save the data file.

Exercise 2: VEP Testing Patterns

Aim: To identify the VEP pattern for the left eye while looking at a flashing checkerboard.

Procedure

1. Instruct the subject that he or she needs to avoid any movement other than opening his or her eyes when asked. The subject should have his or her eyes closed at the beginning of the recording.
2. Have the subject cover his or her right eye with their hand or a patch of some type.
3. Click Record, and then click the AutoScale button on the VEP Response channel. You should observe a recording similar to the "eyes closed" recording shown in [Figure HP-10-L1](#).
4. Type the letter C for Eyes Closed in the Mark box to the right of the Mark button. Press the Mark button or the Enter key on the keyboard to mark the recording. Record for five seconds.
5. While the subject has his or her eyes closed, type the Left Eye Checkerboard in the Mark box. Press the Mark button or the Enter key on the keyboard to mark the recording as you instruct

the subject to open his or her eyes and focus on the dot in the center of the flashing checkerboard pattern. Record the subject's VEP pattern for ten seconds.

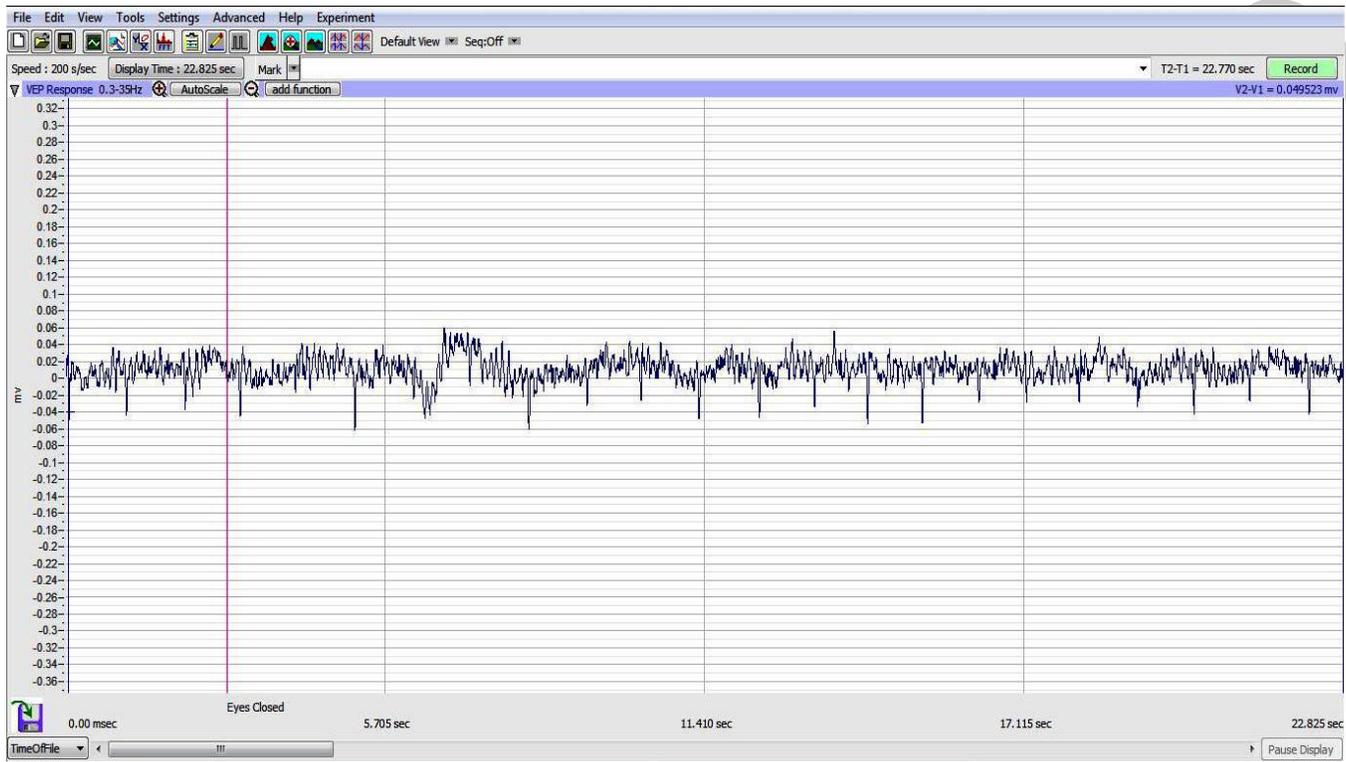


Figure HP-10-L1: Recording shown of subject sitting quietly with his or her eyes closed during the initial section of the VEP test.

