EBME 319
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(last updated: 29 Feb 2012)

A quick note about data calibration.

We have tried to give you properly calibrated data, i.e., the eye movements range from +15 degrees to -15 degrees, accurately following the target.

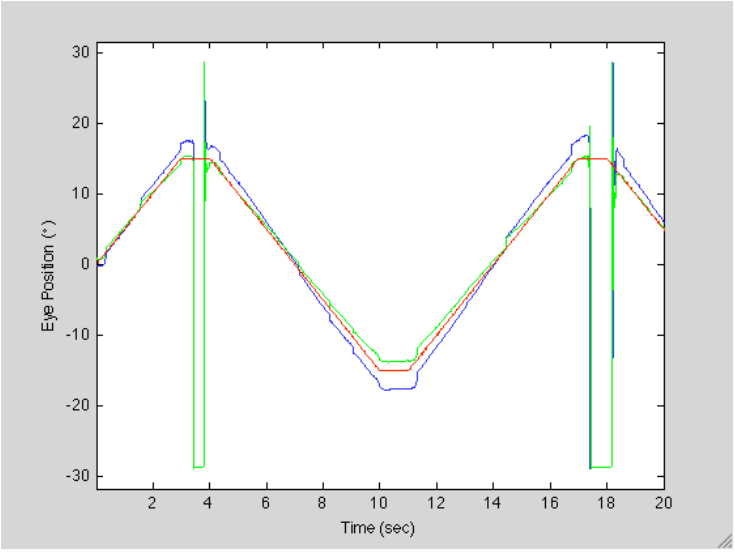
However, as the lab session is quite busy, we can not spend more than a few minutes calibrating the equipment. And for a variety of reasons, small offset and gain errors are likely to creep in as the lab progresses.

Historically speaking, we usually get a good ballpark approximation (within a couple of degrees in either direction of the ±15° calibration points), so that your data is within 10% of ideal.

That said, there have been times where our accuracy left something to be desired. Fortunately, most of those times, only one channel was badly off, and the other was within range. We usually discover this during the post-experiment discussion when demonstrating how to load and analyze the data. The solution is to determine which channel is best and suggest basing the analyses on that data.

But what about that rare time when BOTH channels are poorly calibrated? (Or perhaps you want everything to be just right…)

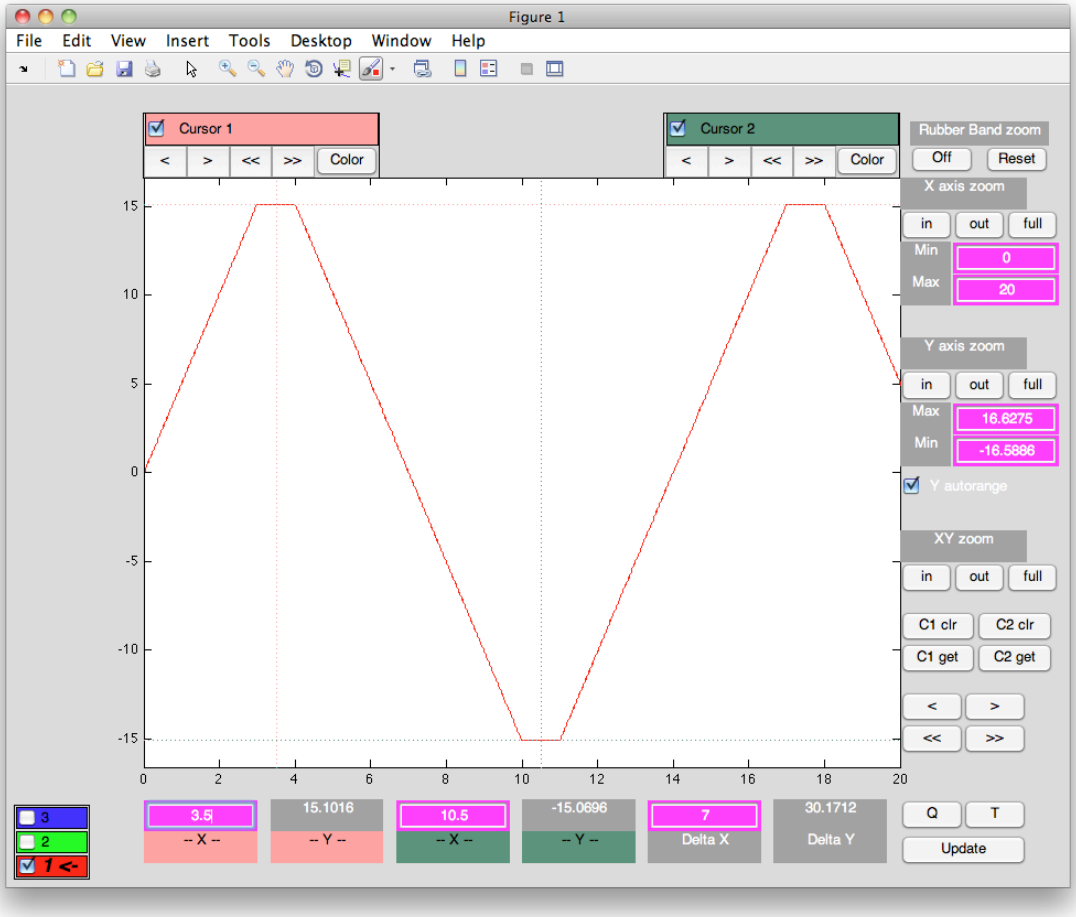
The solution is to perform a scaling operation on the data (and possibly apply an offset as well). This is actually a very simple process, easy to calculate and apply.



