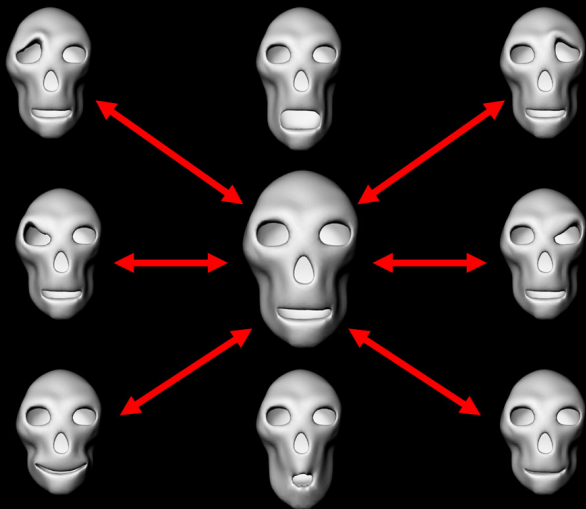


## 1

## Facial Animation with Morph Targets



While many of us use bones\* to animate our character's body and some of us are daring enough to try the same with facial work, it is rarely the best solution to this complex problem. The challenge lies in the many subtle expressions and movements required to pull off animating a character's face. Creating the necessary adjustments is a daunting process. That is where Morphing or Blend Shapes comes into play.

\*Bones are elongated, cone shaped objects that are used to deform 3D geometry.



# 2

## Sculpting the Shapes



The approach is to sculpt key expressions and then simply blend these together to create the animation. We might create a few mouth shapes, an open eye and closed eye, a few nose wrinkles, etc.

With varying mixtures of a handful of individual expressions, we have an infinite variety of options.

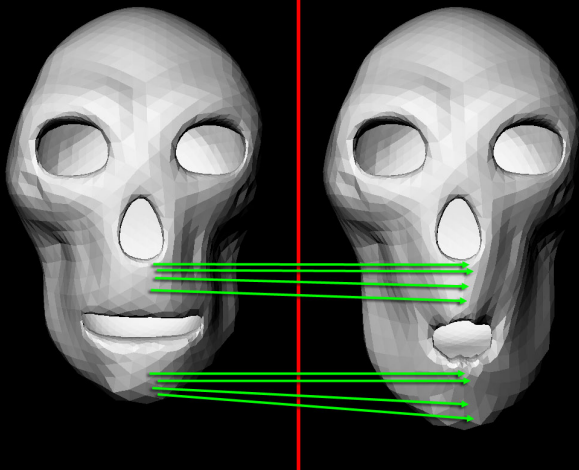


**Overview**



## 3

## How it Works...

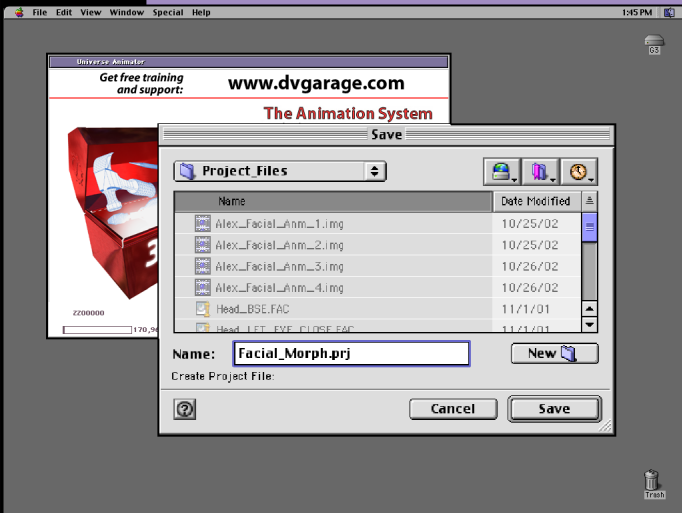


What makes it all work are "Delta Calculations". This means the application doesn't simply blend two heads together. It looks only for where there is a change in the vertex positions.

It compares the Delta between the base model and the morph target. This is important because it allows you to stack many individual morph targets overtop of each other effectively.

For example, a right eye morph target will have no effect on any area other than the right eye area. Each target moves only the vertices that are different. The difference, or delta, is blended to animate the surface of the face.





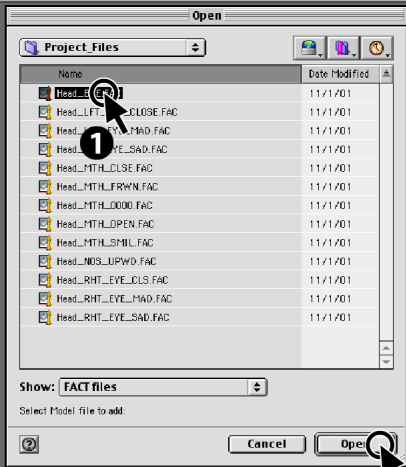
Launch Electric Image Animator.

Press [**CMD/CTRL+N**] to create a new project file.

When Electric Image prompts you to name and save this new project, name it "Facial\_Morph.prj" file, then navigate to the Morph\_Tutorial folder and save it in there.

Note: Macintosh keyboard commands are indicated in **red**. Windows keyboard commands are indicated in **blue**. Some files may need to be manually located while loading.