Note: At this time, set up the second computer with the flashing checkerboard pattern video ready to be shown to the subject. One video that can be used is: http://www.youtube.com/watch?v=xEd1h_lz4rA

Note: It is important to have the video is ready to play immediately as the subject opens his or her eyes.

6. Click Stop to halt recording.
7. Select Save in the File menu.
8. Have the subject close their eyes and sit quietly for about 10 seconds.
9. Repeat this procedure 10-20 times for the subject's left eye, stopping after each 10 second recording.

Data Analysis

1. Scroll through the data recorded in this exercise and find the first VEP pattern for the subject's left eye and checkerboard pattern.
2. Use the Display Time icons in the LabScribe toolbar ([Figure HP-10-L2](#)) to adjust the Display Time of the Main window to show the ten second section of data on the Main window. This section of data can also be selected by:
 - Placing the cursors on either side of the data recorded while the subject's eyes were open.
 - Clicking the Zoom between Cursors button on the LabScribe toolbar to expand the period to the width of the Main window.
3. Scroll through the data recorded in this exercise and find a artifact-free section of data recorded while the subject's eyes were open.
4. Use the Display Time icons in the LabScribe toolbar ([Figure HP-10-L2](#)) to adjust the Display Time of the Main window to show a ten second artifact-free section of data on the Main window. This section of data can also be selected by:
 - Placing the cursors on either side of the data recorded while the subject's eyes were open.
 - Clicking the Zoom between Cursors button on the LabScribe toolbar to expand the period to the width of the Main window.

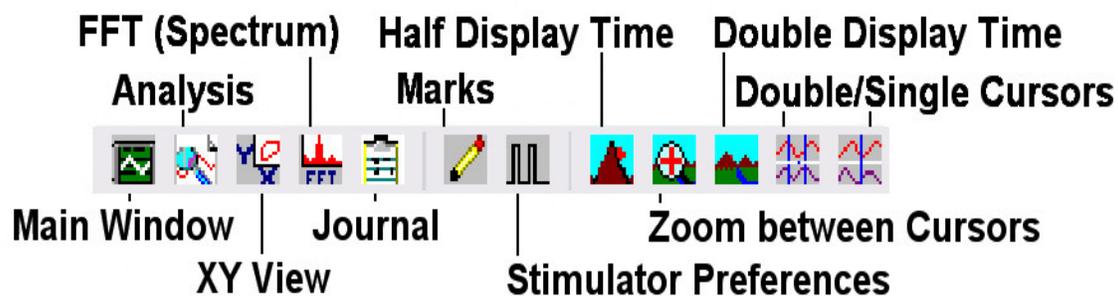


Figure HP-10-L2: The LabScribe toolbar.

5. 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 ([Figure HP-10-L3](#)).
6. Look at the Function Table that is above the uppermost channel displayed in the Analysis window. The name of the mathematical function used in the analysis, T2-T1, appears in this table. The values for T2-T1 is seen in the table across the top margin of the VEP Response channel.

7. Once the cursors are placed in the correct positions for determining the time difference between the Latency and Evoked Potentials in the ten-second section of data, the values of these parameters can be recorded in the on-line notebook of LabScribe by typing their names and values directly into the Journal, and on [Table HP-10-L1](#).
8. The functions in the channel pull-down menus of the Analysis window can also be used to enter the names and values of the means into the Journal. To use these functions:
 - Place the cursors at the locations used to measure the values for the parameters of the VEP pattern in the selected region of data.
 - Transfer the name of the mathematical function used to determine the values of the parameters to the Journal using the Add Title to Journal function in the pull-down menu of any channel.
9. Transfer the values of the parameters of the VEP pattern to the Journal using the Add Ch. Data to Journal function in the VEP Response Channel pull-down menu.

