

## Lab 5-Electroencephalography and reaction time

### Purpose

This experiment helped demonstrate the concepts of action potential velocities and synaptic delays in complex visual and auditory reflexes, as well as the diversity of reaction times found in a population.

### Procedures

#### 5-A

1. To get things started: Before you turn anything on, be sure the IWX/214 unit is plugged in, and that the IWX/214 unit is connected to the laptop by USB cable. Be sure that the EM-100 Event Marker is fully connected to the Channel 3 socket in front of the IWX/214 unit (Fig. 5-4).

Figure 5-4: The EM-100 Event marker plugged into Channel 3 of the IWX/214 unit. Once everything is connected, FIRST turn on the laptop and allow it to fully boot up before you turn on the IWX/214 unit. Once the Iworx unit is on, the red indicator light on the Iworx unit should light up and you may hear the USB chime from the laptop if the laptop does not default to mute (many are set to default to mute).

2. Open the LabScribe3 program by clicking on the LabScribe3 icon on the desktop. As soon as the program opens, you should see a window pop-up that says "Hardware found IWX214:2008-1-24," click "OK." If you see a window pop-up with procedures for installing new hardware, you may have turned on the IWX/214 unit before the laptop fully booted up. Simply turn off the IWX/214 unit, close the LabScribe3 program and start over again by first turning the IWX/214 back on and then reopening the LabScribe 3 Program as described above.

3. In the second row from the top (the row that says "File Edit View Tools Settings Advanced External Devices Help"), click on the "Settings" tab. A little more than halfway down the drop-down window should be a tab called "Human Nerve." Click on that tab and that should lead you to the second tab called "Auditory-Visual Reflexes," click on that tab. Close the pdf file that opens automatically, you don't need it.

4. Pair up with a lab partner and arrange yourselves according to this recording setup: The student subject should sit in a chair facing the laptop computer with their hand in position so that they can press the "Enter" key as quickly as possible. The lab partner holding the EM-100 Event Marker Should stand out of sight of the subject. They

need to be able to quietly press and release the button of the EventMarker once the test begins.

5.Type the subject's name and "Visual" in theMark box that is to the right of the Mark Button just above the data recording. Click the red"Record" button then click the Mark Button, this will put a vertical line in your recording and the words in the Mark box at the bottom of the vertical line.Leave the cursor mouse over the Mark box (not Mark Button)

6.Each time the lab partner quietly clicks the Event Marker button, the green line coming in from the right side of the computer screen will jump up then back down. As soon as the subject sees the green line jump up, they need press the "Enter" key as quickly as possible.When this happens a small "Enter Mark Text" window will pop up, ignore it.However, the subject will have to click on the "Enter" key again to clear it. Do not worry, the Mark line will still be in the right place. The subject will have to hit the"Enter" key twice for every trial: once to leave the Mark line and a second time to clear the "Enter Mark Text" pop up window.

7.Repeat this for ten trials but the lab partner should be sure to click the Event Markerbutton at irregular intervals(not less than 5 seconds apart, but not more than 10 seconds apart). After ten trials click the "Stop" button (it's the same button that turns from the red "Rec" button to the black "Stop" button once it is recording).

8.Multiple lab partners can use the same lworx file. Just click the red "Rec" button again and let a good 20 seconds of flat line go by before you click the black "Stop" button.Then repeat steps 5-7 above with the new subject's name. If a third student will be using the same file, just click the red "Rec" button again and let a good 20 seconds of flatline go by before you click the black "Stop" button. Then repeat steps 5-7 with the third student's name.

