Rejecting noisy components after ICA

Varghese Peter

May 2019

The final stage in the previous analysis was the ICA (independent component analysis. ICA divides the EEG data into multiple independent components (the number of components will be same as the number of channels in the data (64 in this case). Some of this components will be brain components; some will be artifacts (eye artifacts, channel noise, heart noise, muscle etc). The aim of this step is to remove the artifacts from the data. I prefer doing this step manually as there is an option to manually verify the artifacts.
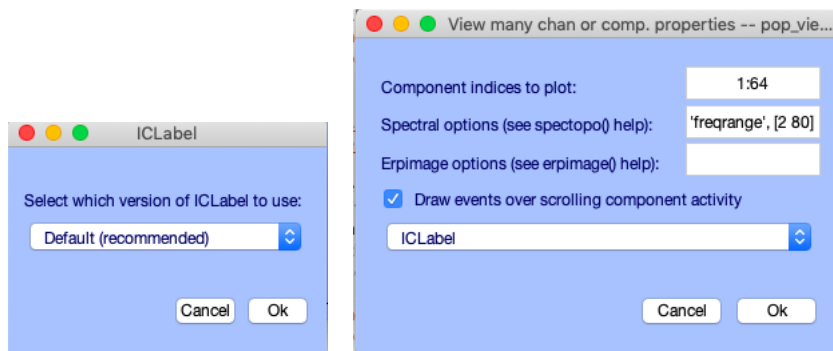
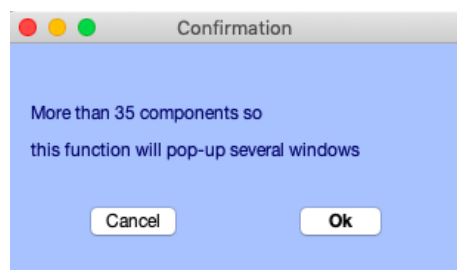First load the data from the previous stage. **File → Load existing dataset**.
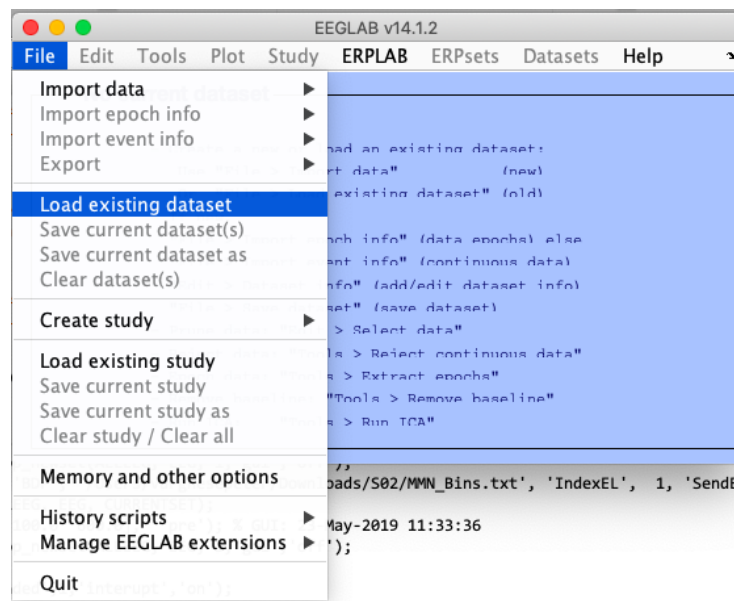
Select the **"Sxx_MMN_ica.set"**/**"Sxx_ACC_ica.set"**/**"Sxx_ASSR_ica.set"**
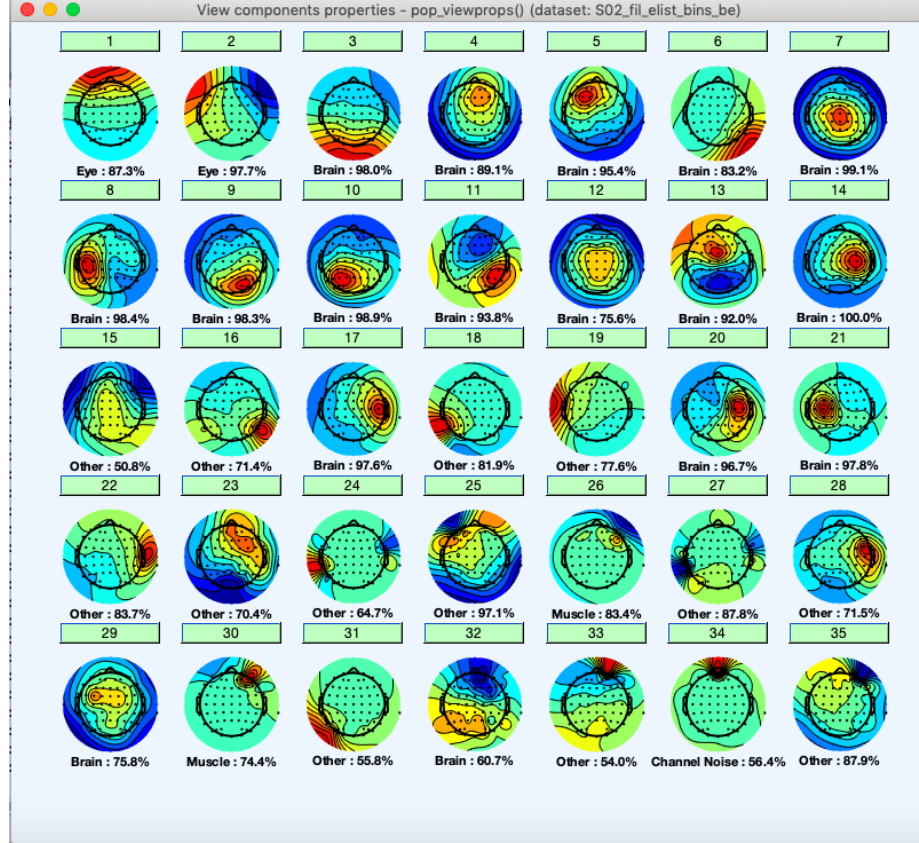Then go to **Tools → ICLabels**
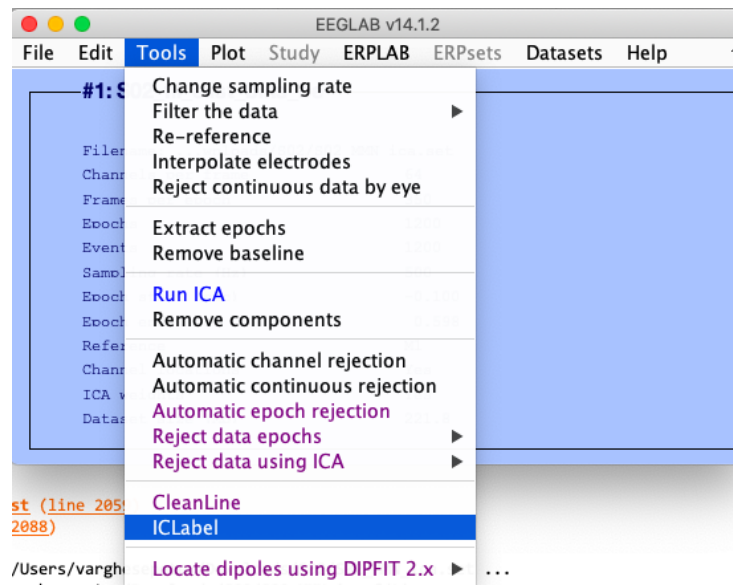
You can leave the default parameters as it is.