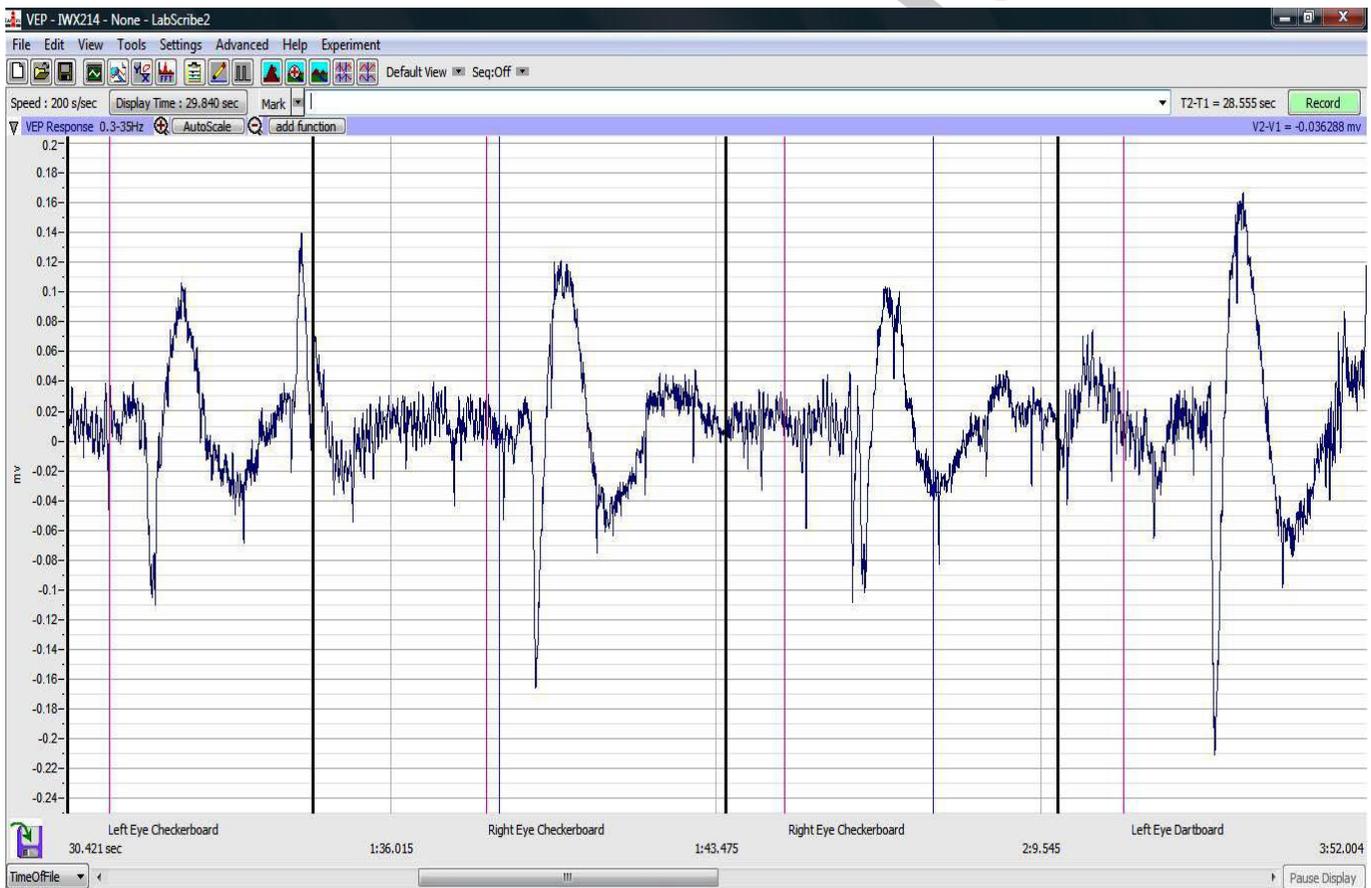


Figure HP-10-L3: Recording of VEP patterns from the subject's left and right eyes as shown on the Main window.