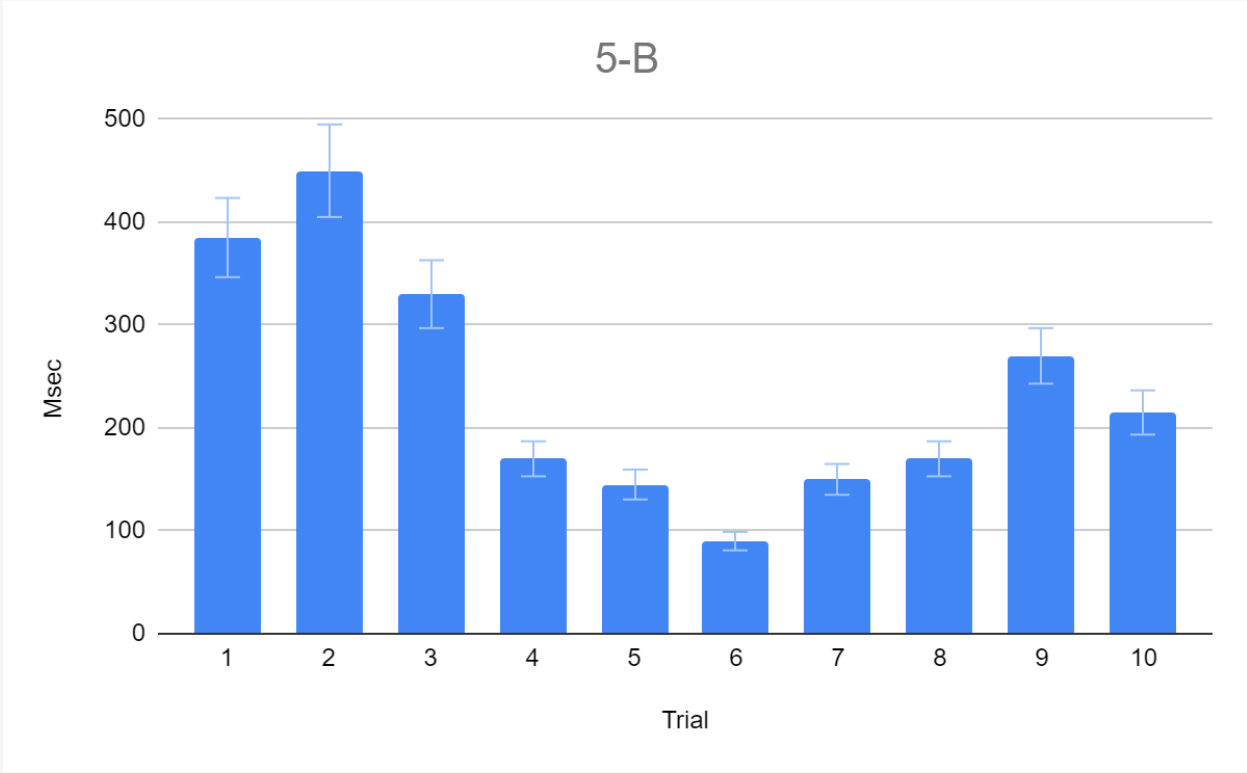
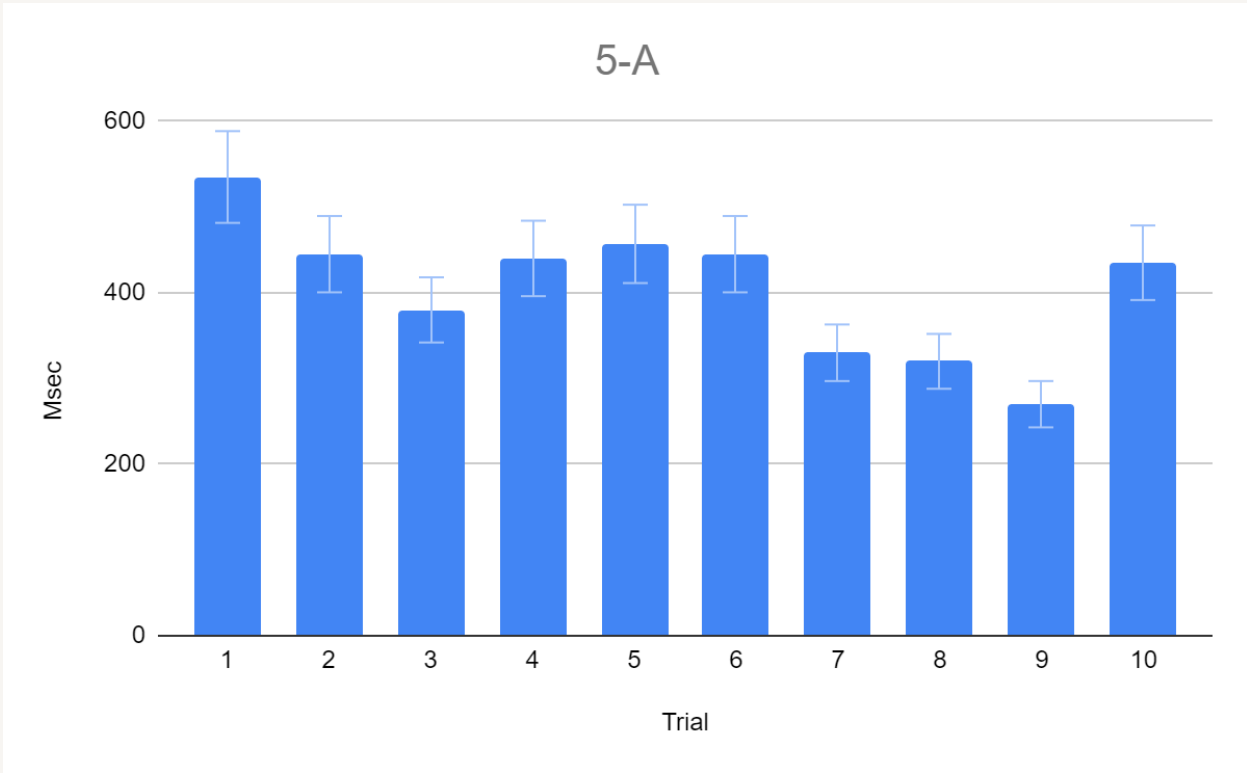
9.Once all lab partners have made their Visual Cues recording,go back to the first often trials for each student. Move the red cursor lines (there are two) by left clicking on the red cursor line and while holding down the left mouse pad button,sliding your finger on the mouse pad to move one red cursor line to the left base the green rectangle,then releasing the left mouse pad button. Move The other red cursor line to the black Markline.

