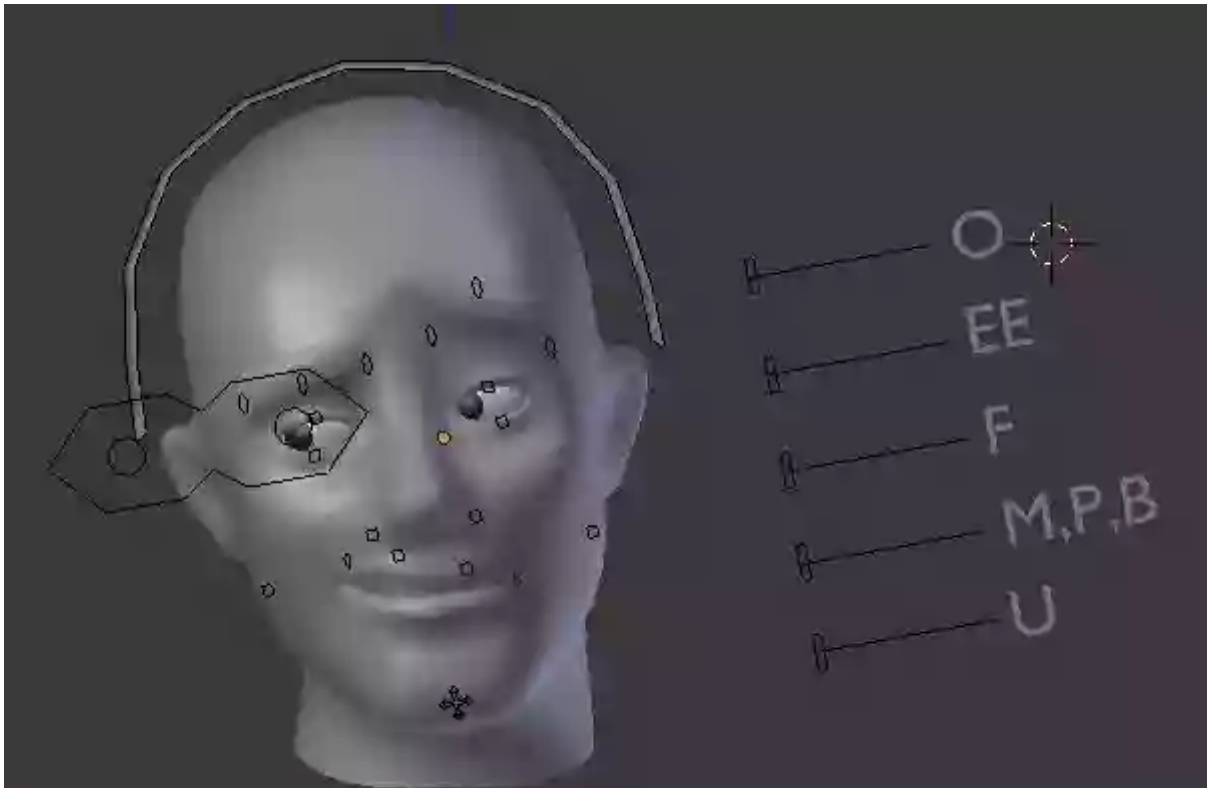
Create a Facial Animation Setup in Blender - Part 2

by Karan Shah 7 Feb 2014

Difficulty: Advanced Length: Long Languages: English

Blender 3D



In this part of the tutorial we will learn how to add drivers to the shape keys we created in part one, and add controller bones to complete our basic face rig.

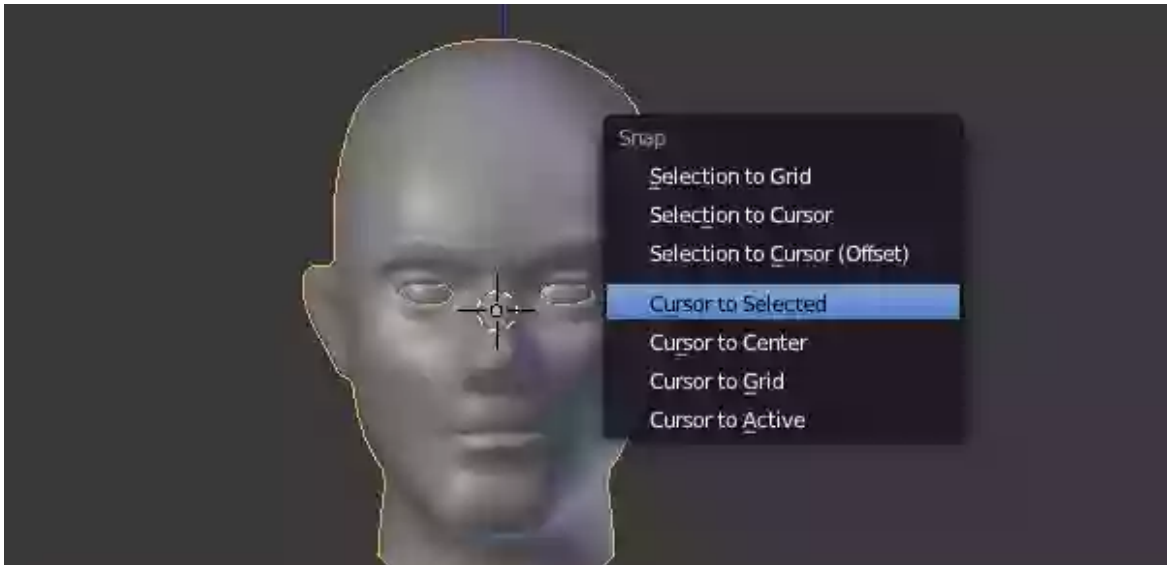
Additional Files:

- Download the Project Files for Part 2.

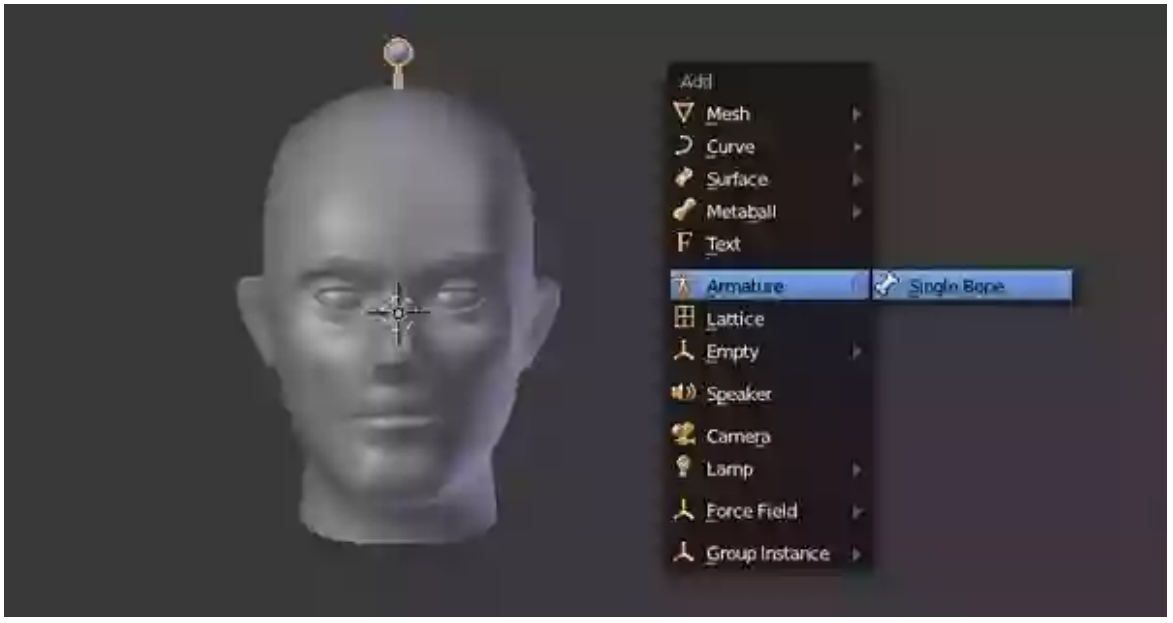
Armature Setup

Step 1

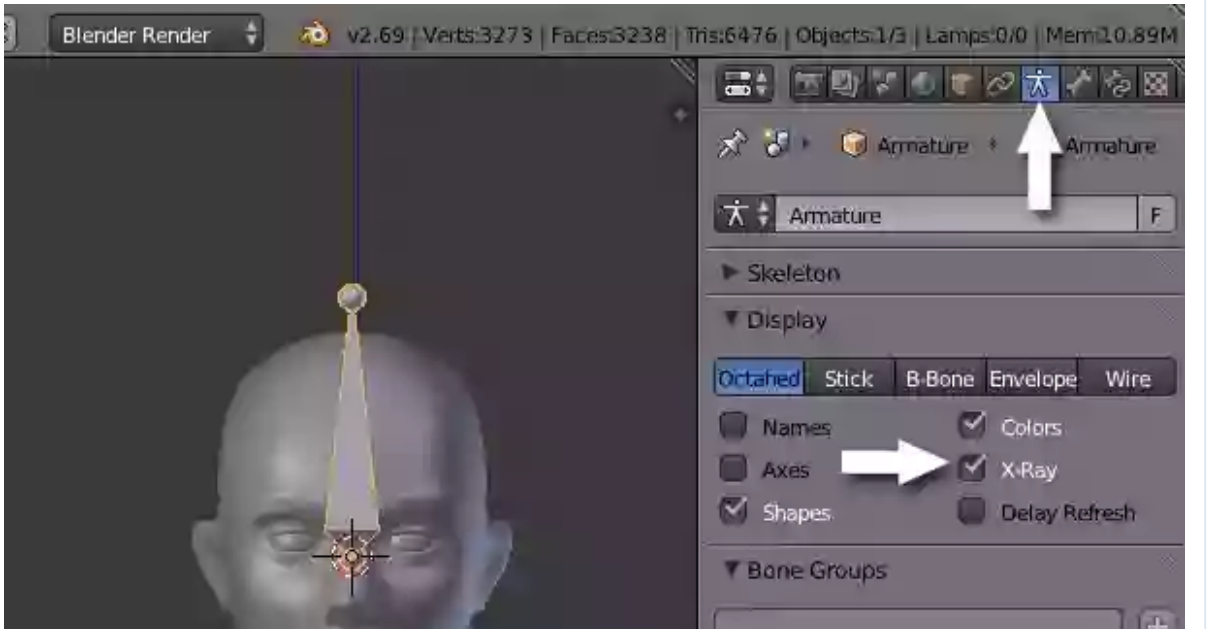
Since we are focusing only on the face, we will create a small armature just for the head for now (assuming that it is continuing from chest.) If your model is already rigged, you can skip this and start with the **Creating Driver Bones** section. To start, select the model by **Right Clicking**, and then press **Shift-S** and select **Cursor to Selected**. This will move the 3D cursor to the center of the object.



Press **Shift-A** and add an **Armature**.