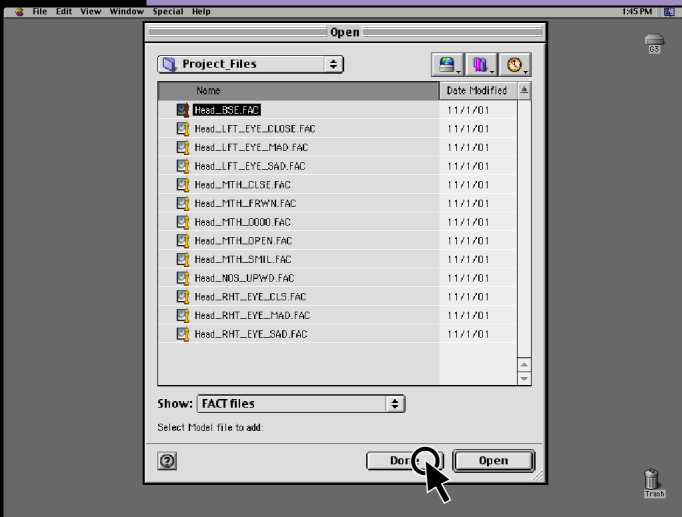


After saving, you will be prompted to load your FACT files into this new project.

Locate the Head\_BSE.FAC file, select it, and **[CLK]** Open.

Note: This model is the "rest position" for the face. All the following Morph targets will measure their deltas (see step #3) from this model. If you are creating your own morph targets, you should always start with this model.





After loading the base model **[CLK]** the Done button.

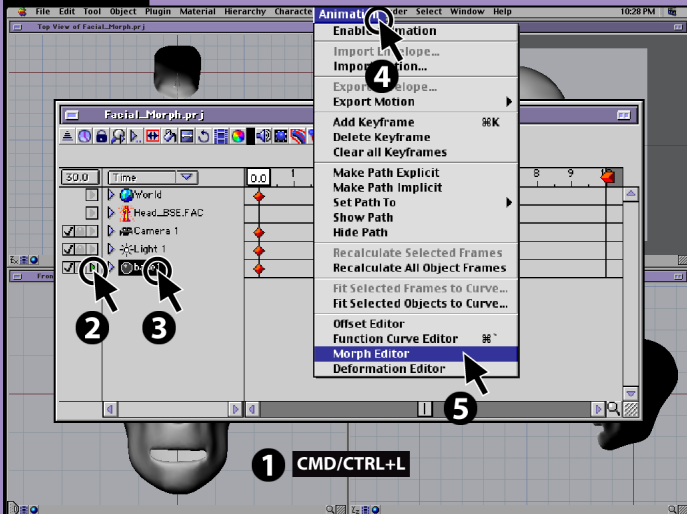
The remaining models will be brought into EI through the Morph Editor window. Those models will be used to change the shape of our head base model.

Note: In this tutorial, we won't build the actual morph targets; we are just going to concentrate on how they are applied to achieve the facial animation. While this tutorial utilizes Electric Image Universe, the concepts can be applied to many popular 3D applications.



## 7

## Open the Morph Editor



Open the Project view window [**CMD/CTRL+L**].

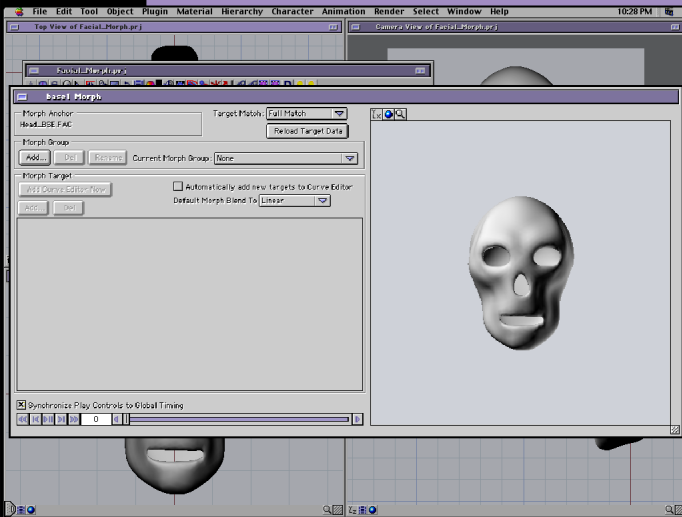
[**CLK**] on the animation triangle for the “base1” layer and then [**CLK**] on the layer itself to highlight it.

In the Main menu, select Animation > Morph Editor.



Set Up





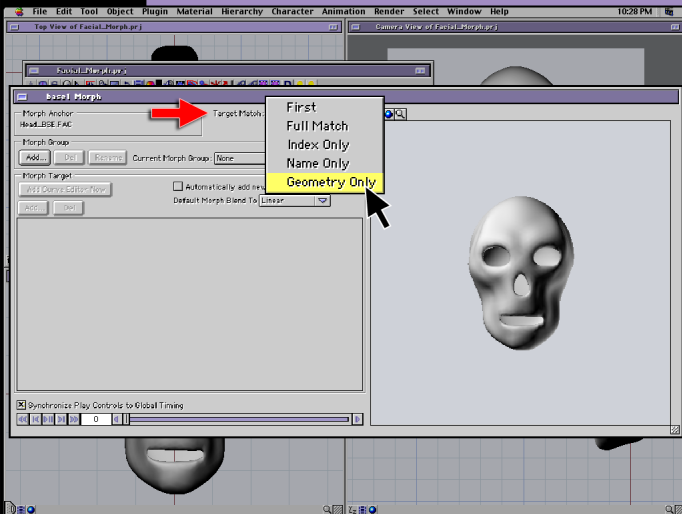
The Morph Editor window is where you create groups and relationships between your source base model and the pose models (morph targets) that we did not import earlier.