10.Look at the top right of the screen where it says " $T2-T1$ " = \_\_\_\_\_ msec. Record that number and repeat this step for all ten trials and for each of the students using your laptop.Calculate The average for the ten trials.Report These numbers to the lab instructor who will compile the class numbers.

5-B

1. Once all students using your Iworx unit and laptop have reported their 5-A averages, arrange yourselves for 5-B according to this recording setup: Turn the laptop so the subject can still press the "Enter" key but cannot see the screen. The subject's hand should be in a position so that they can press the "Enter" key as quickly as possible. The lab partner holding the EM-100 Event Marker Close to one of the subject's ears should stand out of sight of the subject.
2. Type the subject's name and "Auditory" in the Mark box that is to the right of the Mark Button just above the data recording. Then Click the red "Record" button then click the Mark button, this will put a vertical line in your recording and the words in the Markbox at the bottom of the vertical line. Leave the cursor mouse over the Mark box (not Mark button).
3. Each time the lab partner clicks the Event Marker button near the subject's ear, the click should be audible to the subject. As soon as the subject hears the "click," they need to press the "Enter" key as quickly as possible.
4. Like in 5-A, when this happens a small "Enter Mark Text" window will pop up, ignore it. However, the subject will have to click on the "Enter" key again to clear it. Do not worry, the Mark line will still be in the right place. The subject will have to hit the "Enter" key twice for every trial: once to leave the Mark line and a second time to clear the "Enter Mark Text" pop up window.
5. Repeat this for ten trials but the lab partner should be sure to click the Event Marker button at irregular intervals (not less than 5 seconds apart, but not more than 10 seconds apart). After ten trials, click the black "Stop" button.
6. Like in 5-A, multiple lab partners can use the same Iworx file. Just click the red "Rec" button again and let a good 20 seconds of flat line go by before you click the black "Stop" button between each student.
7. Once all lab pairs have made their Auditory Cues recording, repeat Steps #9-10 of 5-A to analyze the data. Be sure to report the average of the ten auditory trials to the lab instructor.
8. Discuss the class results for both 5-A and 5-B. Does your lab show a normal bell-shaped curve? Why or why not? What accounts for the diversity seen in reaction times?

