



Neural Bases of Language, V61.0043-001

LAB 2

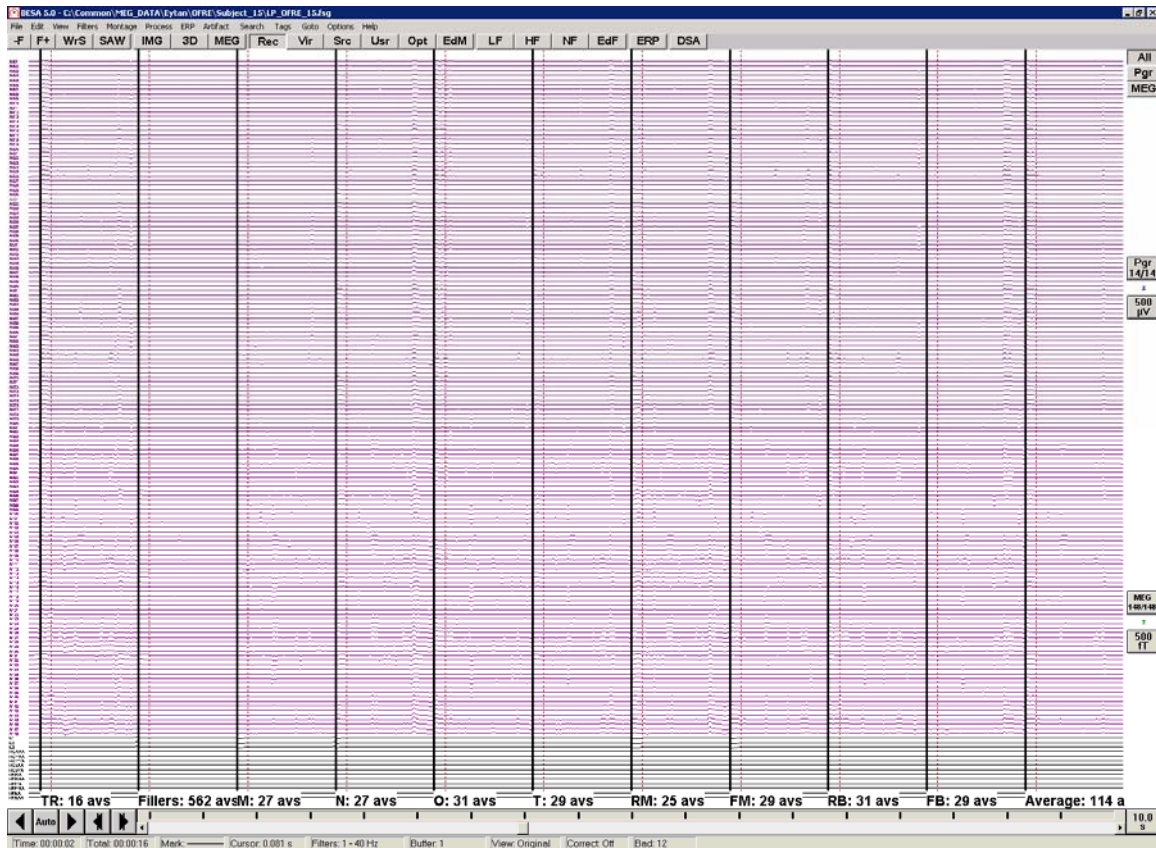
GROUP MEMBERS:

SUBJECT ANALYZED: _____

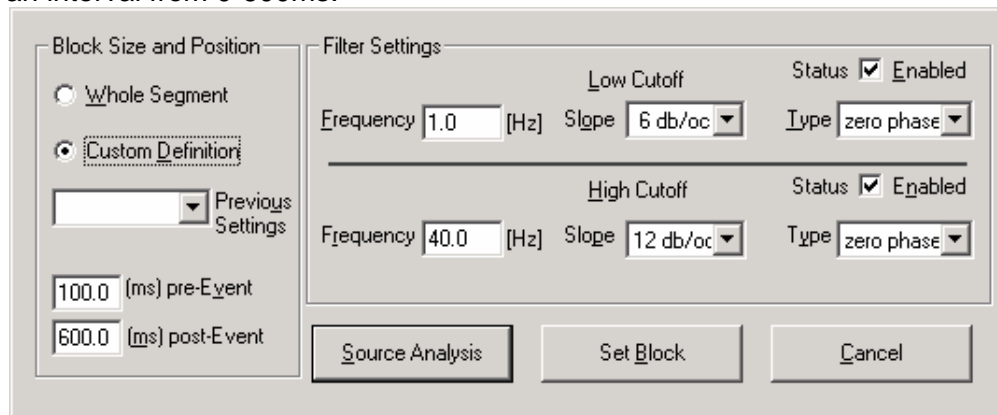
Name of ppt file for final presentation:

Lab 2

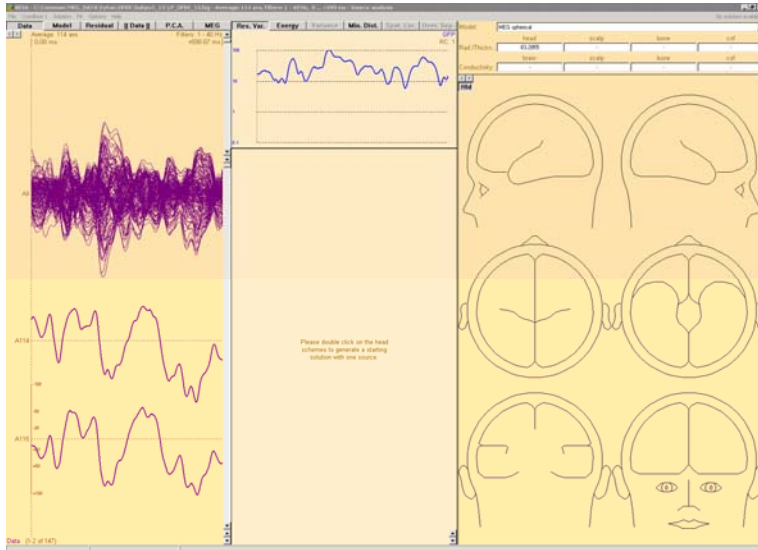
1. Open BESA (Brain Electric Source Analysis).
2. Open the averaged .fsg data file. In this file all the experimental conditions are concatenated together.



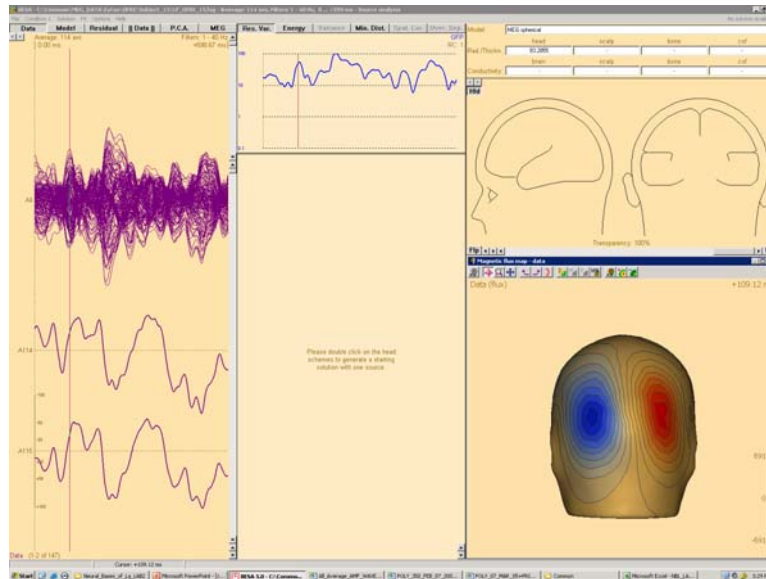
3. Scroll to the end of the file until you see a file labeled “Average”. This is the grandaverage of all the experimental conditions. By left-clicking, highlight an area of the grandaverage. Then right-click to reveal a menubar. Select “Source Analysis.”
4. In order to exclude very low frequency activity, set the Low Cutoff at 1Hz and, in order to exclude very high frequency activity, set the High Cutoff at 40Hz. Select an interval from 0-600ms.