When we create a group and define the morph target relationship, a slider will appear that will control the positioning strength between the source model and the morph target model.

**Note:** While we could do some of the animation in this window, we won't. Instead, we'll simply use it to set up our morph groups and load our morph targets.





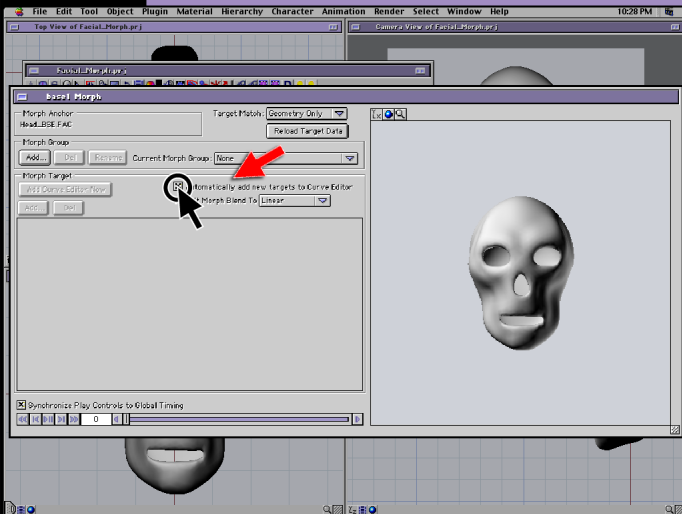


Set the Target Match to "Geometry Only".

We need to make sure the vertex numbering is correct, but if the tolerance is too tight, none of the models will match. Geometry Only is enough.

Note: The Target Match option tells the morph engine how to interpret the morph target group. You can find more information about this in the Animator manual.

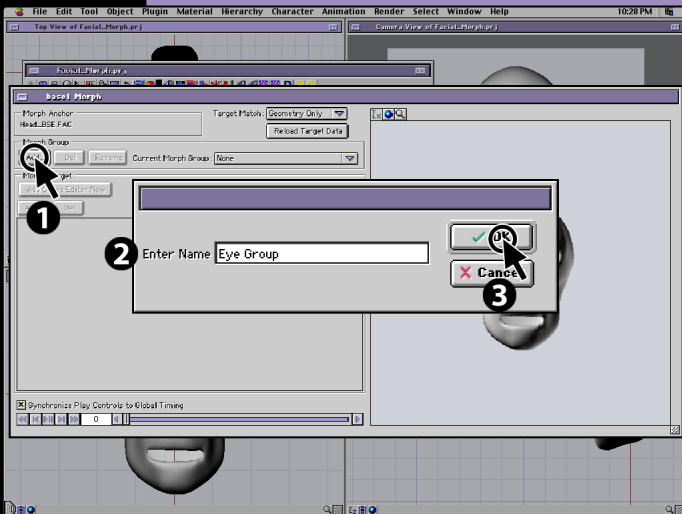




Make sure to activate "Automatically add new targets to Curve Editor".

This means the control value for the targets will be added to the F-Curve Editor as we add targets to this dialog. Most of our motion editing will be done in the F-Curve Editor later.

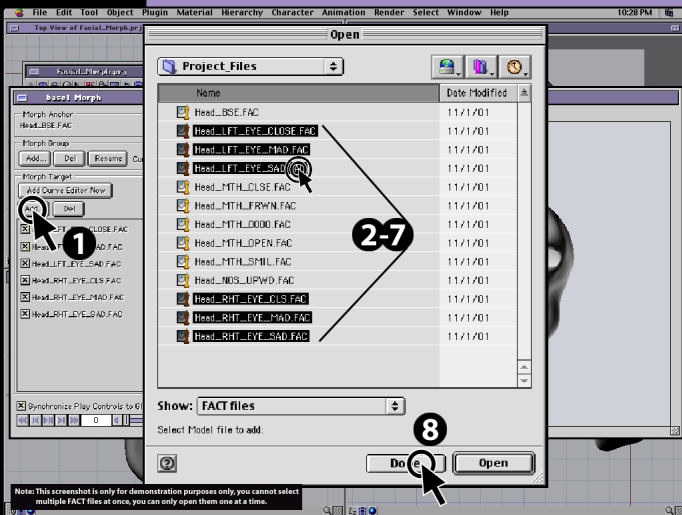




Under Morph Group, **[CLK]** the Add... button to create a new Morph Group.

Name it "Eye Group" and **[CLK]** OK (or press **[RTRN]**).





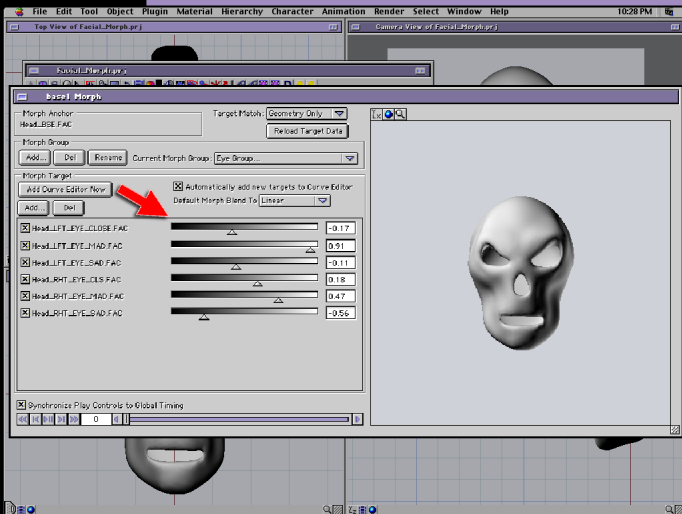
In the Morph Target area, **[CLK]** on the Add... button.