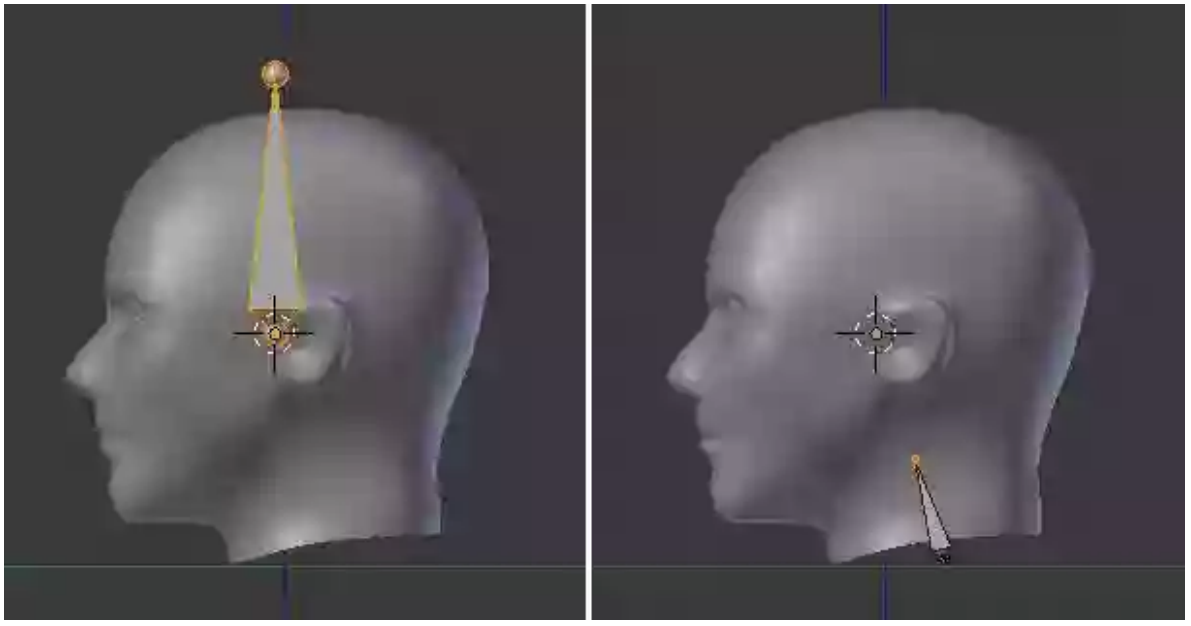


In the **Armature** properties, check on **X-Ray** so we can see the bone through the object.



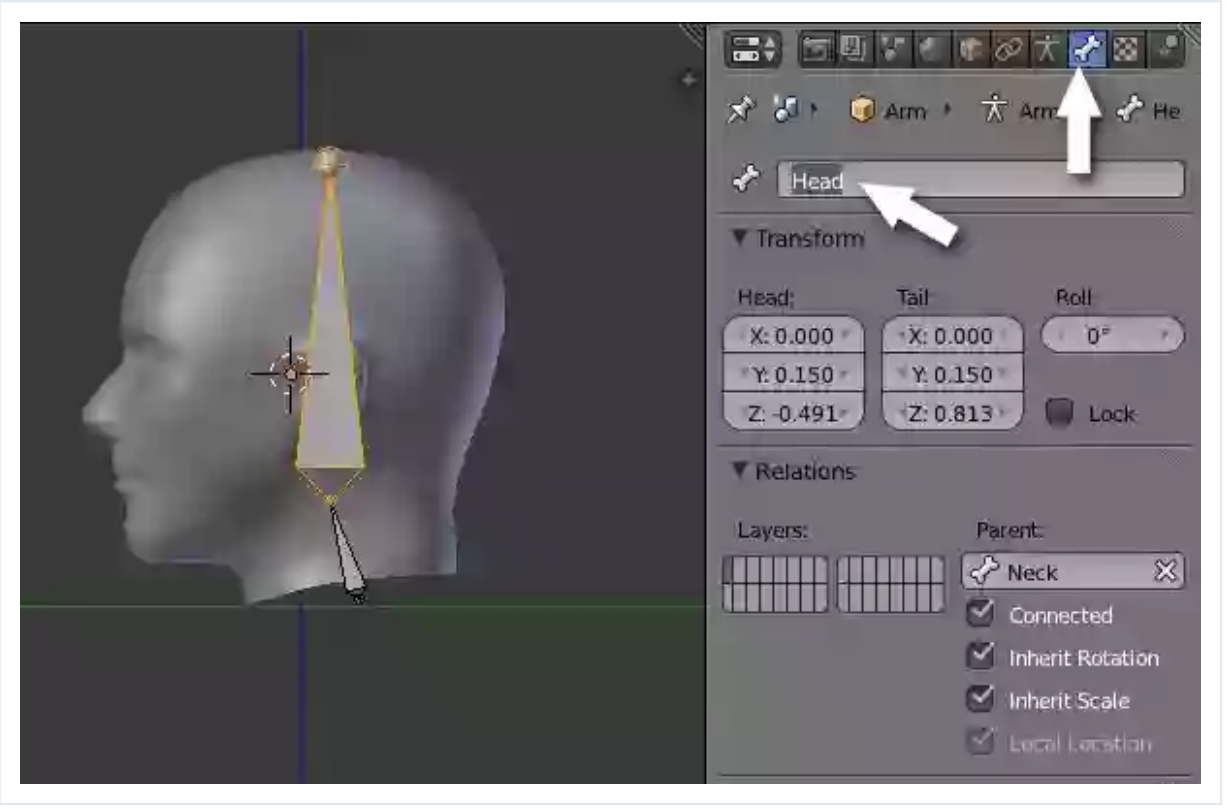
Step 2

Press **3** on the **Numpad** to get into a side view. And with the **Armature** selected, press **TAB** to enter into **Edit** mode. Select the bone by **Right Clicking**, and press **G** to move it near the neck as shown in the following image. Select the tip of the **Bone**, and move it down (with the **B** key) to the top of the neck.



Step 3

Select the tip of the **Bone** by **Right Clicking** and then press **E** to extrude a bone for the head. Name the bones - **Neck** and **Head**.



Step 4

Press **TAB** to exit **Edit** mode. Select the **Head**, hold **Shift** and

select the **Armature**. Then press **Control-P** and choose **With Automatic Weights** to assign the object to the armature.

Step 5

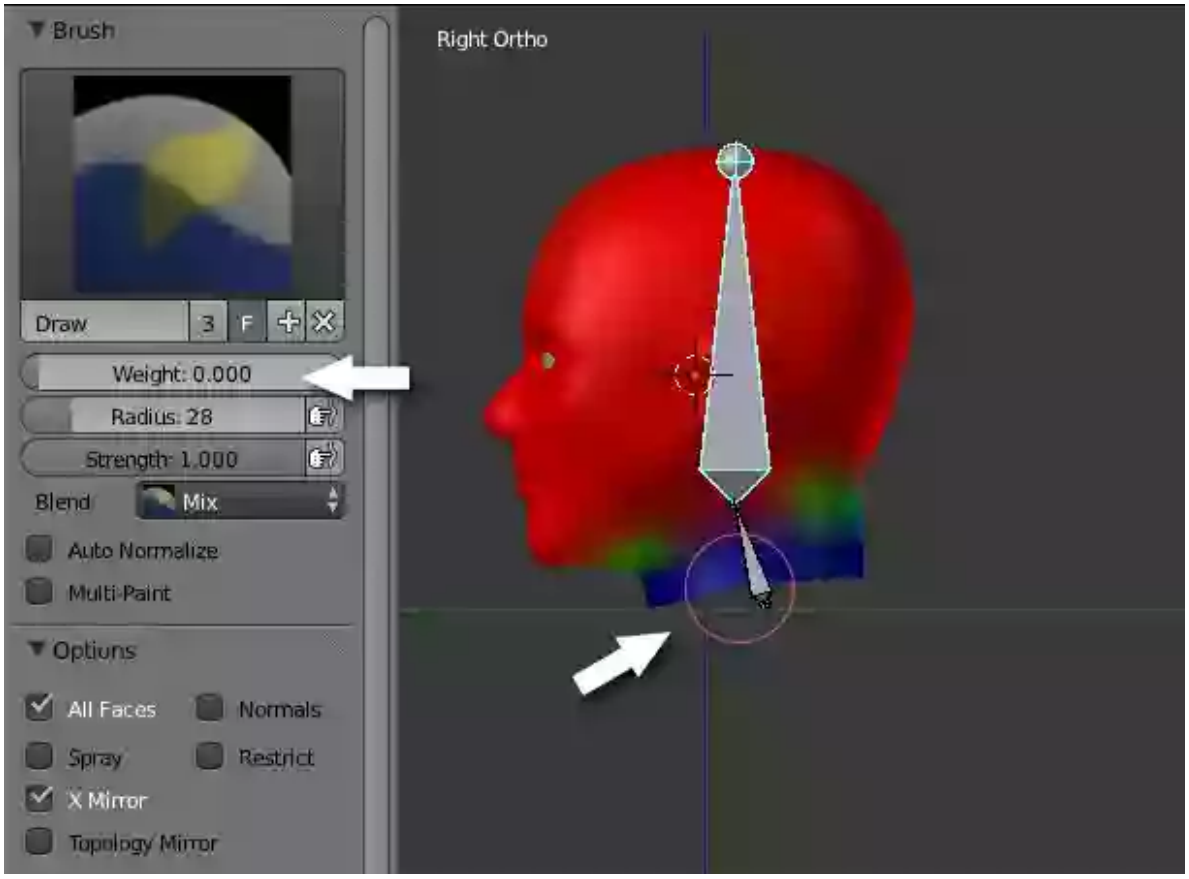
Select only the **Armature**. Press **Control-TAB** to get into **Pose** mode and select the **Head** bone. (The selected bone will be highlighted in light blue.) Now select the **Head** (object) and press **Control-Tab** to enter into **Weight Paint** mode.

Step 6

Now assign the head vertices to the **Head** bone by just painting them. Set the **Weight** value to **1.00** and in the **Options** panel, tick on **X Mirror**. This will allow us to paint symmetrically.

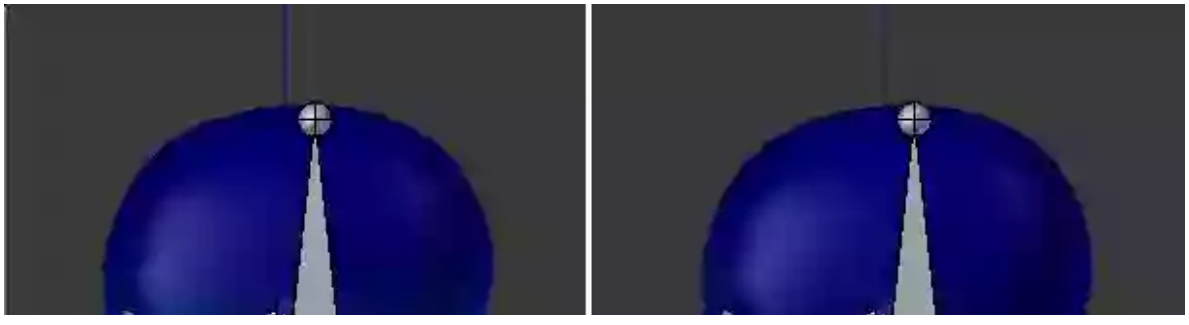
Paint the head with full weight, so it's assigned to the selected (**Head**) bone.