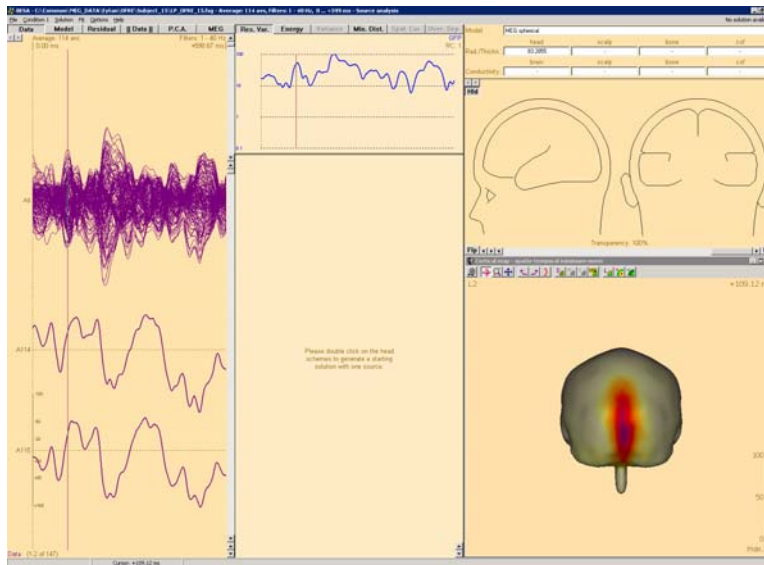
- Click on Source Analysis to reveal the Source Analysis window.



- Find the M100 response by inspecting the magnetic field patterns associated with major response components between 70 and 170ms. Point the cursor to a peak in the average and hit 'm'. With the mouse, turn the head so you can view it from the back. The M100 field distribution is shown below.



- Click on MN (=“Minimum Norm”). A dialog box opens. Click on “Start,” in order to calculate a distributed source solution. Instead of positing a single point source for the measured magnetic field, this type of analysis estimates the *density of current in an area*.



8. The minimum norm gives you a quick visualization of how many areas are active. Turn the head around to see active areas. In addition to V1, are there other areas active at the M100 Peak?

YES

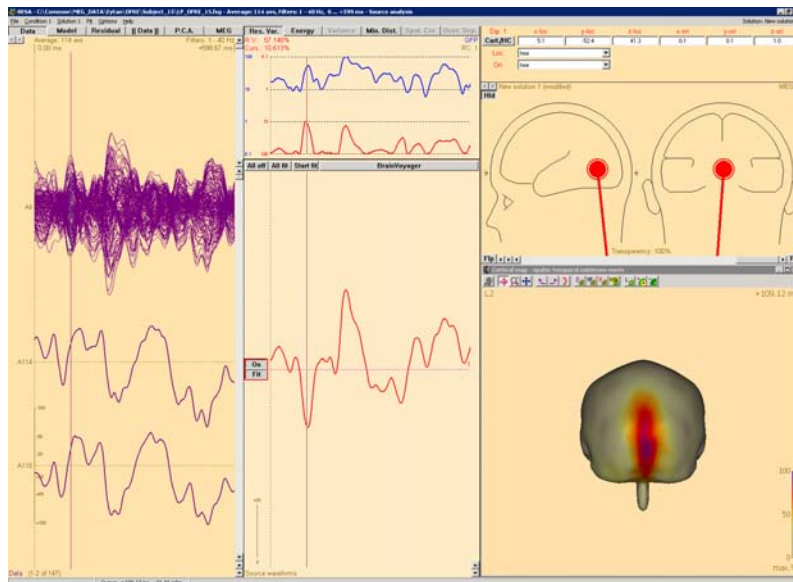
NO

If yes, what areas? (Use the Brain Anatomy links on our course website if needed.)

How many active areas does the minimum norm estimate show? What are they?

- 1.
 - 2.
 - 3.
 - 4.
 - 5.
- Etc...

- By double-clicking on the head frame, insert one dipole into the source model. Click on Start fit.



- If the dipole localizes in an area that is consistent with the results of the minimum norm estimate and if its orientation is consistent with the measured magnetic field (remember the right-hand rule), save the solution as:

NBL_Freq_Opa_SubjectNumber_M100.bsa

And label the source as M100 by double clicking on the number right next to the source wave.