Through this Open dialog box, load all of the eye targets (there are six of them) into this group.

**[CLK]** the Done button when finished.

Note: You'll notice that each eye has roughly identical and individual targets. This provides the necessary control over the eyes.



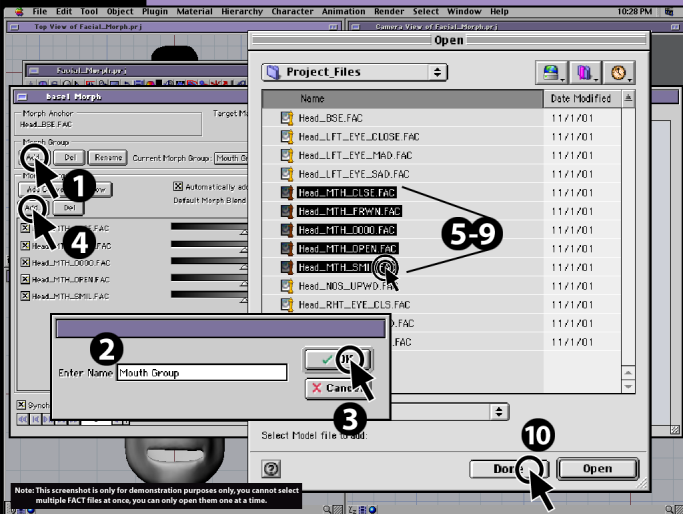


Go ahead and play with the target value sliders. You should get instant feedback in the dialog box. Notice what happens when you mix and match. There's nearly an infinite number of possibilities.

When finished, set the values back to 0.

**Warning:** If you make the adjustments and the model rips apart, the vertex numbering is mismatched. If this occurs, you will have to re-sculpt the base model into the appropriate morph target model.



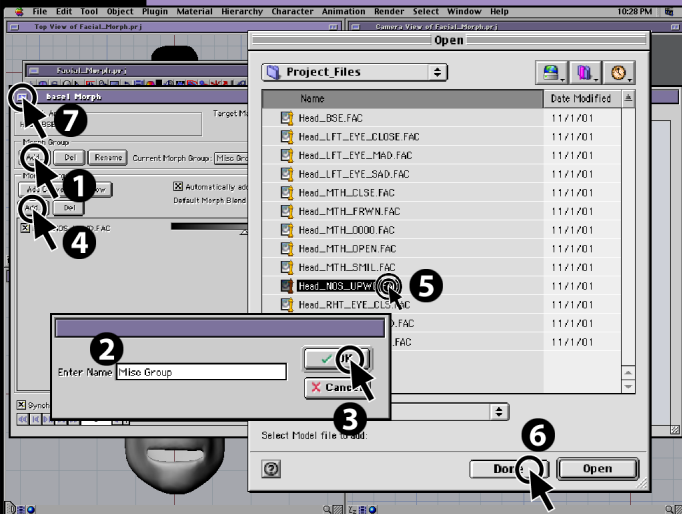


As with the Eye Group, create a new group for the mouth and name it "Mouth Group".

Load all of the Mouth morph targets to this group (there are five of them).

As with the Eye targets, you can test these targets to make sure that they work.





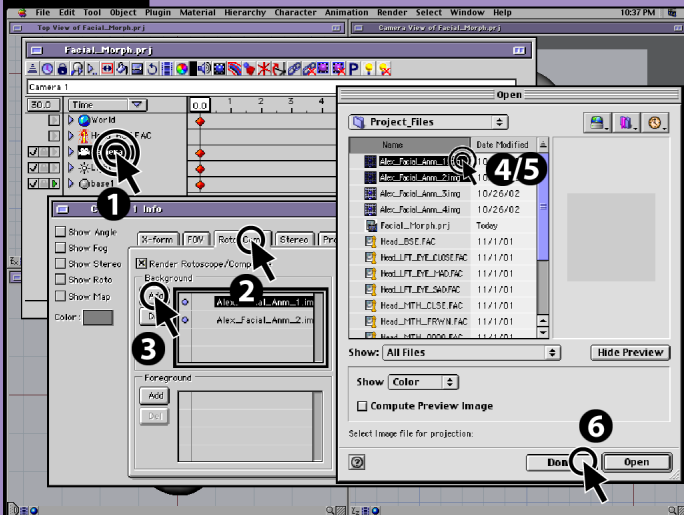
Create a group called "Misc Group" and add the remaining targets to this group.

In the case of this head, there is simply a nose target. For your own character, you could add more targets if necessary.

When finished, press [**CMD/CTRL+W**] to close this window.

Note: We are next going to load an image into the background to use as a guide to pose the face. You can either load the image we have supplied, or you can use your own.





In the Project window, **[DBL+CLK]** the Camera 1 layer.