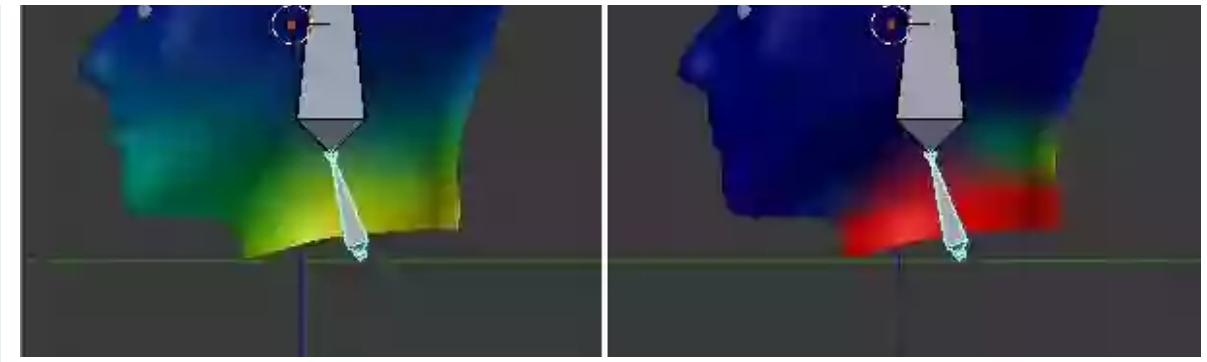
Remove the neck vertices by painting them with **0.0 Weight,** as we don't want the head bone to effect the neck vertices.



Step 7

Now select the **Neck** bone. Weight paint the model appropriately to assign only the neck area to the bone.



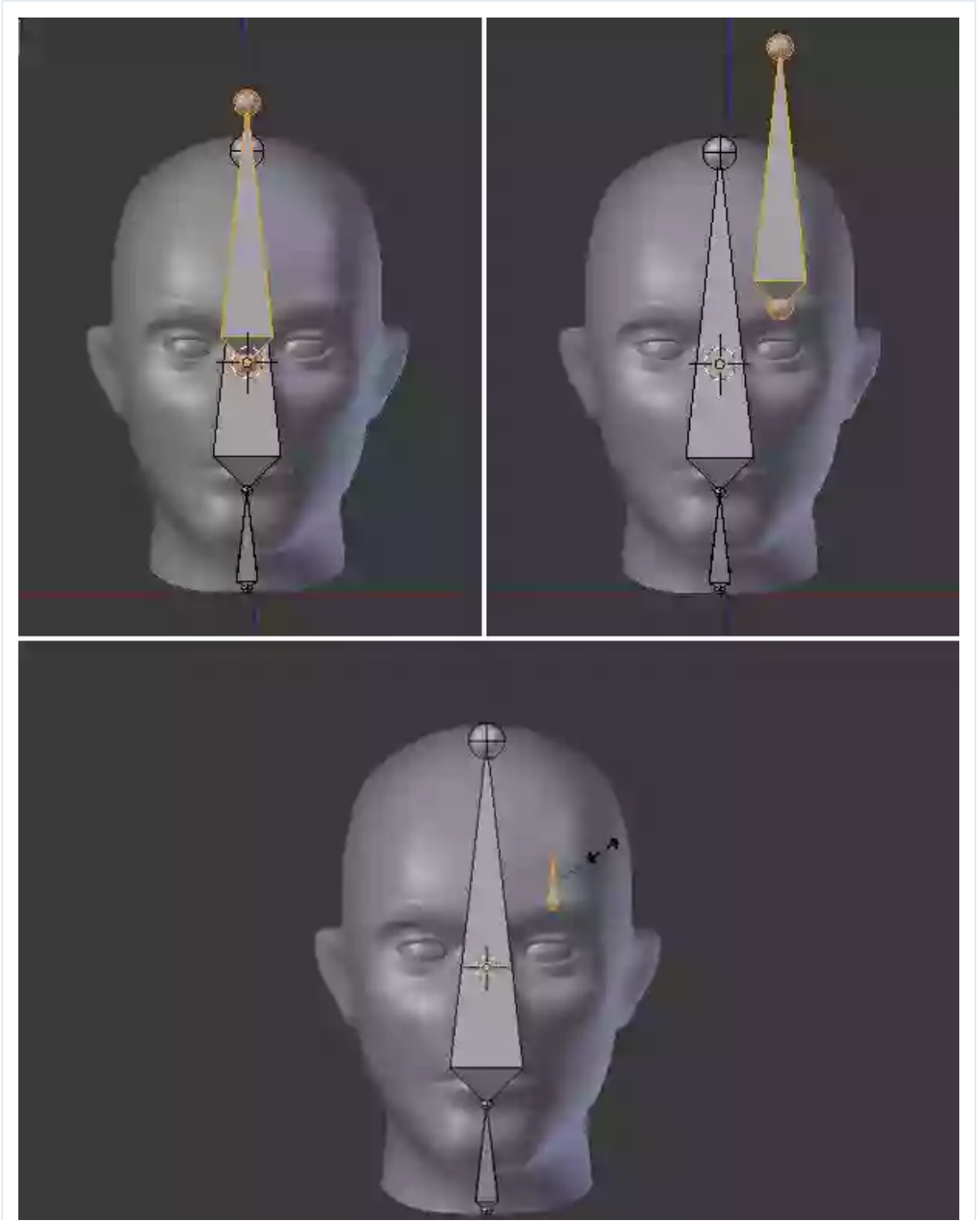


Creating Driver Bones

Step 1

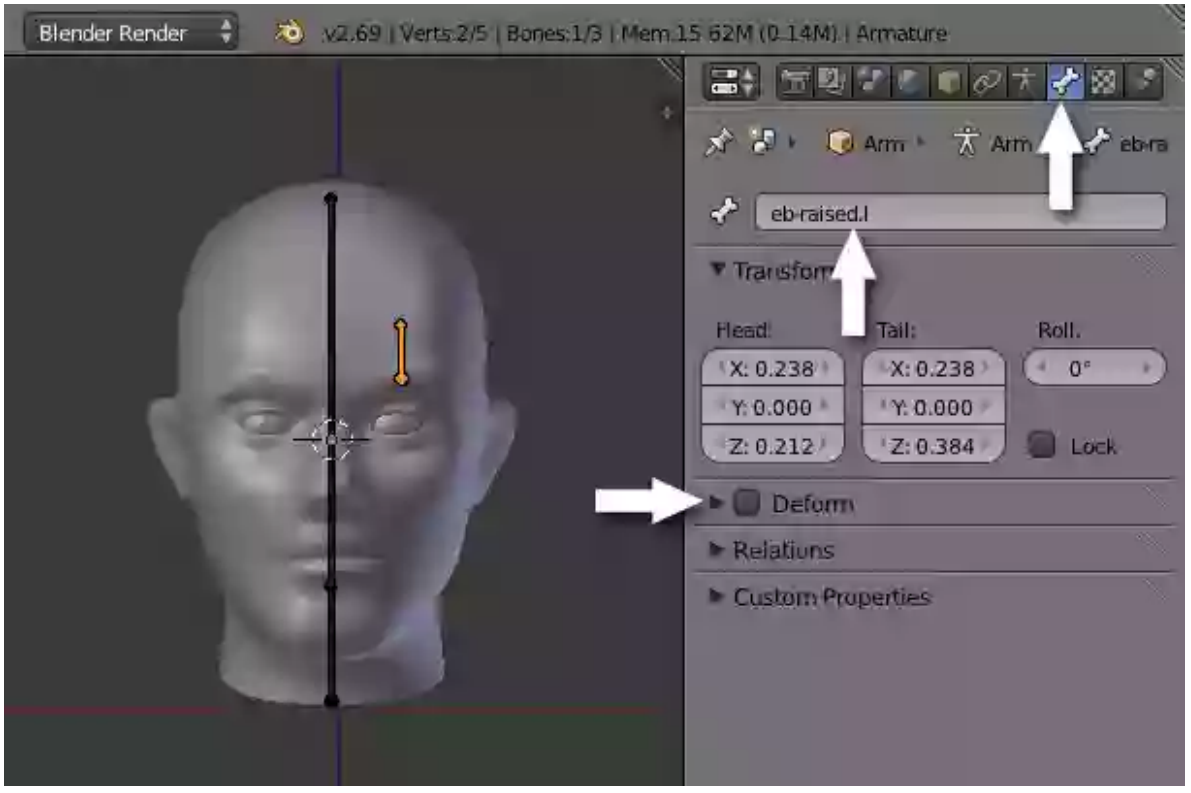
Now we will create the bones which will trigger the shape keys. The position of the bones doesn't matter, some people like to have a separate control, while others like to have it on the face itself. We will cover both cases in this tutorial.

Press **Control-TAB** to exit **Weight Paint** mode. And with the **Armature** selected, press **TAB** to enter into **Edit** mode. Press **Shift-A** to add new bone, and then select the new bone (by **Right Clicking**.) Place it (using the **G** key) above the eyebrow, and **Scale** it down using the **S** key.

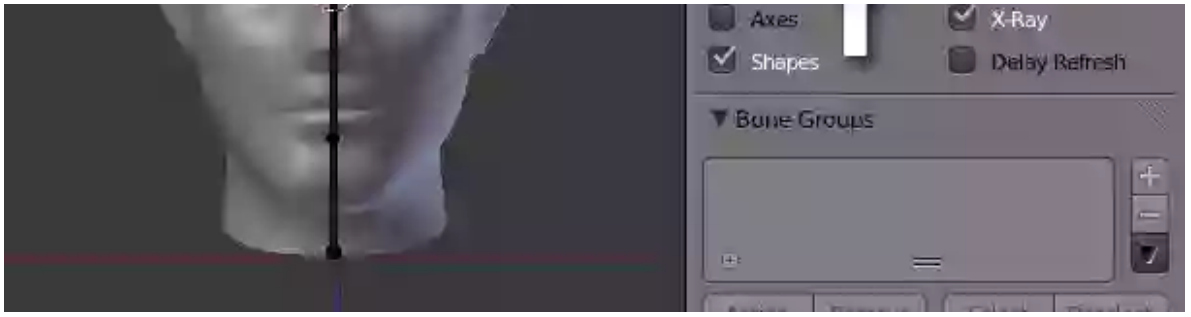


Step 2

In the **Bone** properties, rename this new bone to anything you like, for example **EB-raised.l** (l for left). Uncheck the **Deform** option as we don't want this bone to deform the mesh.