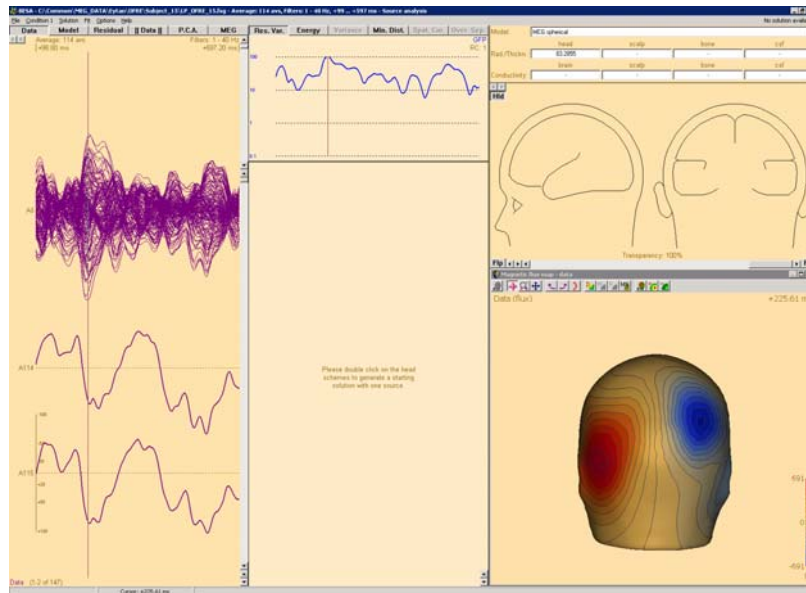
- If the dipole does not localize in a way that is consistent with the minimum norm, this probably means that more than one source is active at the time point you are localizing. By double-clicking on the headframe, add as many dipoles to your model as your answer to the question in 7 would suggest there to be sources.
- Turn all the dipoles on but clicking on “All fit”. Then “Start fit”.
- If the dipoles localize in areas that are consistent with the results of the minimum norm estimate and if the orientations are consistent with the measured magnetic field (remember the right-hand rule), save the solution as:

NBL_Freq_Opa_SubjectNumber_M100+#OfOtherSources.bsa

Label the V1 source as M100. The other sources you can leave unlabelled.

- Take a screen shot of your solution and the associated minimum norm estimate and paste into a Powerpoint slide titled **M100 Minimum Norm**. Then take another screen shot, now showing the magnetic field (click on D). Paste it into a slide titled **M100 Magnetic Field**.

15. Your next task is to model the M170. Move the cursor to the next component following the M100. The field map should show a polarity reversal wrt the M100.



Do you observe a polarity reversal?

YES

NO

16. Place the cursor at the peak of the component and run the minimum norm estimate.

How many active areas does the minimum norm estimate show? What are they?

1.

2.

3.

4.

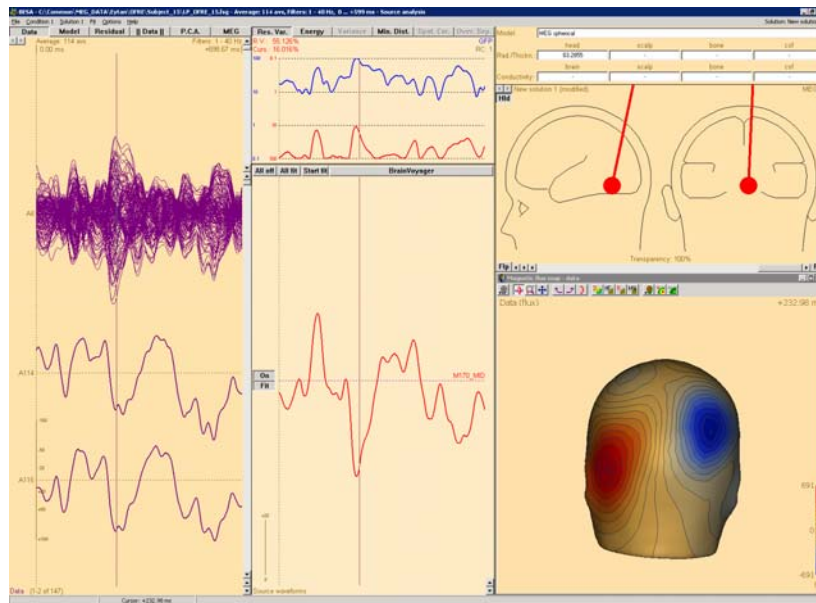
5.