Here is some sample data (left eye = green, right eye = blue, target = red):

As you can see, the traces don't quite line up at the ±15° endpoints (e.g. at 3.5 and 10.5 seconds), with the blue line being several degrees beyond the red line. If you run 'zoomtool' on this figure, you can easily measure the peak-to-peak values for each line.

Let's start by examining the target trace, which was calibrated independent of the test subject, and therefore is likely to be accurate:



Here the cursors are on the rightward (3.5 seconds) and leftward (10.5 seconds) position limits of the target trace. The target values are 15.1016 and -15.0696 degrees, respectively, for a total p-p of 30.1712 (shown in the 'Delta Y' field). Not too shabby.

Therefore the difference between the red and blue lines is due to inaccuracy in the calibration of the right eye data.

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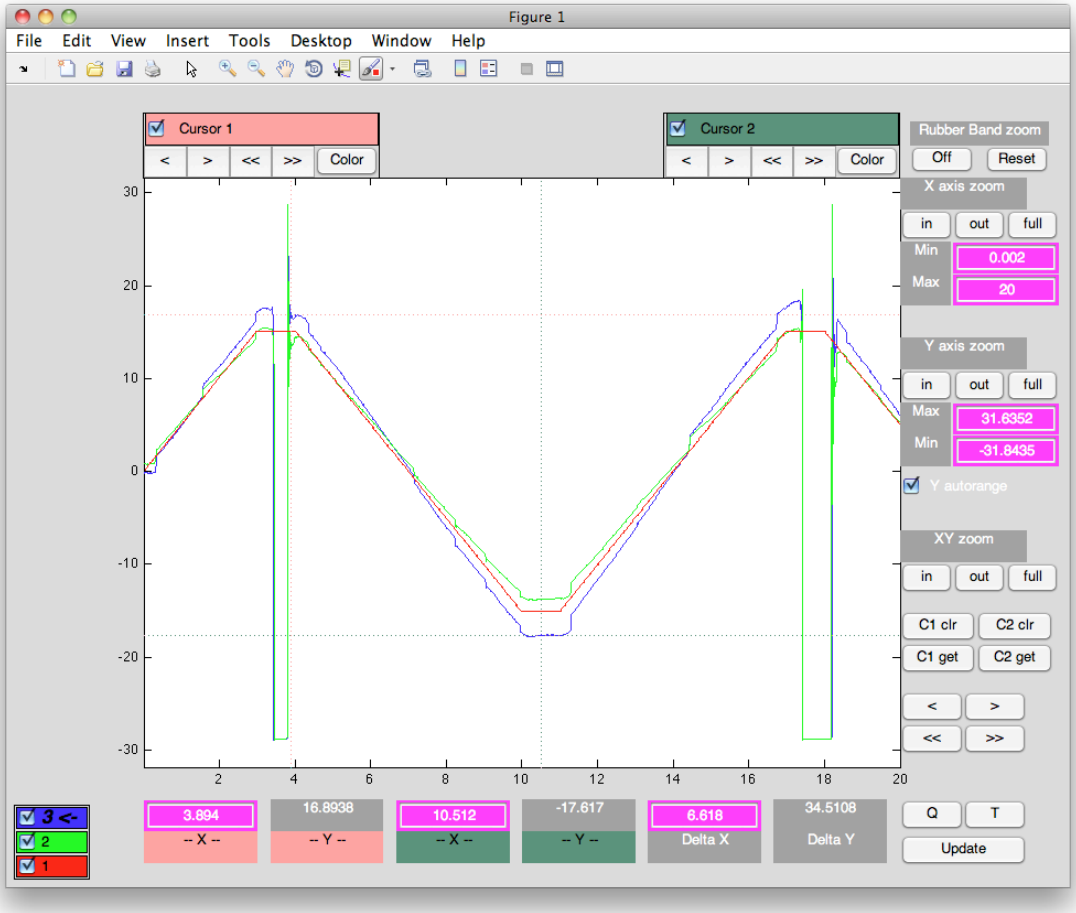
So now we will take a closer look at the blue line:



The p-p amplitude is 34.51 degrees, which is more than 10% error. To correct for this, you would multiply the right eye data by 30/34.51.

rh_old = rh;
rh = rh * 30/34.51;

To see how good a job this scaling value did, replot the data and run zoomtool again.

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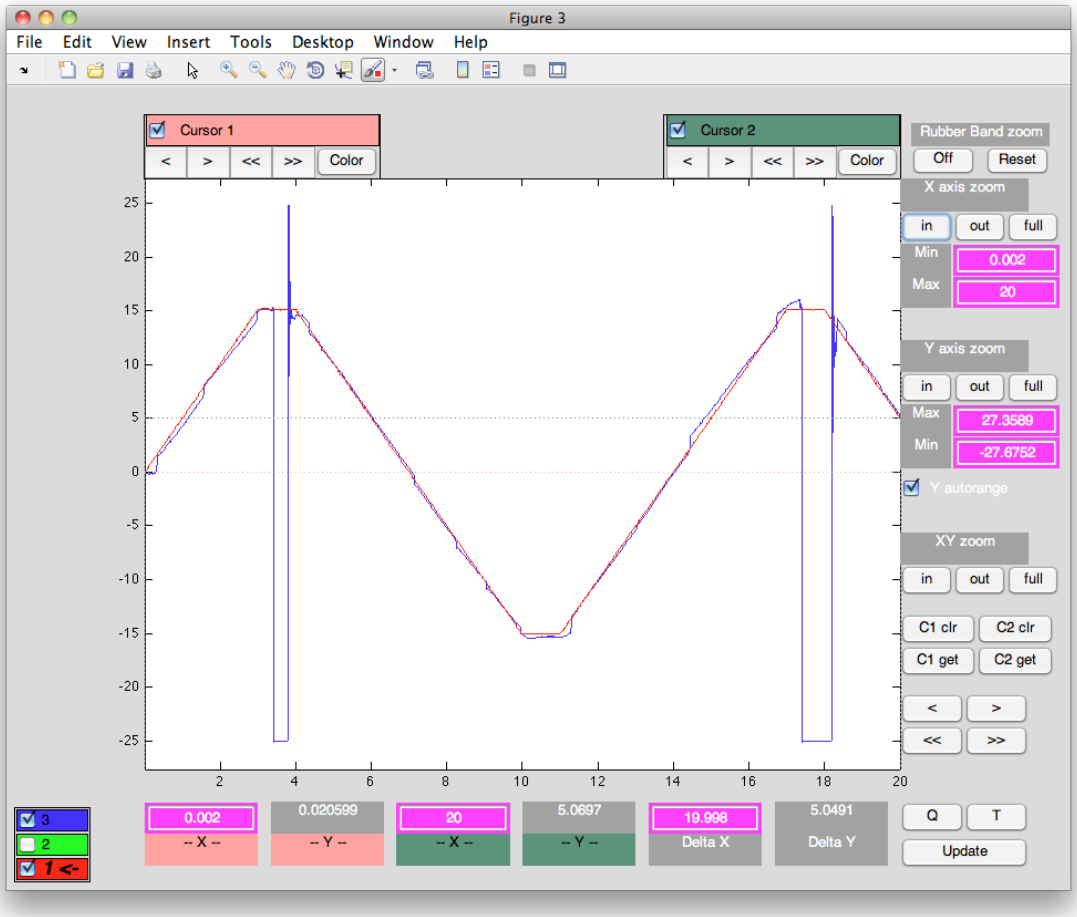

(For the sake of simplicity, I have not plotted the green line)

As you can see, the blue line is much closer to the red line now. For the purposes of the analysis you will perform for your writeup, this will do quite nicely.