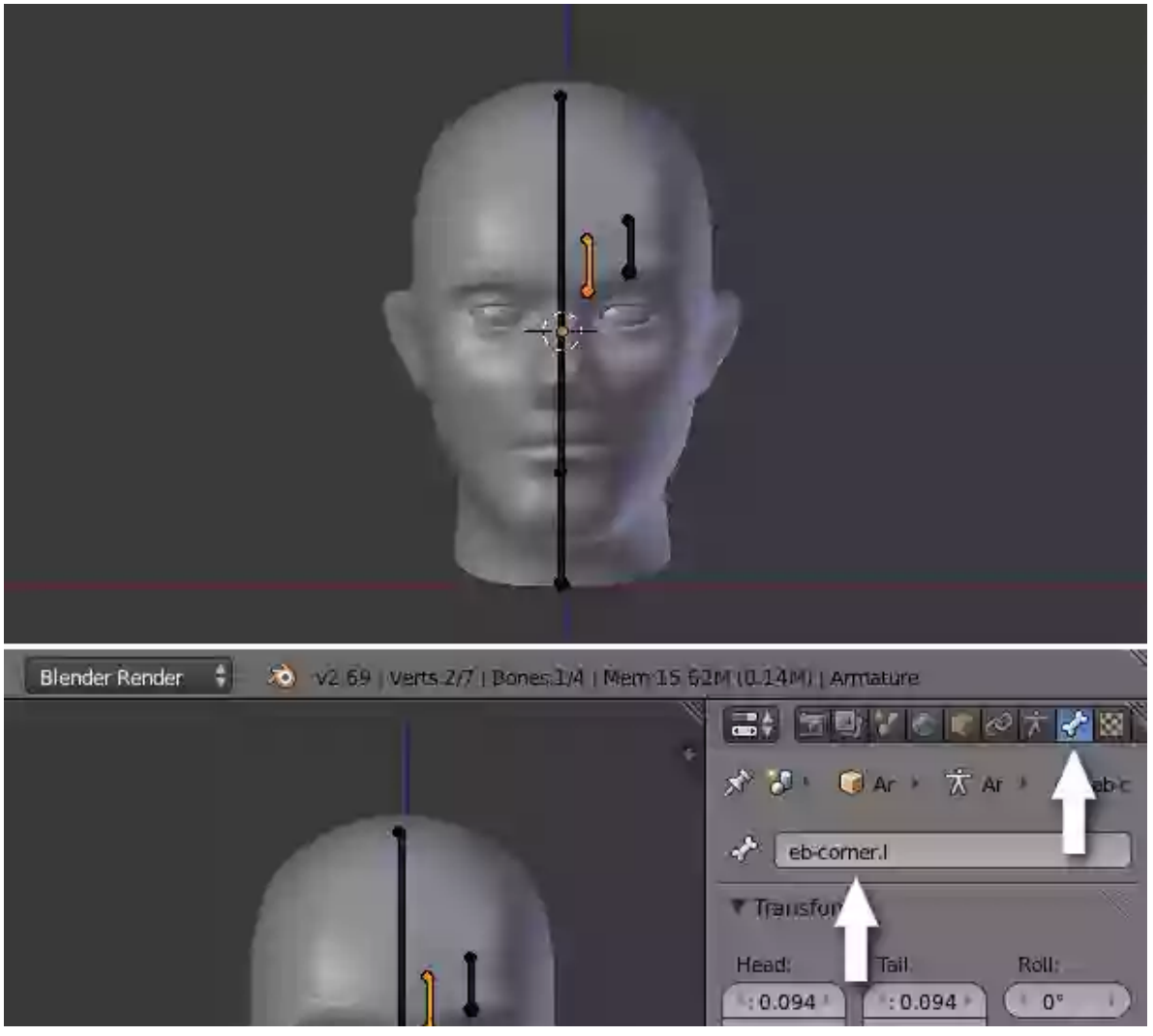


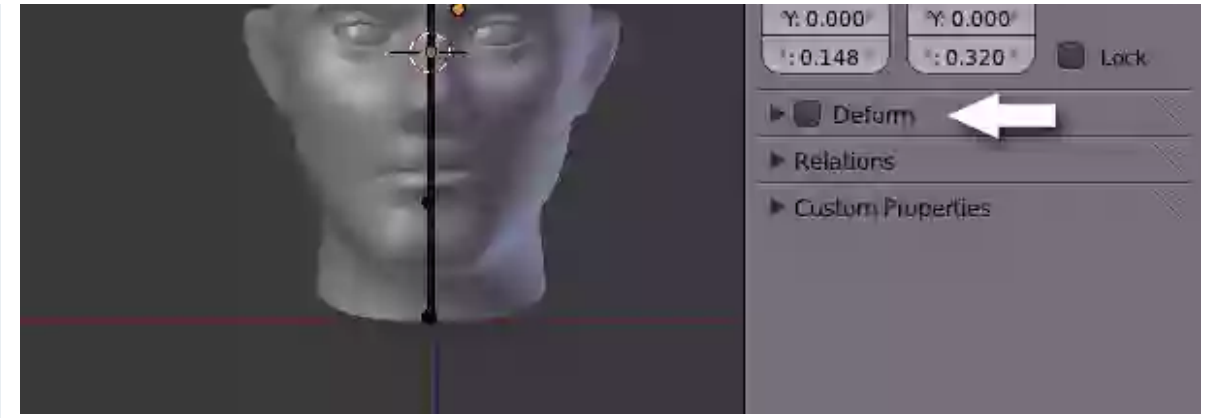
You can also change the display type for the bones. In the **Armature** properties and under the **Display** panel, click on the **Stick** Button.



Step 3

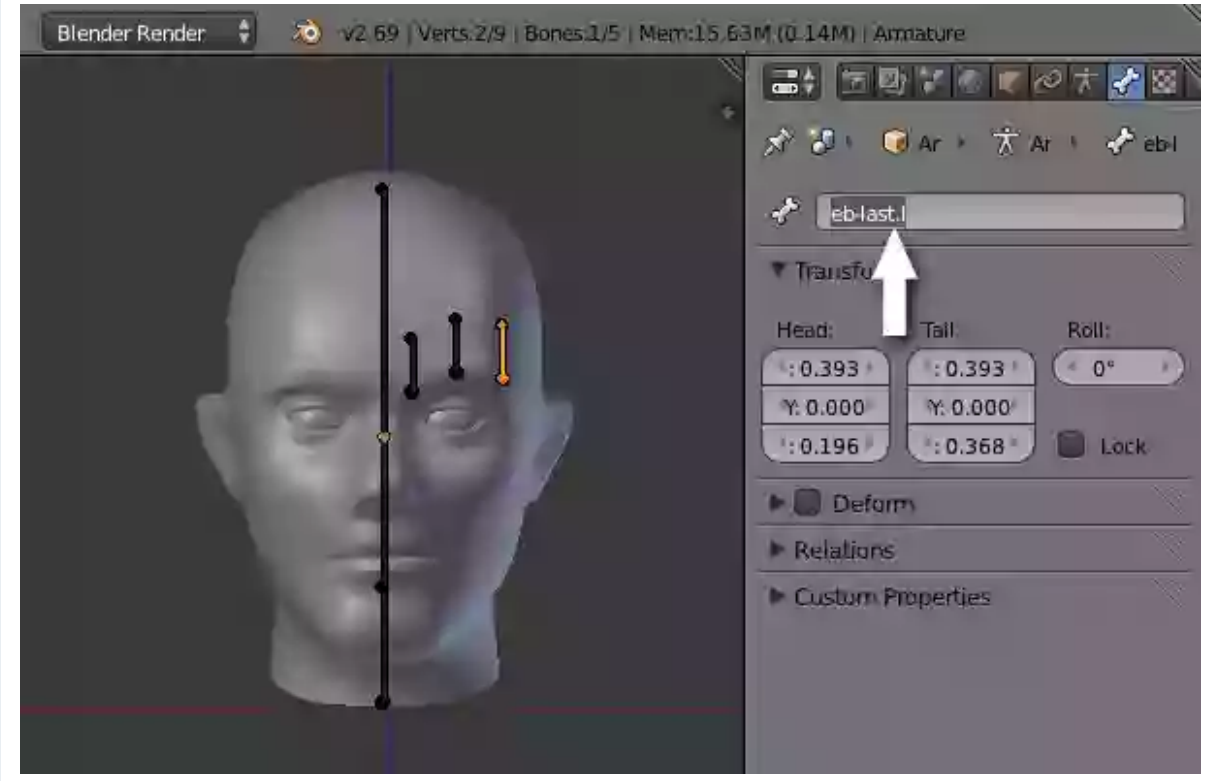
Select the new bone and press **Shift-D** to duplicate it. This way the duplicated bone will have the properties of the original one (like the size and the deform option unchecked.) If you prefer to create a new bone, then make sure that the **Deform** option is *unchecked*. Name this new bone **EB-corner.l** or anything else, but use a relevant name.





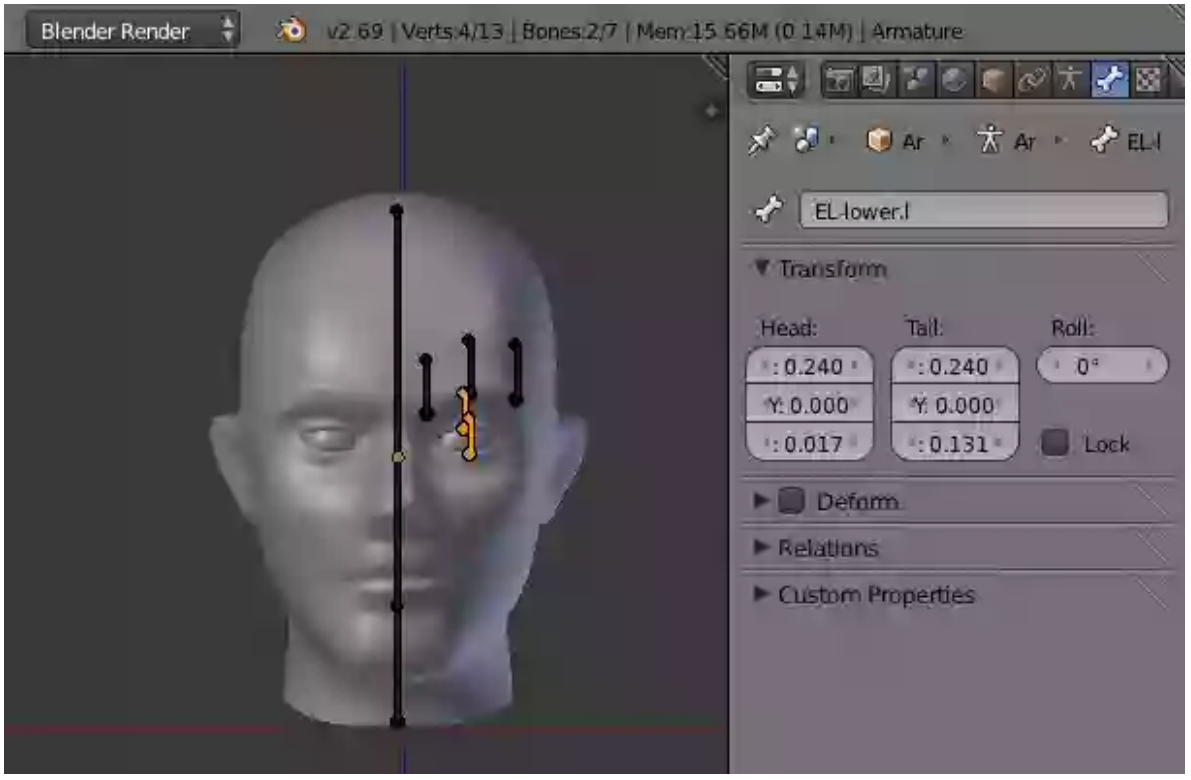
Step 4

Select the new bone and press **Shift-D** to make another duplicate. Name this **RB-last.l** (or anything else) but use a **.l** extension. Now place it over the outer corner of the eyebrow. This will trigger the EB-corner shape keys.



