# Opening the GUI

To open the GUI, double click on the ARSGUI file. The ARSGUI file must be in the same file location as the breathmetrics-ARS folder.

When you double click the ARSGUI file, MATLAB will launch if it is not already open.

# Uploading a file

When the GUI opens, the only button enabled is the “Upload .txt File” button. Click this button and a file explorer will launch. Either double click .txt file or choose a .txt file and click select.

Once the selected file is processed, a Comment Selection pop-up will appear.

Hold the ctrl key and click on the desired comments. The desired comments are:

* Those that indicate the start of an anoxic challenge ***that the pup survives***(See example Figure 1).
* Those that are unique. (see example Figure 2).

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(A) (B)

**Figure 1:** (A) *Pup dies before final trial.* This displays the correct comment selection in this situation. Since the pup dies during/following the 5th anoxic challenge, the proper selection is the 1st through the 4th. (B) *Pup survives to the final trial.* This shows the correct selection of comments, all trials but the final are selected.

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1. (B)

**Figure 2:** *Repeated gas on comments.* These highlights repeated comments and the correct selection of comments. (A) In this situation, select the first of the repeated comment as it was likely a repeated mis-click in LabChart. Follow this rule unless the comments suggest otherwise as in (B). Also note the 10th trial is not selected as the pup does not survive to the next trial.

# Navigating Plots

To move the plot window, click and drag on the plot in the direction you want to move.

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Description automatically generated**In the button cluster, the buttons in Figure 3 will move the plot window to the respective marked event.

**Figure 3:** *Navigating Buttons. “*Gas On” jumps to when the anoxic challenge starts. “Gas Off” jumps to end of the anoxic challenge. “Apnea” jumps to the marked first apnea. “Eupnea” jumps to the marked breath when eupnea is restored. “HR Restored” jumps to when the HR is restored to 63% of baseline.

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Description automatically generatedThese buttons will move to the respective anoxic challenge you selected.

**Figure 4:** *Navigating Anoxic Challenges.* “Next Anoxia” will advance one forward, “Previous Anoxia” one back, and “Jump to Anoxia” will jump to the entered anoxia.

# Editing Marked Events

The points marking the First Apnea, First Gasp, Return to Eupnea, and HR Restored can be edited.

The First Apnea, First Gasp, Return to Eupnea points are draggable and will snap to the closest breath detected to where you drag and drop the point in the *Respiratory Flow* Plot.

Similarly, the HR Restored point is draggable and will snap to the closest detected R-wave (indicated by the gray X’s) on the *ECG* plot.

*Shift Apnea Button*. In some traces, the first apnea will be marked right after the anoxic challenge begins (see in Figure 5) or due to some other disturbance. When this occurs, click the Shift Apnea Button to move to the next detected apnea. This is usually achieved within one or two adjustments.

A screen shot of a graph

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**Figure 5:** *Obviously incorrect First Apnea marking.* The top trace is an example of an incorrect marking directly proceeding the start of the anoxic challenge. The bottom trace is the result of clicking the Shift Apnea button once, which is the more appropriate marking considering our criteria.

# Secondary Plots

To view plots of both Minute Ventilation and Heart rate for the current anoxic challenge, click the “Secondary Plots” button. This will launch an additional figure plotting these values.

*Note:* To see the changes made by moving the draggable points reflected in these plots, you may need to close the current Secondary Plots figure and open a new one after editing points by clicking the “Secondary Plots” button.

# Editing Marked Breaths

*Adding a Breath(s)*

1. To add a breath, click the “Add Breath” button.
2. Two draggable points will be dropped in the middle of the plot window. One labeled “Inhale Peak” (colored blue) and the other “Exhale Trough” (colored purple).
3. Drag these points as close to the desired positions as you can and drop the point. The “Inhale Peak” will update to the local maxima and the “Exhale Trough” to the local minima.
   1. *This can be a bit finicky, focus aiming on the x-value which is more important than the y-value.*
4. If there is no associated exhale with the breath to be added, you must Right Click on the “Exhale Trough” point and click delete point.
5. If you don’t want to add the breath you started to select, right click on, and delete both points.
6. Once both the points are either in the desired position or deleted, click the “Add Breath” button again.
7. The breath will now **be marked to be added but not yet addedto the feature analysis.** This is because you can mark multiple breaths to be added and then add them to the feature analysis all at once.
   1. Note that when you mark a breath to be added, the green lamp in the “Recalculate Features” button will turn red. This indicates you have marked breaths to be added or removed and need to recalculate before you proceed in your analysis.
8. A screenshot of a computer screen

   Description automatically generatedOnce all breaths to be added are marked, click the “Recalculate Features” button and the plots and analysis will update based on your manual input.

*Removing a Breath(s)*

1. To remove a breath, click the “Remove Breath” button.
2. A draggable point will be dropped in the middle of the plot window. Labeled “Inhale Onset” (colored red).
3. Drag these points as close to the desired breath as you can and drop the point. The point will snap to the nearest marked inhale onset.
4. If you don’t want to remove the breath you started to select, right click on the point, and select “Delete Point.”
5. Once the point is either in the desired position or deleted, click the “Remove Breath” button again.
6. The breath will now **be marked to be removed but not yet removed**from the feature analysis**.** This is because you can mark multiple breaths to be removed and then remove them from the feature analysis all at once.
   1. Note that when you mark a breath to be removed, the green lamp in the “Recalculate Features” button will turn red. This indicates you have marked breaths to be added or removed and need to recalculate before you proceed in your analysis.
7. Once all breaths to be removed are marked, click the “Recalculate Features” button and the plots and analysis will update based on your manual input.

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Description automatically generatedNote: You only need to click the “Recalculate Features” button once. You should mark all breaths to be added and all breaths removed. Then click the “Recalculate Features” button to update your analysis all at once.