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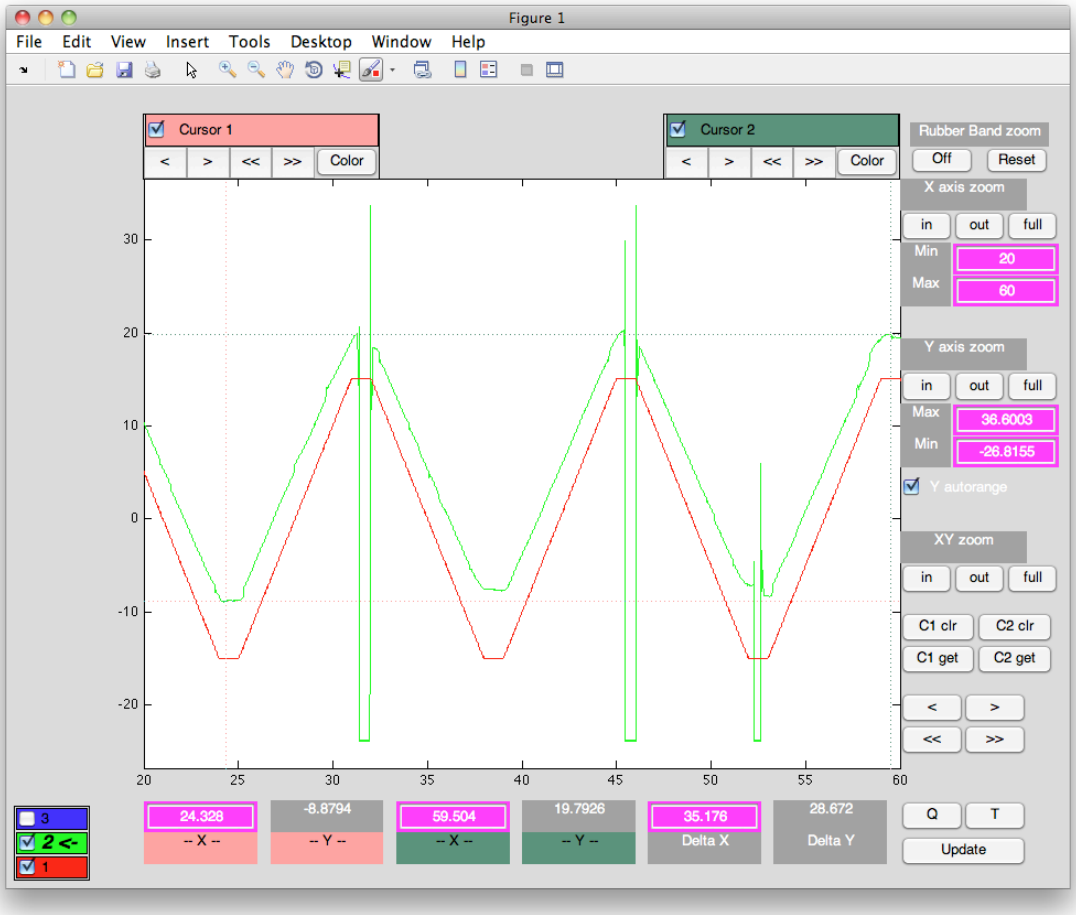
Most of the time, this should be enough to fix the problem. But consider the case where the subject turned their head sometime during the recording session. You might see something that looks like this:



As you should be able to see, the green trace looks like it has been shifted upward by several degrees. The p-p amplitude is quite good (28.5 degrees), but the place where it *should* be -15° (at 24.328 seconds) it is nearly at -9°, while the 15° point (at 59.504 seconds) is nearly 20°, suggesting that there is a constant rightward 5° error, which is likely due to the subject moving his head 5° to the left.

The correction for this problem is very easy: shift the data back to the left by five degrees:

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lh_old = lh;
lh = lh – 5;
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Replot and you will see that the green line now is in good agreement with the red line.

Note that you will have to be careful about where you select adjustment points. For example, you want to avoid any times when the subject blinked, as there is no good tracker data at those times.

If you choose to apply these sorts of corrections, you need to keep track of them for your own calculations, and should also mention that you did so when presenting your data and analyses.