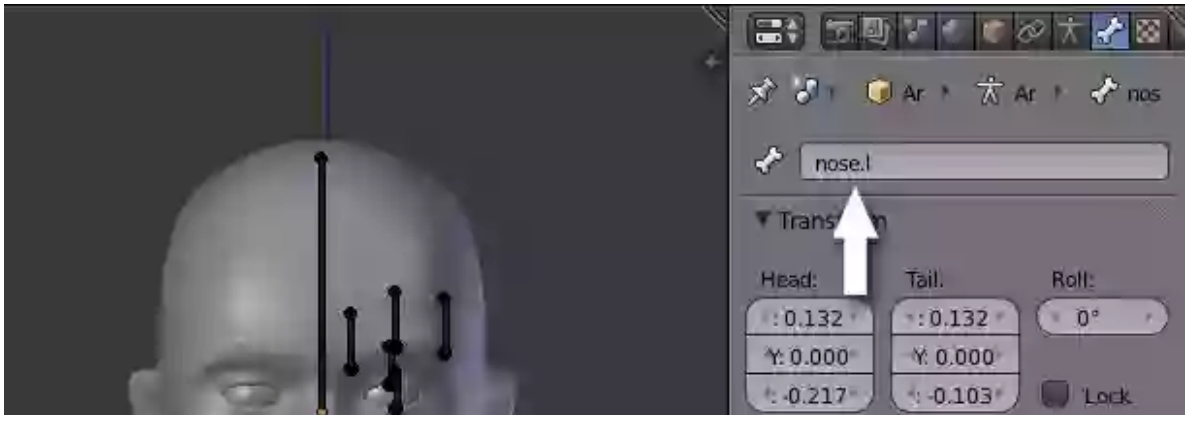
Step 5

Similarly add two more bones - one to trigger the shape key for the upper eye lid, and another for the bottom eyelid. Place them appropriately and name them **EL-upper.l** and **EL-lower.l**.



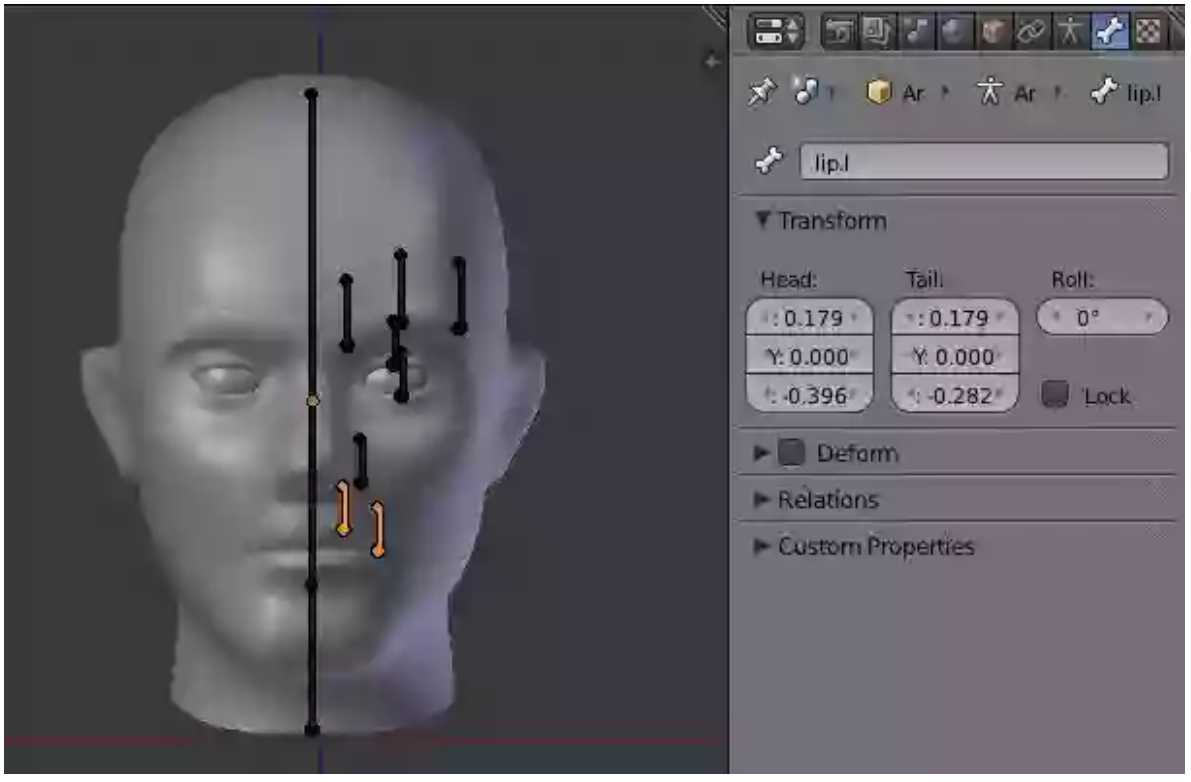
Step 6

Create (or duplicate) another one for the nose Shape key. Name this **nose.l**.



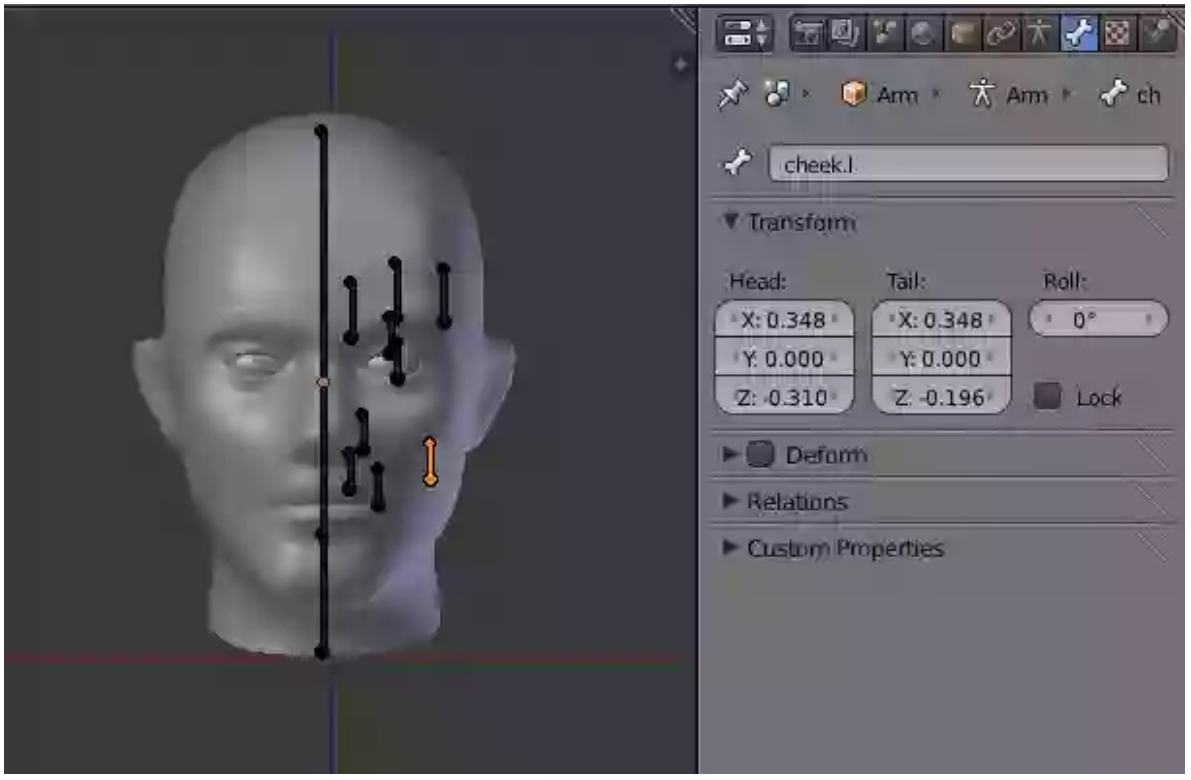
Step 7

Moving downwards, add another bone to trigger the upper lip deformation (or disgust) shape key. And a second one to control the smile and frown.



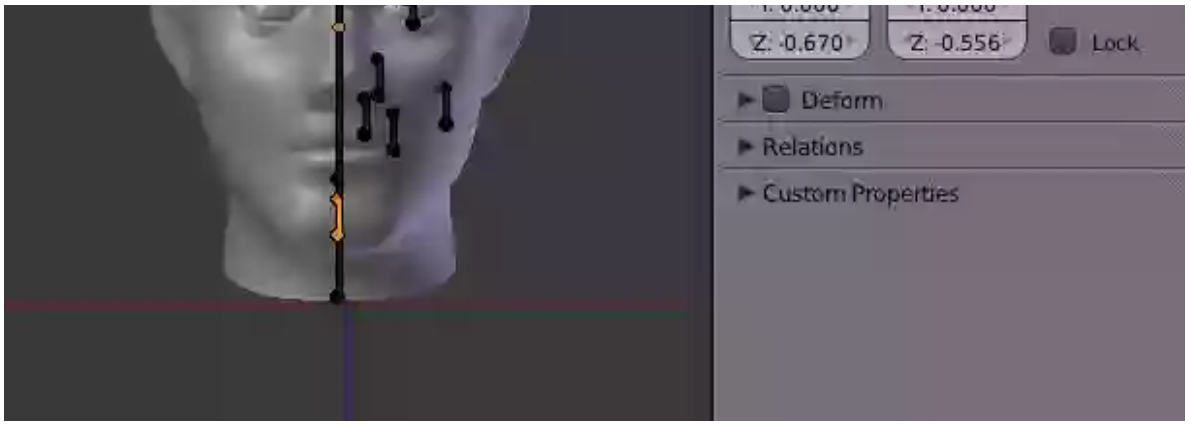
Step 8

If you created a shape key for a cheek puff, then create another bone for it and place it on the cheek. Name it **cheek.l**