**[CLK]** on the Roto/Comp tab.

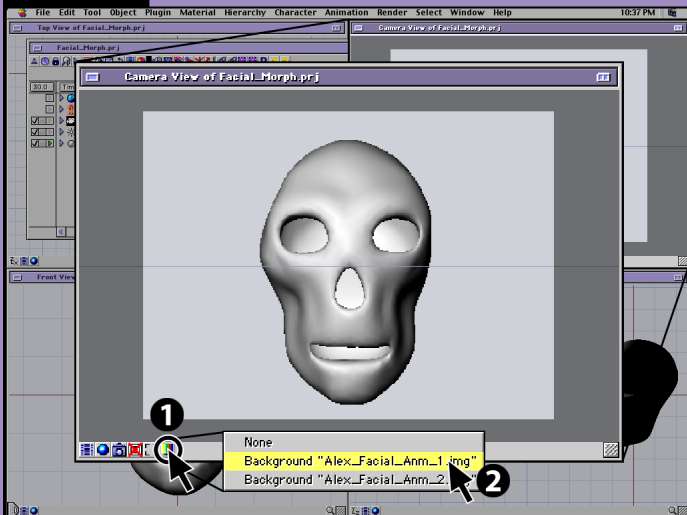
In the Background section, **[CLK]** the Add button.

Load Alex\_Facial\_Animation\_1.img and Alex\_Facial\_Animation\_2.img. This is where you could load your own movie or image(s) that you plan to match your model to.

Note: This is a really useful cheat. Many animators use mirrors at their desk to visualize motion...but with DV cameras and iMovie, why not just record the performance you need and place it beside the model?







Press [**CMD/CTRL+W**] to close the Camera 1 Info window.

In the Camera View window, [**CLK**] on the Rotoscope button (looks like a test pattern) and select the `Alex_Facial_Animation_1.png` or your own movie or image to display in the Camera View.

Note: You are now ready to reshape the model using the underlay as your guide.





As we mentioned earlier, we are going to animate the face using the F-Curve Editor instead of the sliders in the Morph window.

Make sure that your object is set to animate, which is the green triangle in the Project window, then in the main menu header, select Animation > Function Control Editor (or press **[CMD/CTRL+ ` ]**) to open the F-Curve editor.

Note: You will make all of your adjustments here. It's much simpler and offers more control than trying to use the Morph Editor window. Also, the keyboard shortcut for this window is not available on all keyboards.



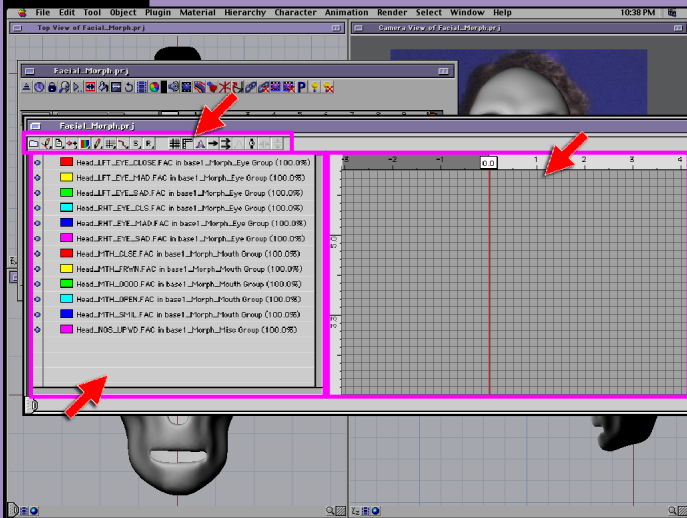


Depending on the image or movie that you are going to animate, you may need to reposition the model to see the underlay. Since the image we are using fills the whole screen, we will reframe the Camera View window so that we can see what we are doing.

In the Camera View window, press **[SPACE+OPT/ALT]** and **[CLK+DRG]** to the left in the window, and position the model on the left side of the screen.

Note: We want to see at least the main facial features of the underlays.



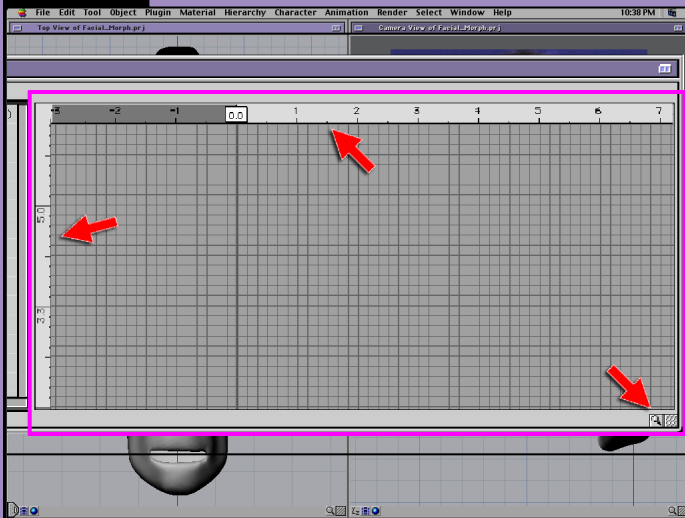


The list on the left side of the window contains all animatable channels, or layers, which in our case consists of the Morph Targets that we entered earlier.

The graph window on the right is where you will be moving the curves around and creating keyframes to animate the face.

Above the Channel/Layer window are tools that further control the animation channels and view of the graph editor.



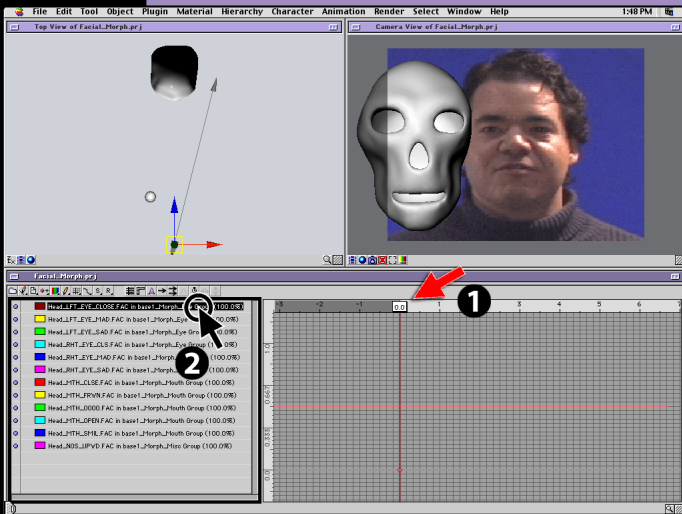


The numbers across the top of the graph represent the time, just like the timeline in the Project window.