Click OK at the next pop up window

The resulting plot shows the components and what the program believes where they come from. For example, there is a 87 % chance that the first component is an eye artifact.

As mentioned earlier the aim of this step is to remove the artifact components. I will remove all the **eye**, **muscle**, **channel noise** and **heart** components. Note the eye, muscle, channel noise and components that have probability 50 % or more. **Do not** remove the components with **other** label.

You can click on the ribbon with component number to see more details about the component (See Figure 1 below). It is strongly recommended to do this if you are unsure about a component. For example, an eye component that have less than 50 % probability. This can help to manually decide whether to accept or reject a component.

Figure A is obtained when you click on component 1. On the top panel, you can see the topography (activity of the component across the scalp, location of this component suggest eye blink, for component 2 it suggest eye movements), the probability of the component belonging to one of the categories (87% eye

artifact), how the component is across the trials (in the example below, you can see that the component 1 is eye blink and there is a blink in certain epochs (e.g. 3-6) and not in others).

The bottom panel shows the activity of the component across trials (y axis). You can see that this component is present only for certain trials. If it was a brain component Figure 2 (component 4), the activity is present in almost all trials.
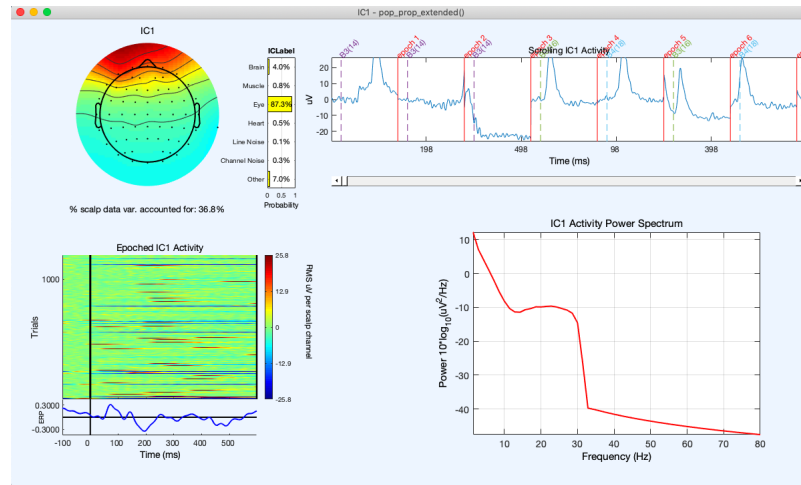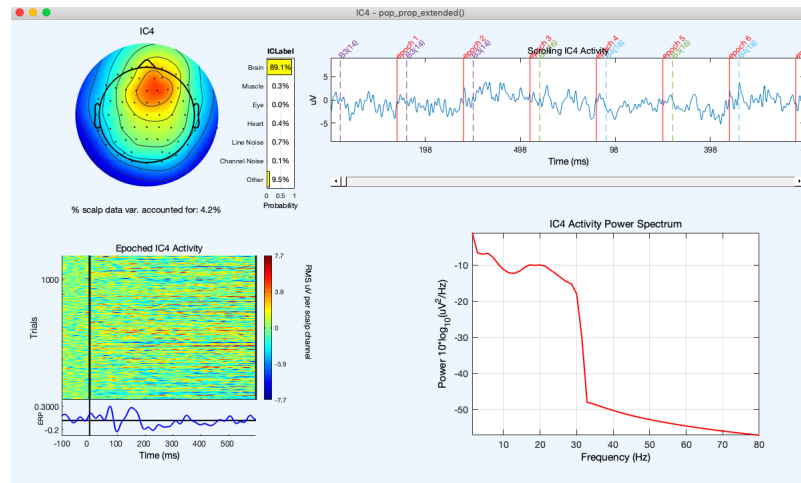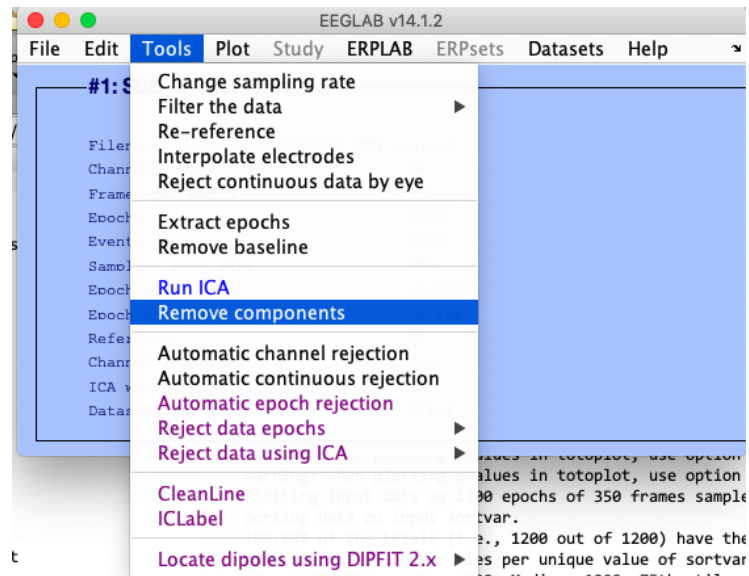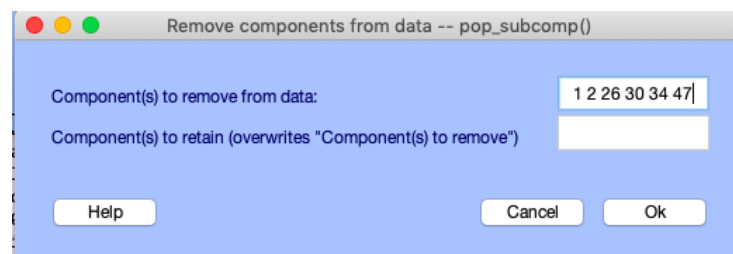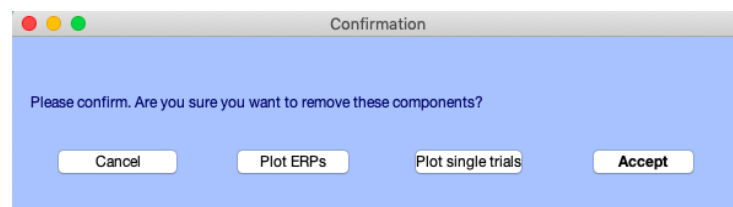