## Results

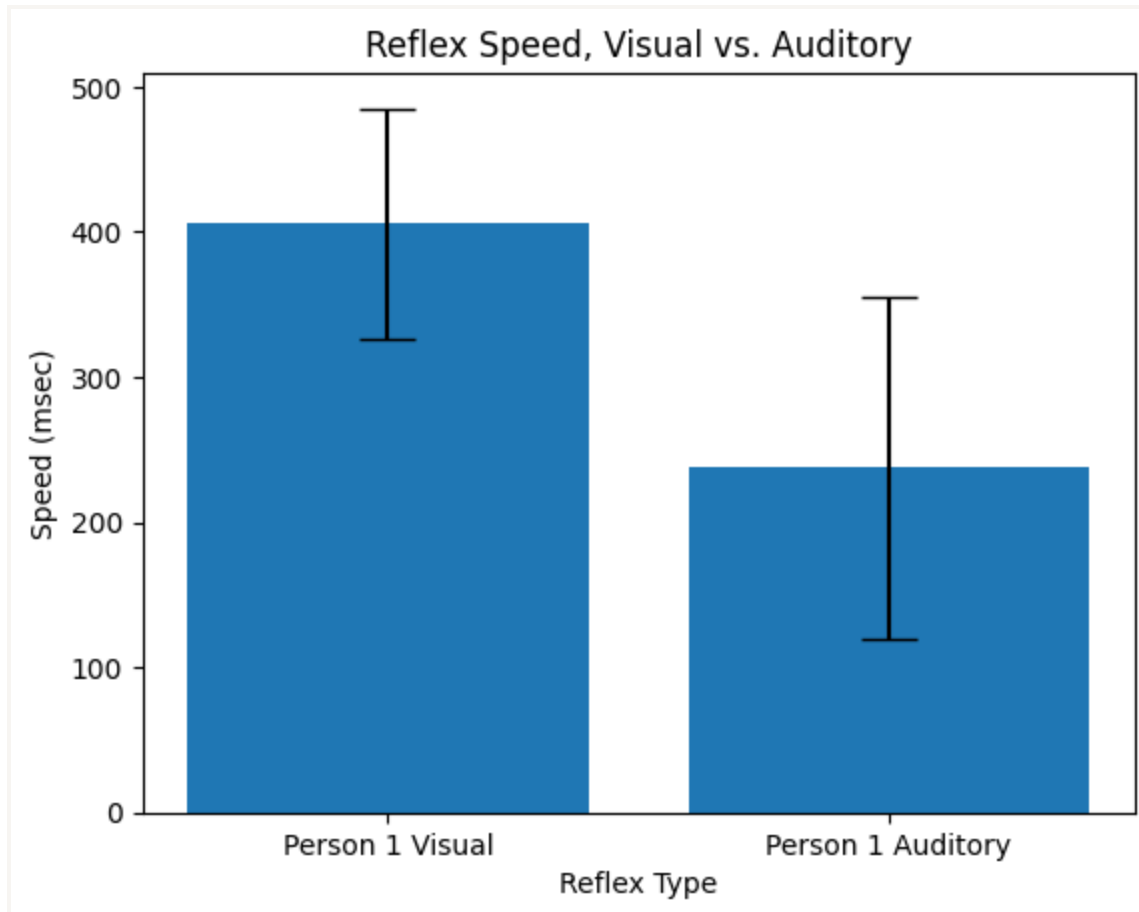


## 5-A

Trial	Msec
1	535
2	445
3	380
4	440
5	457
6	445
7	330
8	320
9	270
10	435

## 5-B

Trial	Msec
1	385
2	450
3	330
4	170
5	145
6	90
7	150
8	170
9	270
10	215



## Discussion

In this experiment, my lab partner did 10 trials of a reaction time test where he had to use his reaction time to press the enter key as quickly as possible after seeing the green line jump up and then back down. In order to measure the reaction time, I had to measure the amount of milliseconds it is between the beginning of the jumped up green line and where the line is that appeared after my lab partner pressed the enter key. Judging by the data, it appears that in 5-B there is a point from trials 4 through 9 where there was a noticeable decrease in milliseconds when it comes to using your sense of hearing while the data in 5-A is a little all over the place with the number of milliseconds decreasing from trials 1-3, increases from trials 4-5, decreases again from trials 6-9 and then increases again at trial 10. From this experiment, it appeared that I had a faster auditory reaction time than a visual reaction time.

## Conclusion

In conclusion, these experiments helped demonstrate the concepts of action potential velocities and synaptic delays in complex visual and auditory reflexes, as well as the

diversity of reaction times found in your population. This lab helped emphasize the importance of considering both visual and auditory sensory modalities when studying these processes. The knowledge gained from this lab can have practical applications in fields such as psychology, sports science, and human-computer interaction, where understanding and optimizing reaction times are of significant importance. Additionally, future research could delve deeper into the factors that influence individual differences in reaction times and explore how training and practice can improve these vital cognitive skills.