Creating Mesh Shape Keys

We’ve discussed deforming a mesh with an armature, but what if you want to deform a mesh in other ways like have it flatten, move a mouth, blink an eye, etc. and have a way of repeating that motion whenever needed? Some of these things can be done with armatures, but sometimes it’s easier to set up a slider that at one end, represents the mesh in one form, and at the other end of the slider, shows the mesh fully deformed. See the example below:

Mesh deformation using Shape Key sliders (called vertex editing in older Blender) in the Dope Sheet Window can be a difficult process because it requires you to shape your mesh in edit mode moving vertices. With practice, this can become a worthwhile tool that will enable you to make quick and high-quality animation like the professionals do. If you notice in the above example, there are several sliders that cause different motions. By using combinations of them, a wide variety of motions can be produced (for example, Eyes Up/Down will combine the motions). These are great tools for making a character speak, blink and show expression.

In order to start using shape keys, we’ll start a new scene, delete the initial cube, then add a Monkey head from the Mesh menu. To make the monkey head look better, we’ll hit “Smooth” in the Tool Shelf and add a “Subdivision Surface” modifier from the Modifier panel. I have also rotated the monkey head to be facing forward in the Front View in Ortho mode. Now, find the “Shape Keys” panel in the Object Data buttons.

In order to start using shape keys, press the “+” in the Shape Keys panel to add a “Basis” group to add keys under. This “Basis” is not an actual key, but contains all the keys you now create under it. This can also be renamed.

In order to add your 1st slider, press the “+” button again. You will have another key show up under the Basis called “Key 1”. It’s a good idea to rename these keys to something matching the motion that you plan to create. A good facial animation could contain dozens of slider!
We will now create the motion for this “Key 1”. You will notice a “relative” block checked by default, meaning that the motion we create is relative to this initial face shape. You can change the name of the key by double clicking it. Right now, it doesn’t do anything because we haven’t deformed the mesh. There are also range settings and group references we won’t be working with now. I usually keep the value of the slider set to zero at this point.

It’s now time to enter **Edit Mode** and alter the mesh for our first key. I want to make the monkey look surprised for this key by just raising his eyebrows. To do this, I will select a vertex above each eye (total of 2 selected vertices), turn on “**Proportional Editing**” and scroll the mouse wheel to change the selection circle while moving the vertices up. After you have the look you wish, go back to **Object Mode**. The mesh should return to its original shape. Test the slider for the shape key. It should transition from normal to surprised as you move the slider.

To add another slider, return the value of the previous slider back to zero, then press the “+” for the next key. By lowering the slider, the next key will start with the basic mesh in **edit mode**, otherwise, it will be deformed. Name the new key, enter Edit Mode repeat the process by shaping the mesh as desired, then returning to **Object Mode** to set the shape key. Test the slider.

Repeat this process to add any number of shape keys. It is important to return all sliders to zero before adding a new slider if you want to create from the untouched original mesh.
Using Action Editor Sliders

Now that you have created the sliders, it’s now time to look at an easy way to animate them. If you review the animation chapter, you’ll see a description on how to work in the Dope Sheet window. First thing we need to do is change our screen layout from “Default” to “Animation”. Your screen configuration will change to show a Dope Sheet window, a Graph Editor window, 3D window and Buttons. We’re interested in the Dope Sheet Window. In order to see your shape keys, we need to switch the view from Dope Sheet to ShapeKey Editor at the bottom of the window. You will now be able to see all your shape key sliders in the window. You may need to adjust the size of the window so you can see everything.

Animation is as easy as moving a slider. As you move a slider, a small diamond will display on the time line to the right of the key. This diamond is an animation key at the current frame. After you set all sliders on the current frame, move up in time to your next desired frame and adjust the sliders. You are now animated over time. With a little practice, you will be able to animate easily using this technique. After you have placed some keys along the time line, go back to frame 1 and press “Alt-A” to see the animation (or press the play button in the time line controls).

As you animate, you can select keys (selected keys are yellow) and copy, move and scale them using standard Blender commands for other spots along the time line. A key that doesn't change over time is shown by a bar between keys. Keys can also be selected and deleted easily.

RoboDude Asks: Why are shapes changing when I haven't inserted keys?
Remember that features change over time and begin changing from one key to the next. If a slider shouldn’t change for, say, the first 50 frames, then change from frame 50-70, you will need to set a key at frame 50 and not just at frame 1.
Syncing Audio With a Shape Key:
Another neat way to animate a shape key is to use an audio file to sync with the motion. This is a quick way to create a lip sync or an object, like a speaker, bounce with the bass.

For this example, we are starting with the monkey head as before, but only applying one shape key for now on the mouth. The shape starts with a closed mouth and a key applied with a large “oh” shape on the key.

Now, switch over to the Animation screen layout and apply a key at frame 1 with the slider at zero and a key at frame 5 with the slider at 1.00. The number of frames between the 2 keys is not too important and 5 seems to work well. All you are doing is adding 2 keys at the minimum and maximum positions.

Now go down to the Graph Editor window. You should see the key graphed. Under the “Key” menu, select “Bake Sound to F-Curves”. Browse out to find an audio file that you plan to use. The curve will reflect the sounds spiking with the keys you created. If you hit the play button at the bottom of the screen, the monkey should be moving his mouth in sync with the audio file, but you will not hear any sound at this point.

To add the audio to the scene, you will need to switch to the Video Editing screen layout and add the audio file to the timeline. The Video Editor is discussed in Chapter 24.
To test your mesh shape key and facial expression skills, we are going to animate the monkey talking and making expressions. Start a new file and call it “Mesh Keys”. Add a *monkey head*, rotate it to face forward in the front view. Add a *Subdivision Surface* modifier and press “Smooth” in the *Tool Shelf*. Create your *Shape Keys* as discussed in the chapter, then switch to the *Animation* view configuration.

Remember that you need to create the “Basis” group key first, then press “+” again to add the first slider. Enter *Edit Mode* and turn on *Proportional Editing* to make your first key. Try to go for a surprised look.

Continue adding mesh keys to bring the monkey to life using proportional editing. Add another slider to the eyes making him squint. Add a slider to move the ears. Add one to his mouth. In total, have at least 4 shape keys. Add more for more expression if desired.

**Challenge:** If time allows, try adding an audio file to make him speak.

When you are finished, animate a short 200 frame movie making expressions.

**Call the instructor when finished**
Chapter 18 Reflection and Wrap-up:

Shape Keys in Motion

Shape keys are used heavily in the movie industry. Take a few moments to reflect on these questions.

1. As you worked through this chapter, what did you find to be the most interesting aspect of shape keys? What was the most challenging? Explain.

2. In the Eddie Murphy movie “Haunted Mansion”, shape keys, identical to Blender, were used to animate the singing bust heads in the cemetery. Research the internet to find how this example, or a different example, of shape keys were used in a movie. How are they used? Explain your findings.

3. Music videos can make use of the “Bake Sound to F-Curve” feature, but most audio tracks are compressed down so all instruments and vocals cannot be separated (i.e. drums only to effect an animation, or vocals for lip sync only). What is a multi-track recording and how does the music industry use them? How could you use them for animations? Explain.