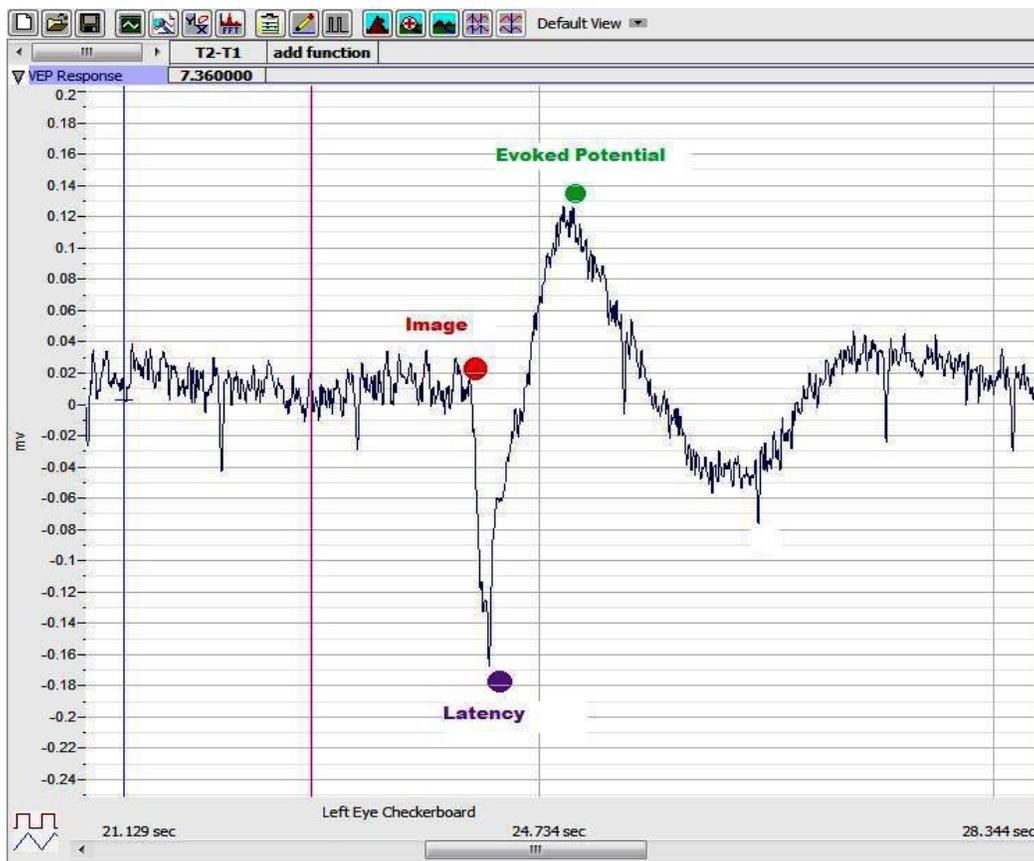


Figure HP-10-L4: Recording of a single VEP response displayed in the Analysis window showing the placement positions of the cursors.

10. See [Figure HP-10-L4](#) for a labeled diagram showing the positions of the cursors:
 - Place 1 cursor on your recording at the area shown by the red dot and the second at the position of the purple dot to measure the T2-T1 value for Latency.
 - Leave the right-hand cursor at the purple dot and move the left-hand cursor to the position of the green dot to measure T2-T1 for the Evoked Potential response ([Figure HP-10-L5](#)).
11. Return to the Main window. Scroll through the recording and find the second recording of the VEP of the left eye while observing the flashing checkerboard.
12. Repeat these steps for the rest of the trials while observing the flashing checkerboard with the left eye. Find the values for T2-T1 for Latency and Evoked Potential and enter this data into the Journal and on [Table HP-10-L1](#) as performed previously.
13. Select Save in the File menu.