Etc...

17. By double-clicking on the head-frame, place dipoles roughly in the areas indicated above.

18. Fit the dipoles (1. "All fit", 2. "Start fit")

19. If there are posterior sources with an upward orientation, label those as M170 sources. In your label, indicate whether the source is left or right lateralize, or in the middle (M170_LH, M170_RH, M170_MID).



20. Save the solution as

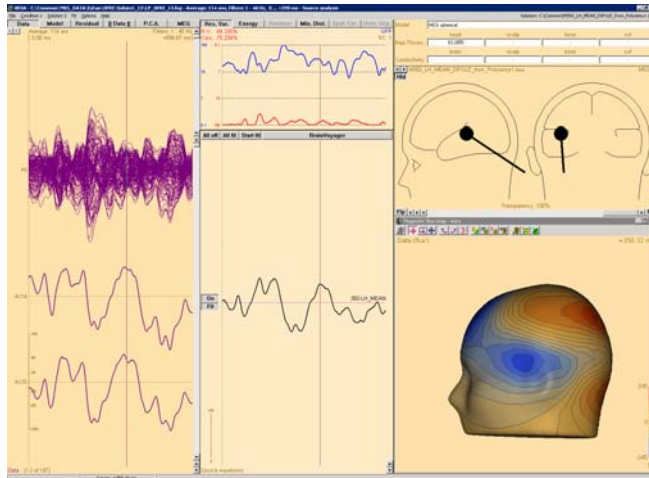
NBL_Freq_Opa_SubjectNumber_M170+#OfOtherSources.bsa

21. Take a screen shot of your solution and the associated minimum norm estimate and paste into a Powerpoint slide titled **M170 Minimum Norm**. Then take another screen shot, now showing the magnetic field (click on D). Paste it into a slide titled **M170Magnetic Field**.

22. Lastly, you will fit the M350 source. In order to do this, first open the solution

M350_LH_MEAN_DIPOLE_from_Polysemy1.bsa

This solution is an average M350 dipole, calculated from a different dataset. By seeing at what time-point this source explains the most activity, you'll find the best timepoint for fitting the M350 source.



23. At what time, between 250 and 450 ms, is the amplitude of the mean M350 dipole the largest?

At _____ ms post stimulus onset.

24. Run the minimum norm estimate at the point indicated above. How many active areas?

1.

2.

3.

4.

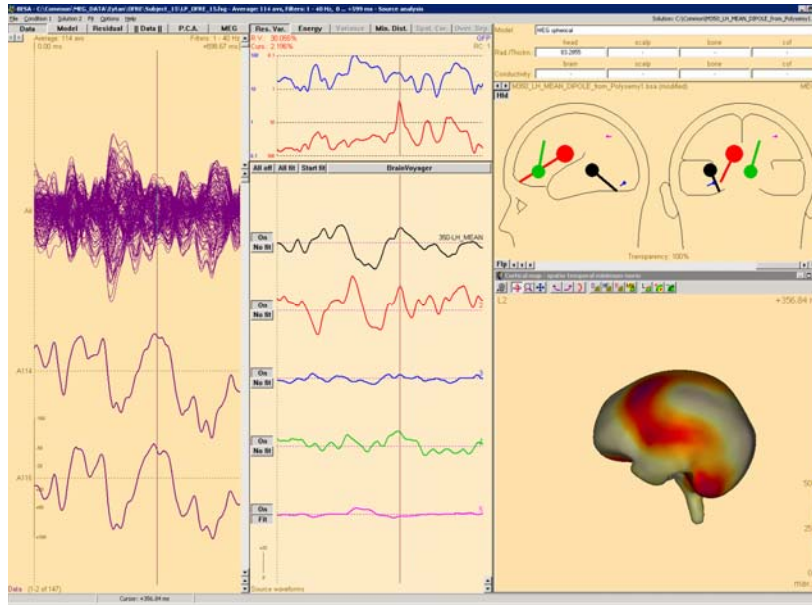
5.

Etc...