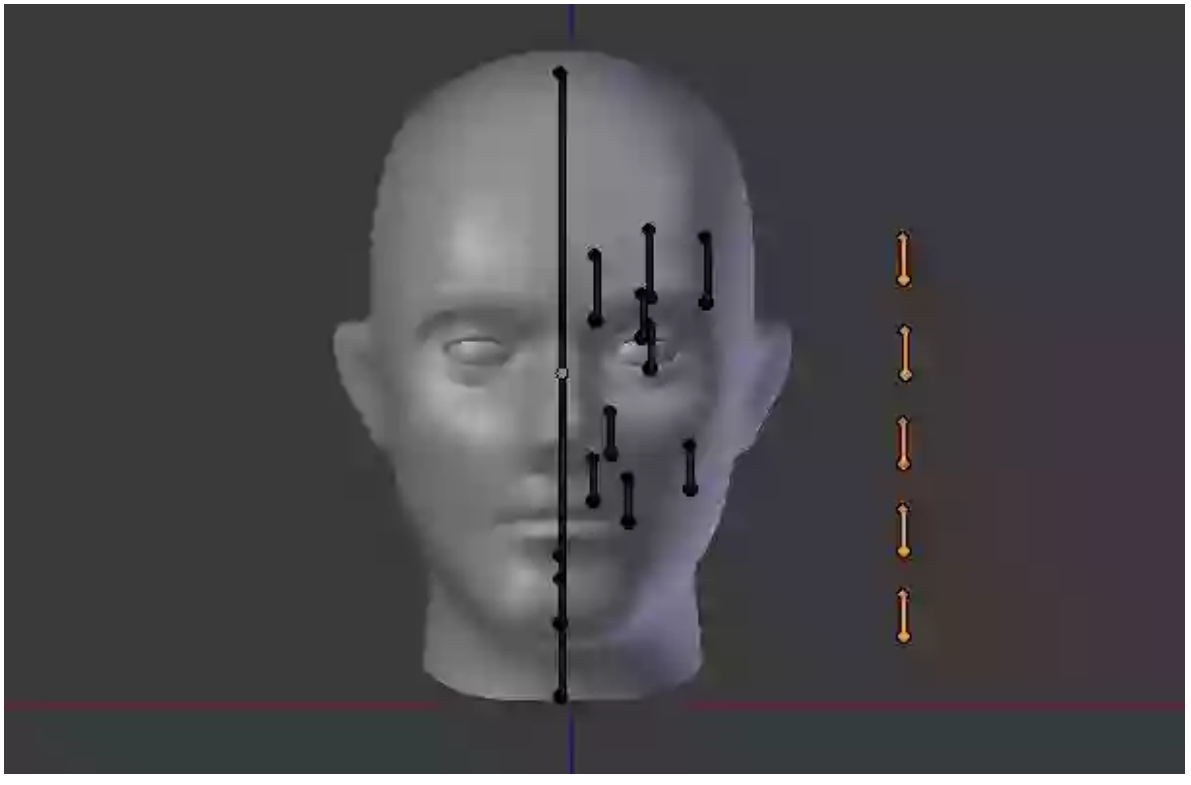
Step 9

Add one for the chin as well. This will trigger many shape keys- Jaw open (aa), jaw right, and jaw left. Since this one is in the center, there is no need to add an extension like .l or .r.



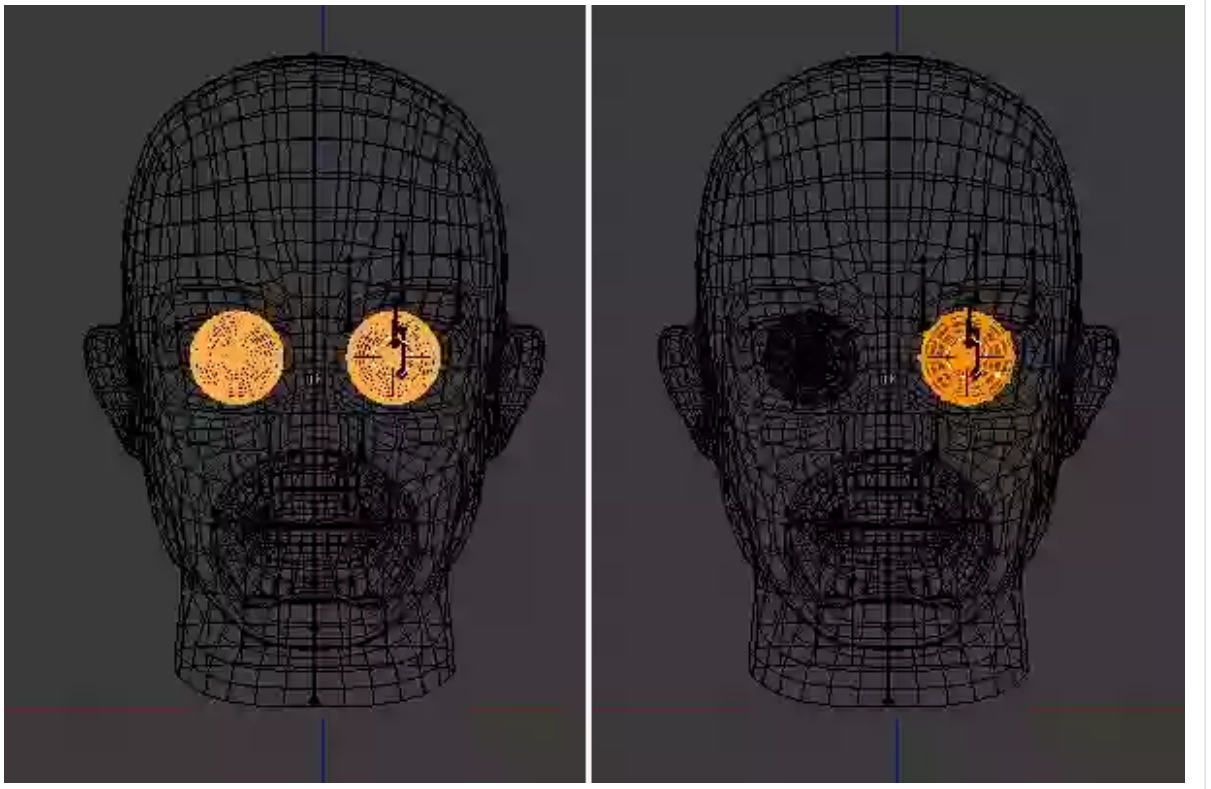
Step 10

Now we will create bones to drive the phonemes shape keys. I created four, so I will add four bones. Name them - **Mouth-F**, **Mouth-O**, **Mouth-U**, **Mouth-EE** and **Mouth-MPB**. Lets place them away from the face for now.



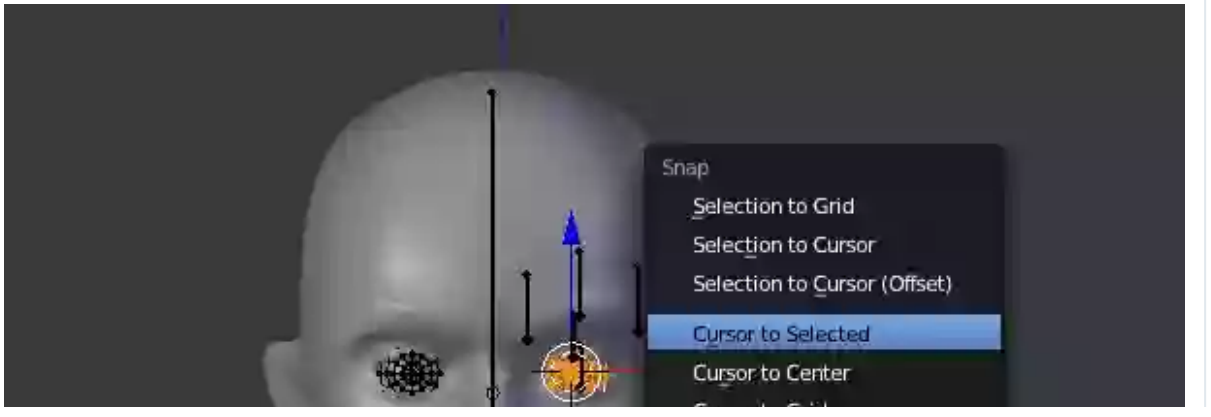
Step 11

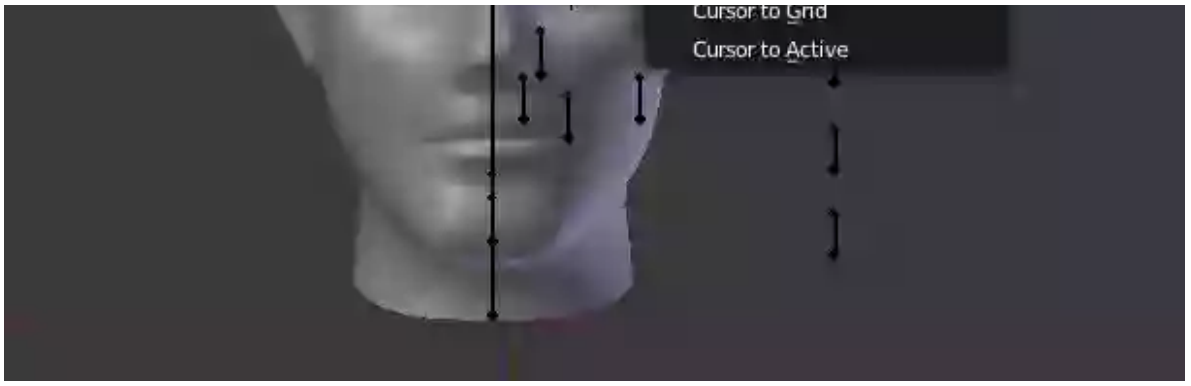
Lets also add bones for the eyeballs. Press **TAB** to exit **Edit** mode. Select the eyeballs by **Right Clicking** and then press **TAB** to enter into **Edit** mode. Hover over the left eye and press **L**. This will select all the connecting vertices.