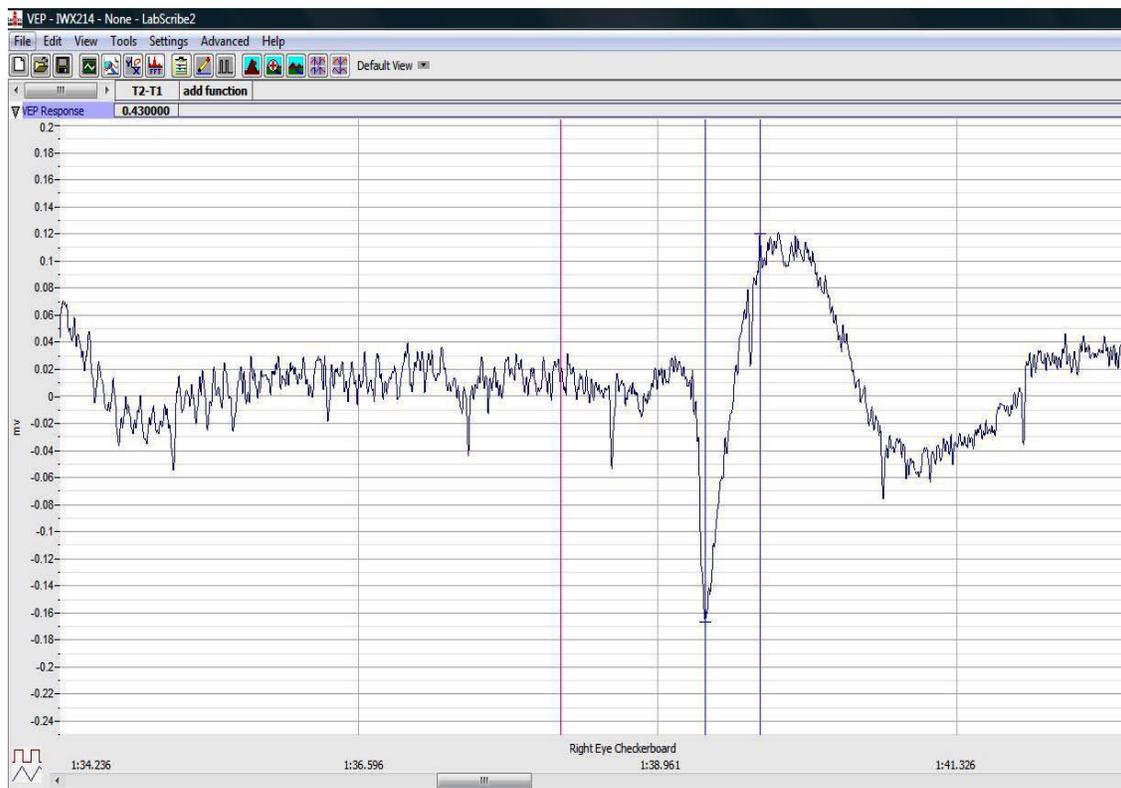


Figure HP-10-L5: The VEP response shown in the analysis window showing the T2-T1 value for the evoked response.

Questions

1. Do each of the ten responses have the same latency? Evoked Potential?
2. Why or Why not?
3. Explain what is happening physiologically during the latent period.
4. What is actually occurring during the Evoked Potential?

Table HP-10-L1: Checkerboard - VEP Latency Period and Response Time for the Left Eye

Trial Number	VEP RESPONSE TIME - Checkerboard	
	Left Eye	
	Latency (sec)	Evoked Potential (sec)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
MEAN		

Table HP-10-L2: Checkerboard - VEP Latency Period and Response Time for the Right Eye

Trial Number	VEP RESPONSE TIME - Checkerboard Right Eye	
	Latency (sec)	Evoked Potential (sec)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
MEAN		

Exercise 3: VEP Testing using the Checkerboard Pattern

Aim: To identify the VEP pattern for the right eye while looking at a flashing checkerboard.

Procedure and Data Analysis

1. Repeat the procedure for both recording experimental data and data analysis as shown in Exercise 2.
2. Enter the data in the Journal and on Data [Table HP-10-L2](#).

Exercise 4: VEP Testing using the Moving Dartboard Pattern

Aim: To identify the VEP pattern for the both the left and right eyes while looking at a rotating dartboard pattern.

Note: Use the link: <http://www.youtube.com/watch?v=GYIIw0vGDk4> for the rotating dartboard pattern for VEP testing.

Procedure and Data Analysis

1. Repeat the procedure for both recording experimental data and data analysis as shown in Exercise 2. Make sure to do both eyes independently.
2. Enter the data in the Journal and on the two data tables: [Table HP-10-L3](#) and [Table HP-10-L4](#).

Questions

1. Is there a difference in the Latency period for the left eye between the checkerboard pattern and the dartboard pattern?
2. Is there a difference in the Latency period with the right eye between the two patterns?
3. Is there a difference in the T2-T1 value Evoked Potential for the right and left eyes between the checkerboard and dartboard patterns?

Table HP-10-L3: Dartboard - VEP Latency Period and Response Time for the Left Eye

Trial Number	VEP RESPONSE TIME - Dartboard	
	Left Eye	
	Latency (sec)	Evoked Potential (sec)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
MEAN		

Table HP-10-L4: Dartboard - VEP Latency Period and Response Time for the Right Eye

Trial Number	VEP RESPONSE TIME - Dartboard Right Eye	
	Latency (sec)	Evoked Potential (sec)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
MEAN		