25. By double-clicking on the head-frame, place dipoles roughly in the areas indicated above.

26. Fit the dipoles (1. "All fit", 2. "Start fit").

27. If there is a left hemisphere source that has the M350 orientation, label it the M350_LH. If there is right hemisphere source, label that source as the M350_RH.



28. Save the solution as

NBL_Freq_Opa_SubjectNumber_M350+#OfOtherSources.bsa

29. Take a screen shot of your solution and the associated minimum norm estimate and paste into a Powerpoint slide titled **M350 Minimum Norm**. Then take another screen shot, now showing the magnetic field (click on D). Paste it into a slide titled **M350 Magnetic Field**.

30. You are now done with the source modeling part of this lab.

TIME COURSE ANALYSIS

31. Next, you'll proceed to examine **how the amplitudes and latencies of the sources you've just fitted vary as a function of stimulus type**. The stimulus categories and labels are shown below (with examples of each category):

	Monomorphemic no -er	Nondecomposable with -er	Bimorphemic Opaque	Bimorphemic Transparent
Frequent	curtain (MF)	feather (NF)	sweater (OF)	painter (TF)
Rare	convent (MR)	blunder (NR)	sneaker (OR)	charmer (TR)

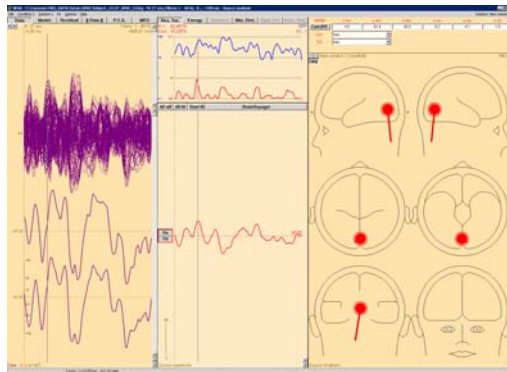
32. Your analysis will test for the effect of morphology and for the effect of frequency. To increase signal to noise, two conditions are always collapsed together (see below).

33. Bring the following conditions into Source Analysis. You'll find them at the end of the file, right before "Averaged." Use the same filter setting as you did with "Averaged."

M: All monomorphemic (curtain (MF) + feather (NF))

- N:** All nondecomposable (convent (MR) + blunder (NR))
- O:** All opaque (sweater (OF) + sneaker (OR))
- T:** All Transparent: (painter (TF) + charmer (TR))
- RM:** Rare Monomorphemic (convent (MR) + blunder (NR))
- FM:** Frequent Monomorphemic (curtain (MF) + feather (NF))
- RB:** Rare Bimorphemic (sneaker (OR) + charmer (TR))
- FB:** Frequent Bimorphemic (sweater (OF) + painter (TF))

34. Open your M100 solution. Point the cursor at the M100 peak.



35. Open the file:

GROUP#_LAB2_peak_analysis.xls

in your group's directory.

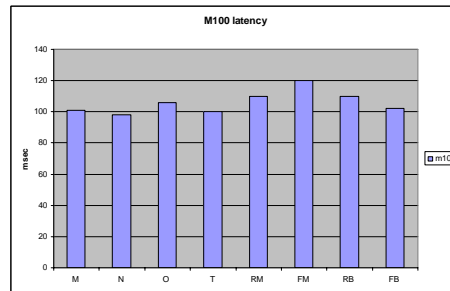
36. Find your subject number and record the latency and amplitude for the M100 condition by condition. The latencies and amplitudes can be found at the bottom of the Source Analysis window. By clicking on the arrow in the top right corner you can move between conditions.

37. Do the same for all M170 sources and the M350.

38. The final step is to plot the data. Create a histogram for each dependent measure. Select the datacells and condition labels and click on Chart Wizard.



39. Plot the data by using msec as the y-axis unit for latency and nAm for amplitude.
An M100 latency histogram might look like this.



40. Create a histogram for each measure you've recorded into the datasheet.
41. Copy paste each histogram to your Powerpoint file. Save the power point file into the directory of your subject. Name it:
- NBL_GroupNumber_Subject_Number_all_graphs.ppt*
42. In the final slide, answer the question: What would you conclude if all the subjects looked like this one?
43. Be ready to present your results in class. You may want to email the file to yourself so you won't forget what you did.

You're done!

Give a filled out version of this document to Eytan or Jesse.