The values on the left side represent animatable data parameters. You can adjust the curve to positive values or negative values as needed.

You can zoom in and out of this window, just like the main orthographic view windows using the magnifying glass on the lower right-hand corner of the window.





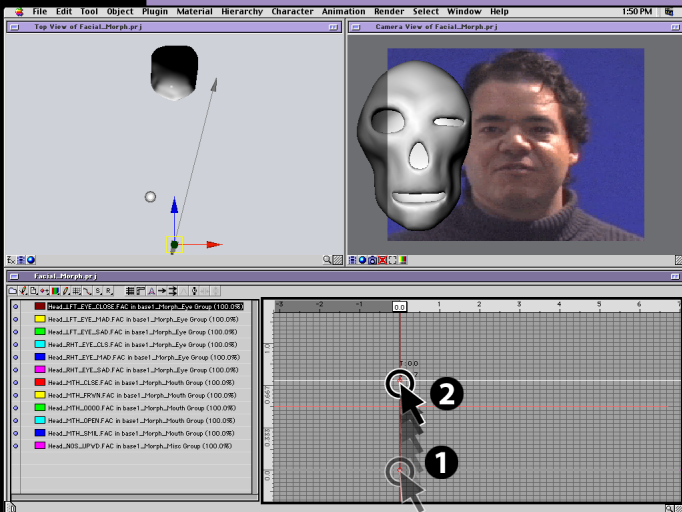
We will be adjusting the curve in the graph window to shape the model so that it looks like the face in the underlay.

To begin, make sure that the Time Marker is at the beginning of the timeline (the 0.0 mark). The first feature we will adjust is the left eye of our character.

In the Channel window, select the `Head_LFT_EYE_CLOSE.FAC` layer.

Note: When you selected the layer, lines appeared in the graph window. These lines are what you will be moving around to reshape the model.





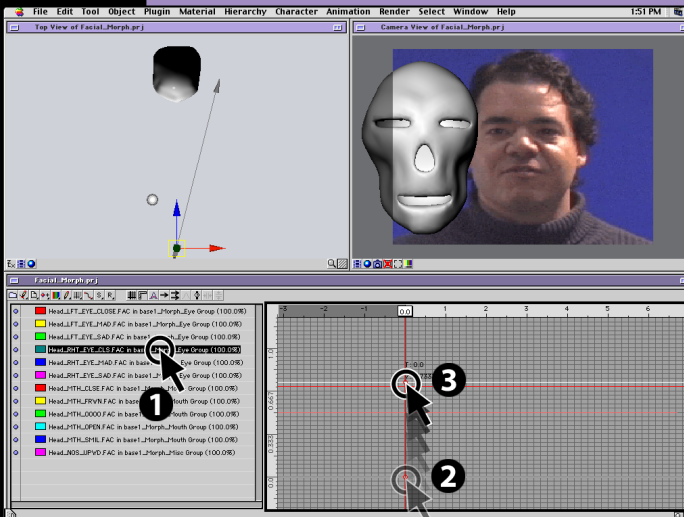
With the Left Eye still selected, note the white line in the Graph window . Notice where the 0.0 time indicator and the white line meet is a red circle. This red circle is a keyframe.

**[CLK]** this red circle and move it up along the time indicator marker (the vertical red line).

Stop dragging the circle when the model's eye appears to match the underlay's eye.

Note: As you moved the circle, numbers appeared. These numbers are the Time value (T) and the Velocity data(V).





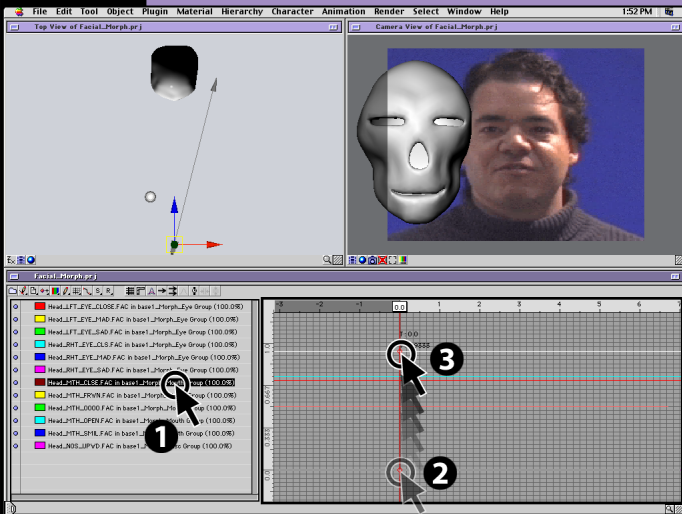
In the Channel window, select the Head\_RHT\_EYE\_CLOSE.FAC layer.

In the Graph window, again where the white line and the time indicator meet, **[CLK]** the red circle(keyframe) and move it up along the time indicator marker.

Stop dragging the circle when the model's eye appears to have the same shape as the underlay's eye.