Step 12

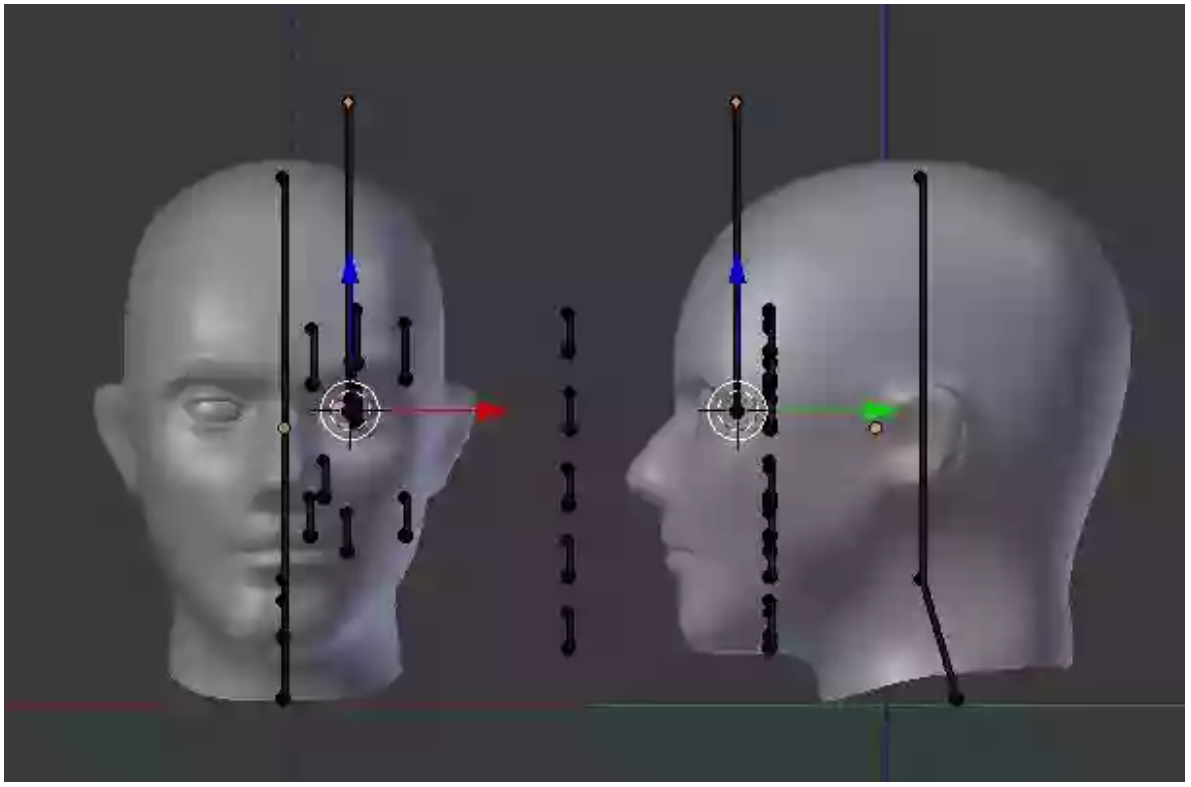
Press **Shift-S** and select **Cursor to selected**. This will move the 3D cursor into the center of the eyeball.

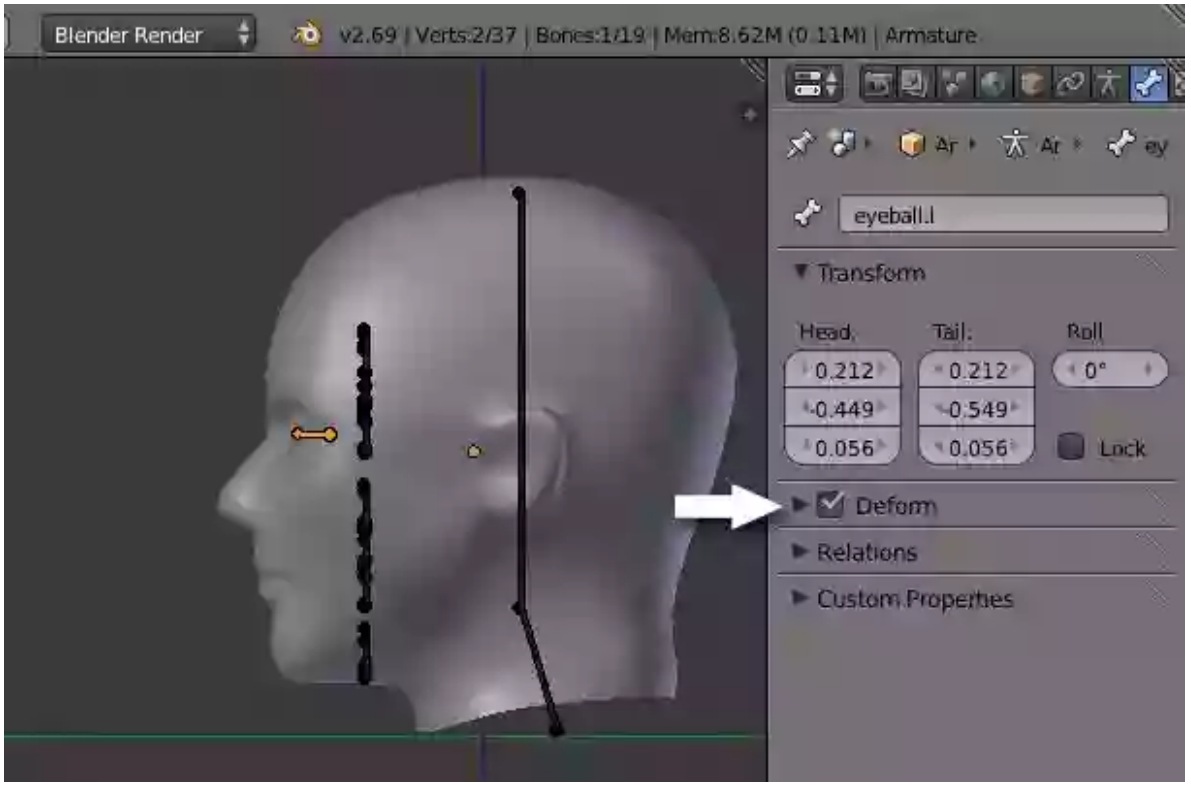




Step 13

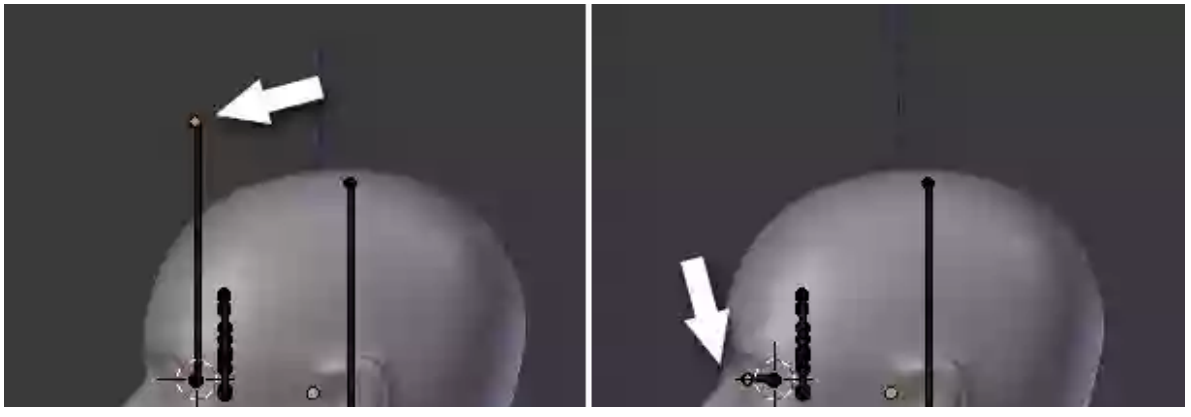
Press **TAB** again to exit **Edit** mode. Select the **Armature** and press **TAB** to edit. Then press **Shift-A** to add a bone. The new bone will be created at the 3D cursor's position. (We need the eye bone to be exactly in the center of the ball.) Name this new bone - **eyeball.l** and make sure that the **Deform** option is *checked*, as we want to deform the eyeball with this bone.

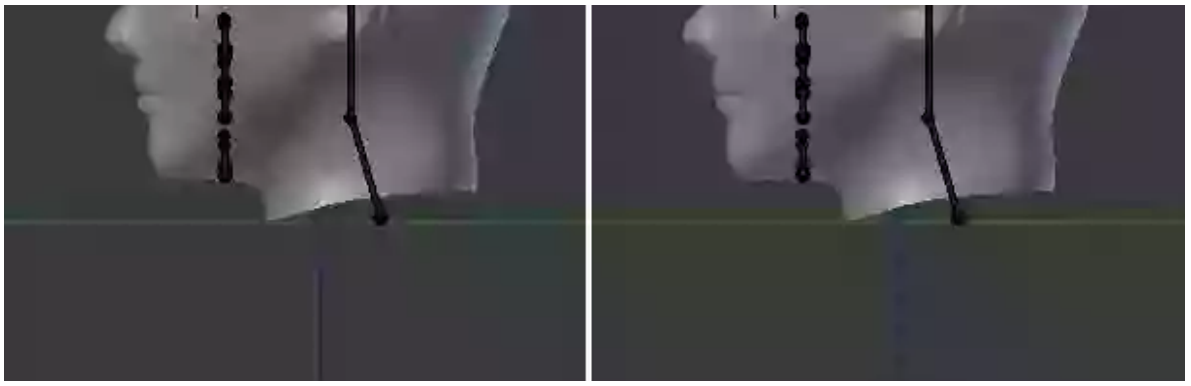




Step 14

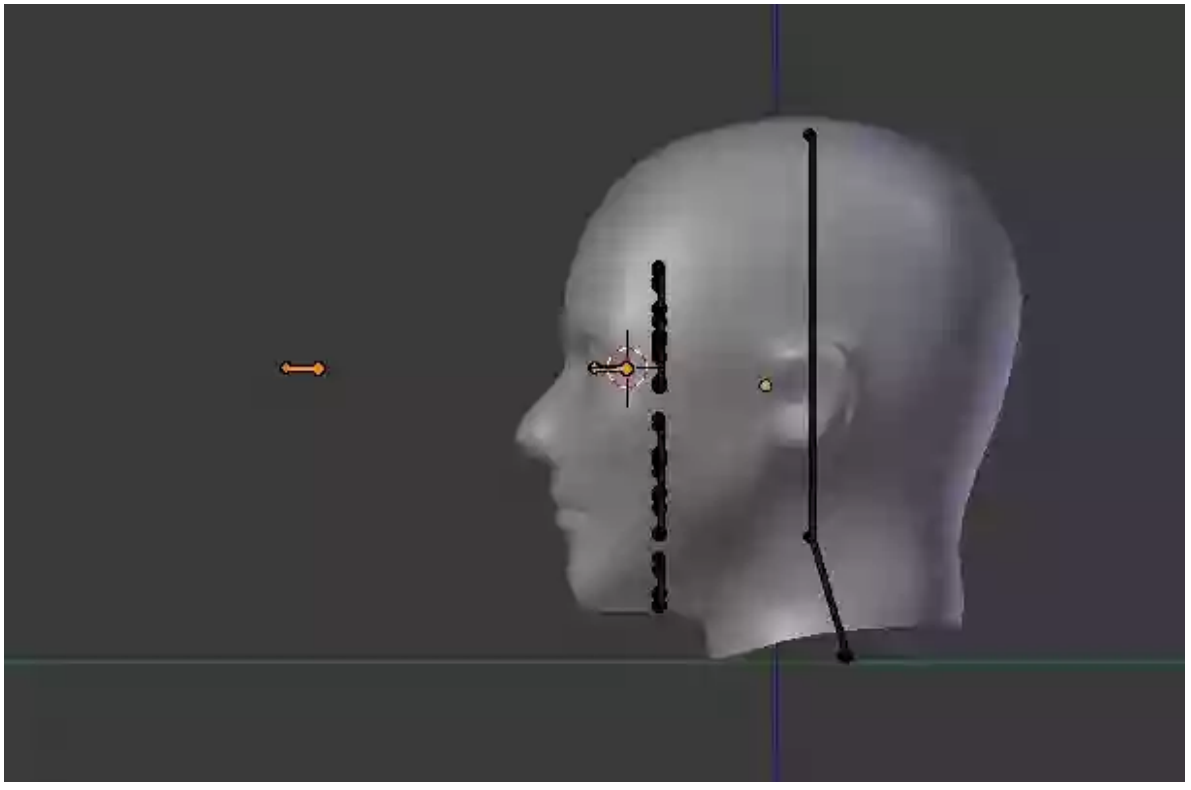
Select the tip of the bone and press **G** to move it down, pointing outwards. (Hold **Control** to snap while moving.)