Figure 1: Component 1

Figure 2: Component 4

Once the noisy components are identified, they need to be removed. For this go to **Tools → Remove components**.

In the pop up window give the component numbers identified in the earlier step in the column titled "**Components to remove from data**".


Confirm by pressing "**Accept**"

If you wish you can see the comparison of the raw data with and without removing the noisy components by selecting "**Plot single trials**" and/or see the effect of the nosy components on ERP by selecting "**Plot ERPs**".

In the next dialogue box give the file name as **"Sxx_MMN_ica_clean"** / **"Sxx_ACC_ICA_clean"** / **"Sxx_ASSR_ica_clean"**. Make sure that the file is saved by entering the name again in the second box.
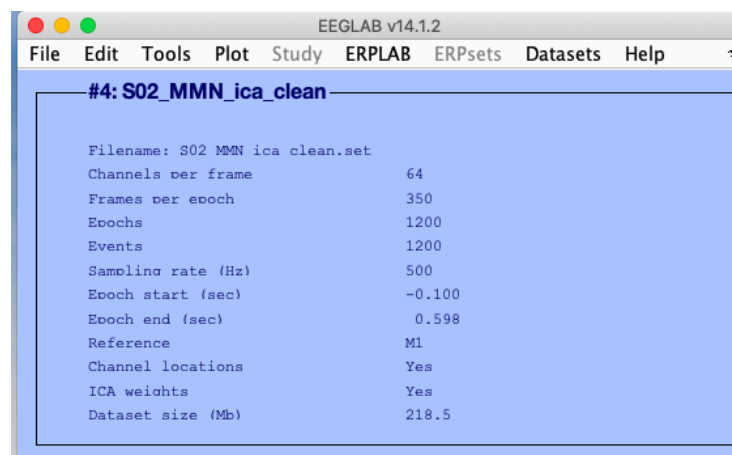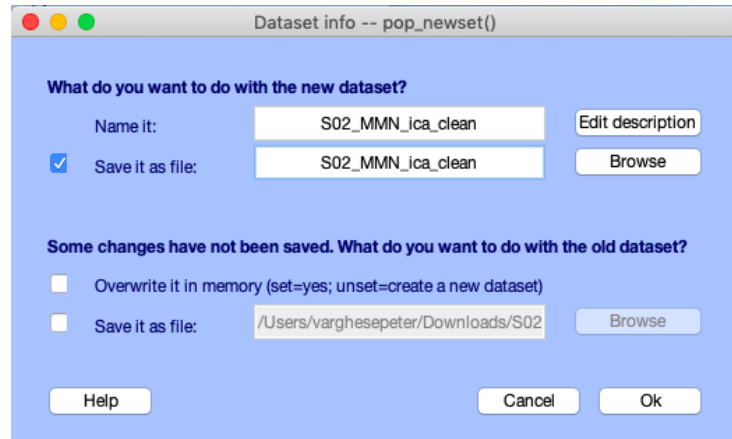
You can now close EEGLAB amd run the Step 4 script.