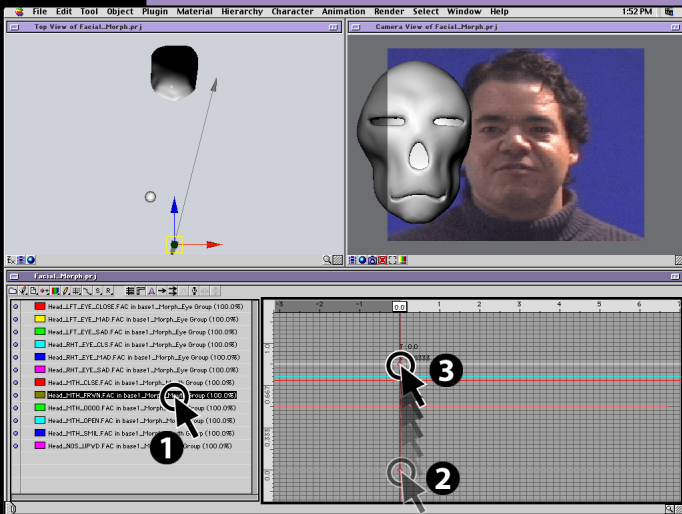


In the Channel window, select the Head\_MTH\_CLSE.FAC layer.

In the Graph window, again where the white line and the time indicator meet, **[CLK]** the red circle (keyframe) and move it up along the time indicator marker.

Move the keyframe up until the mouth is barely closed.



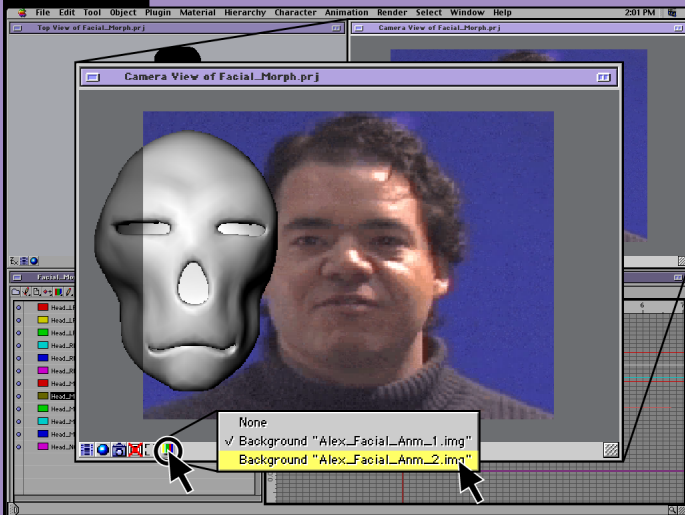


In the Channel window, select the Head\_MTH\_FRWN.FAC layer.

In the Graph window, again where the white line and the time indicator meet, **[CLK]** the red circle (keyframe) and move it up along the time indicator marker.

Move the keyframe up until the mouth starts the match the underlay.



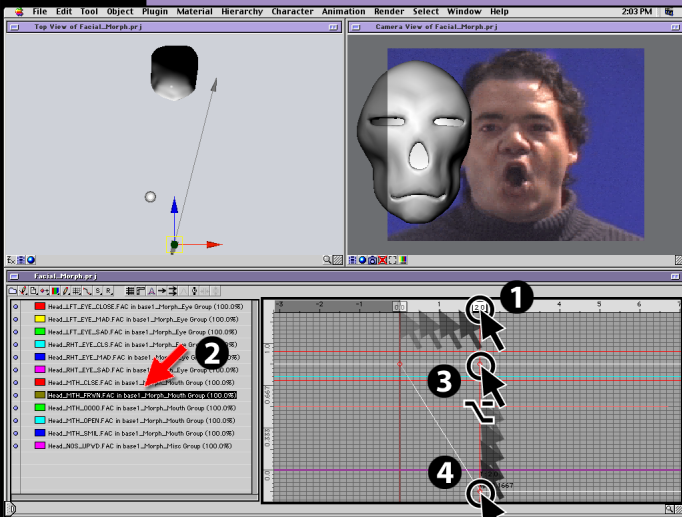


Earlier we had you import two underlays (or your own movie or image(s)) and now we will turn on the visibility of the second underlay and reshape the model.

In the Camera View window, **[CLK]** on the Rotoscope button and select the `Alex_Facial_Animation_2.png` (or your own next image).

Now, if you are using a movie, just advance the time marker in the graph window to the next "peak" performance. What we mean by peak is the next extreme facial gesture. You don't want to keyframe every frame now do you? You should let the computer do the in-betweening between our keyframe poses.





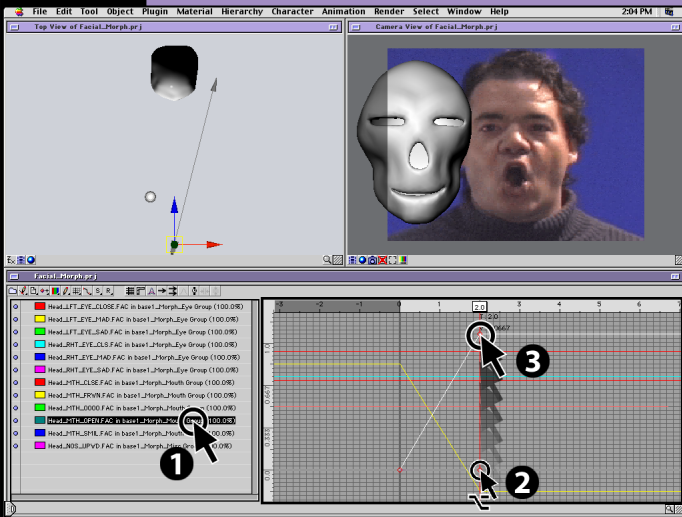
Back in the F-Curve window, move the Time marker to around 2 seconds.

If it's not selected anymore, select the Head\_MTH\_FRWN.FAC layer.

In the Graph window, **[OPT/ALT+CLK]** on the white line where it meets the time marker. This adds a new keyframe at this point in time.

Move this keyframe down back to the 0 velocity position or below it.



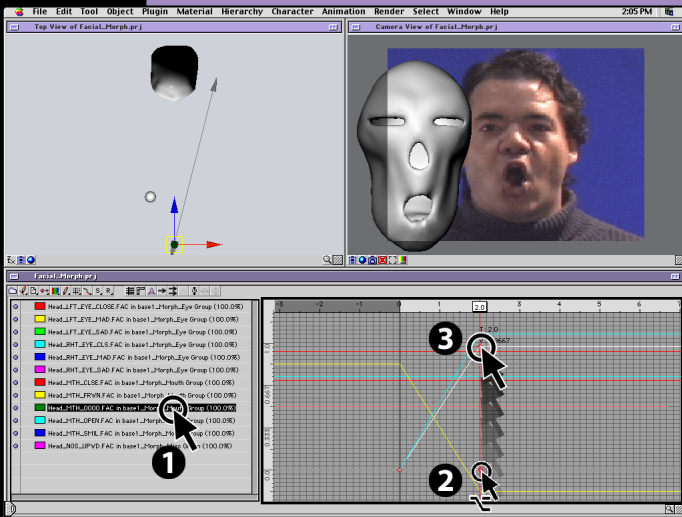


In the Channel window, select the Head\_MTH\_OPEN.FAC layer.

In the Graph window, **[OPT/ALT+CLK]** on the white line where it meets the time marker to add a new keyframe at this point in time.

Move this keyframe up, reshaping the mouth in to an extreme open position.



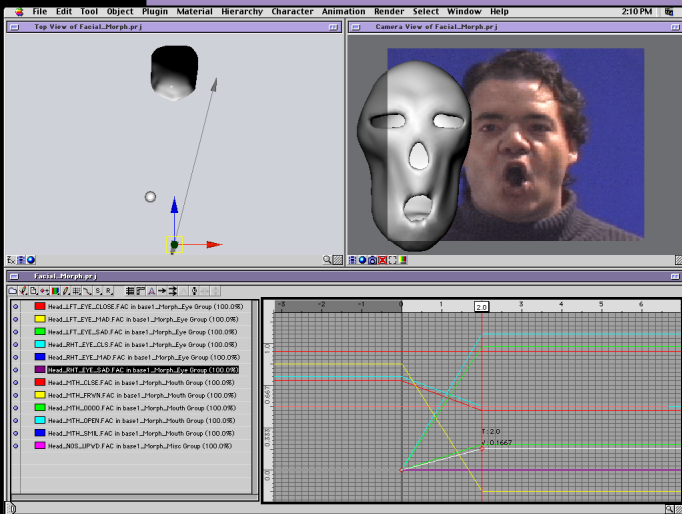


In the Channel window, select the Head\_MTH\_OOOO.FAC layer.

In the Graph window, **[OPT/ALT+CLK]** on the white line where it meets the time marker to add a new keyframe at this point in time.

Move this keyframe up, reshaping the mouth so that it mimics the underlary.

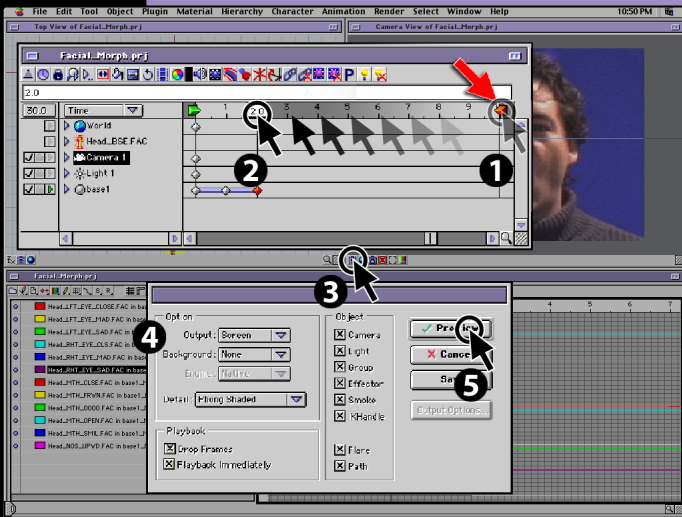




Still at the two second mark, reshape the eyes in the same manner as we did with the mouth.

Note: Pressing **[SPACE]** and **[CLK+DRG]** in the graph window, allows you to position the graph to your liking.





Before we preview the animation, open the Project window **[CMD/CTRL+L]** and **[CLK+DRG]** the red time indicator (the end animation marker) to the two second position.

Now, in the Camera View window, **[CTRL/R+CLK]** on the Preview button and set the preview options as shown in the picture above.

Select the Preview button to preview the animation.







Since we are done with our two images, you can end here. For those who imported the other `Alex_Facial_Animation...` images, or are using your own footage, continue reshaping the model and making adjustments to the given morph target values. Don't forget to lengthen the animation as you go.

As with most processes, this will take time but it's pretty straightforward once you get it set up.

Just as an annoying reminder--we cannot stress this enough--always look for peak movements in your reference video to minimize the number of key frames it takes to create the shapes.