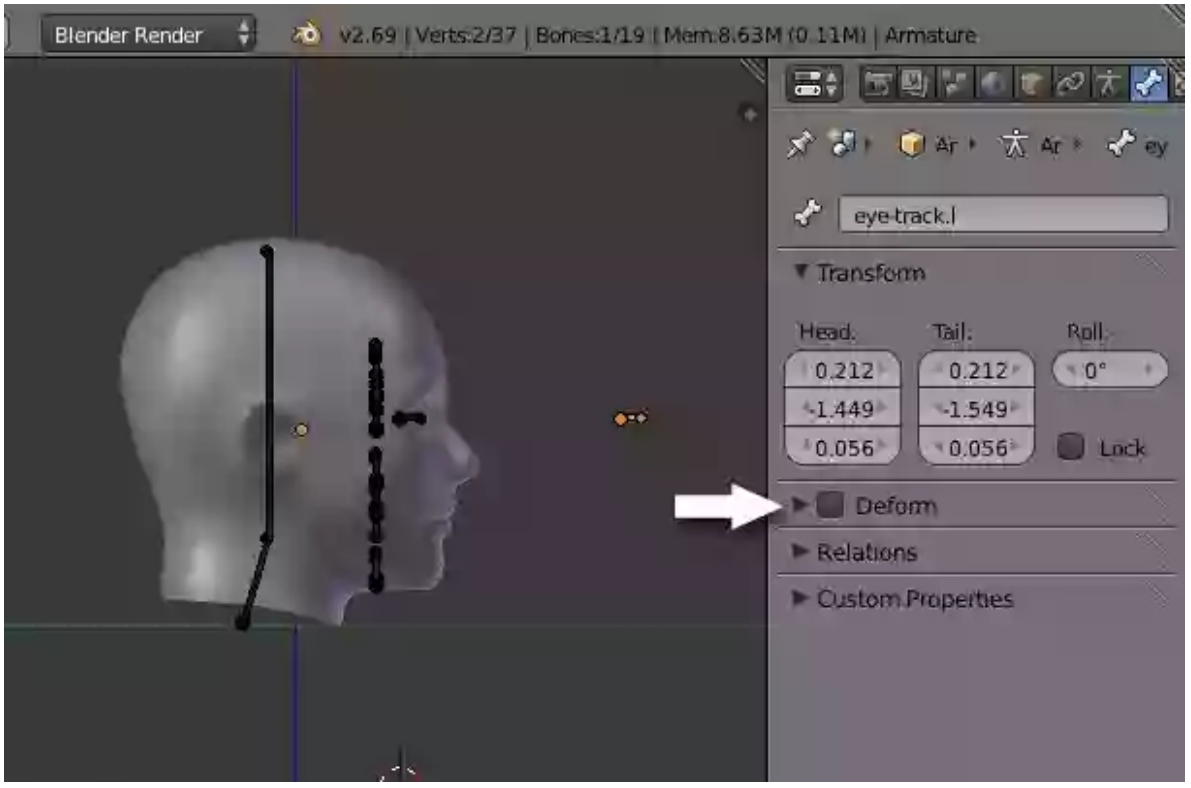


Step 15

Select the new bone and press **Shift-D** to make a duplicate. Move this one away from the face, but keep it exactly in-line with the eyeball bone. (Hold **Control** to snap while moving.)

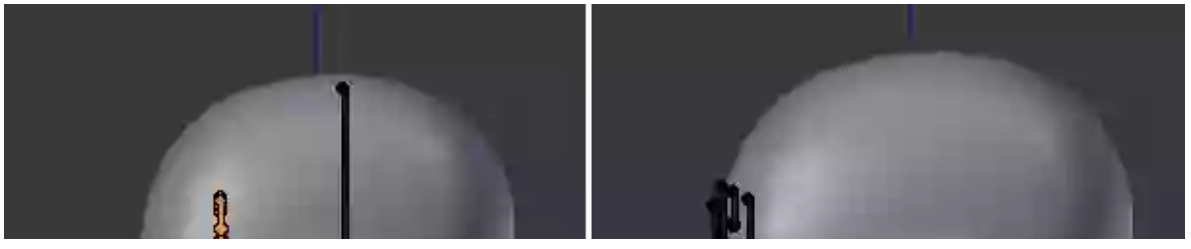


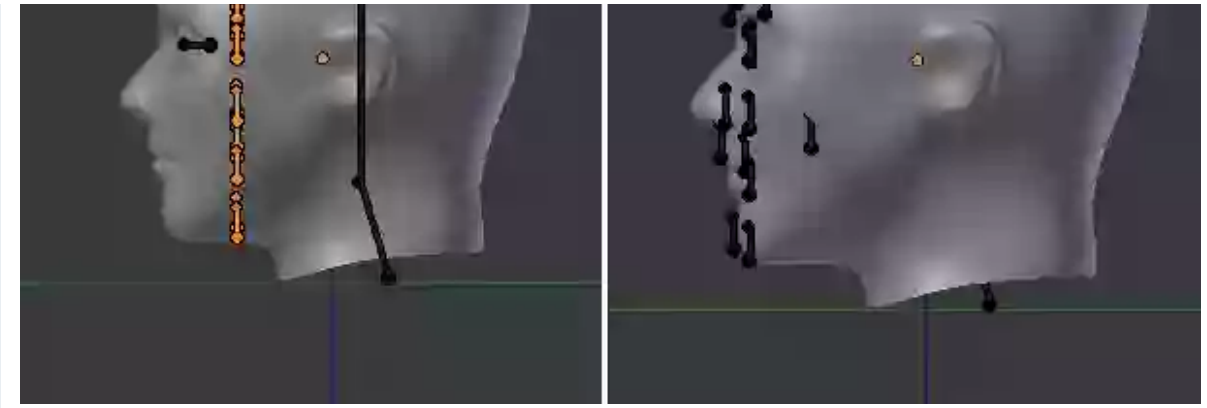
Uncheck the **Deform** option, as we don't want this bone to affect the vertices of the face or the eyeballs.

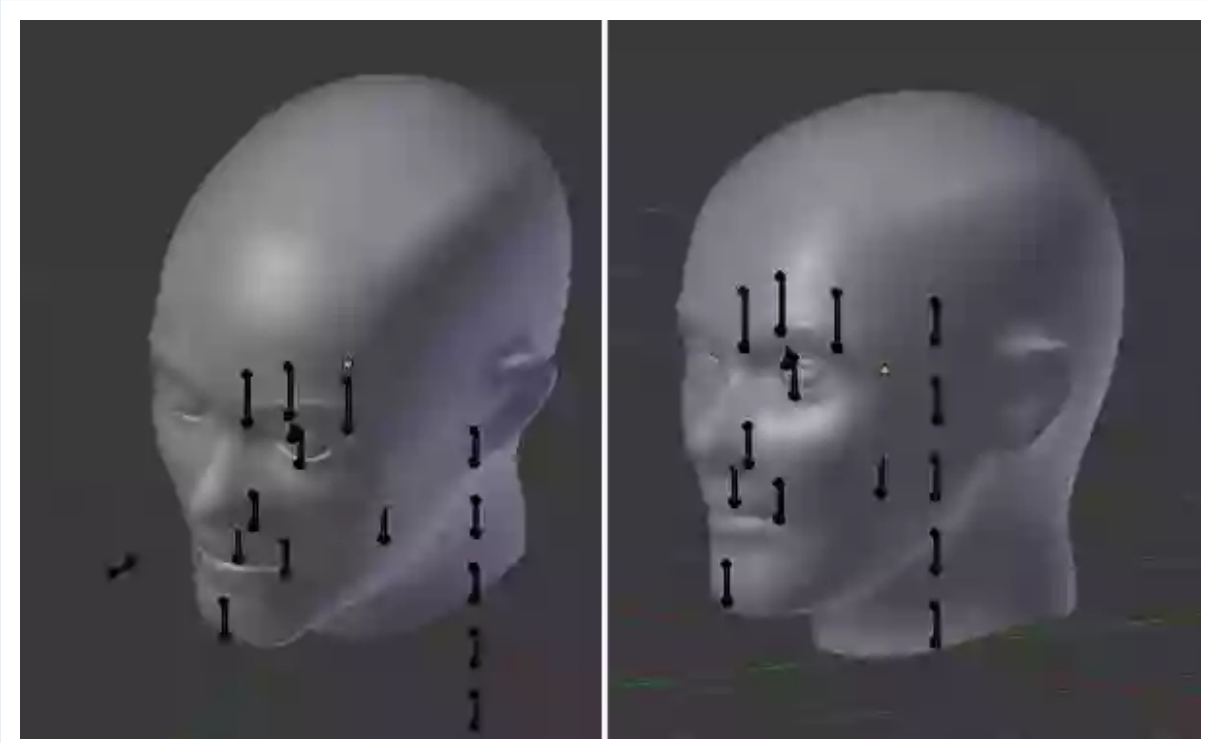


Step 16

Also check the placement of the bones in the side view. Press **3** on the numpad to to get into a side view, and then select the individual bones and press **G** to move them. Place them just outside of the head with a little distance in between them and the mesh.







Step 17

Select the **Head** bone, press **Shift-S** and select **Cursor to Selected**. This will move the 3D cursor to the center of the face.

Step 18

Press **A** to deselect any bone. With the **B** key, drag select *only* the bones for the left side (all bones with the **.l** extension), including **eyeball.l** and **eyetrack.l**, for which we need a mirror copy on the right side.

Step 19

Press the **. (period)** key on the keyboard to make the 3D cursor the center pivot for rotation and scaling.

With the bones selected, press **Shift-D** to make duplicates, **Left Click** without moving the mouse to confirm the same position. The duplicate bones will share the same position with the original ones.

Step 20

With the new bones selected, press **Control-M** and then **X** to make a mirror copy along the X axis. The 3D cursor will serve as the center point.

Step 21

The new bones will have jumbled extensions but we want each one to have **.r** extension. So with the new bones selected, click on the **Armature** menu in the footer of the 3D window, and then select **Flip Names**. This will add a **.r** extension to the mirrored bones.

Step 22

Press **B** to drag select all the controller bones. Hold **Shift** and then **Right Click** on the **Head** bone to select it last. Press **Control-P** to make it the parent bone and select **Keep Offset**, so that the position of the bones is kept the same. This way all the facial

controller bones are now children of the head bone, so they will follow the movement of the head bone.

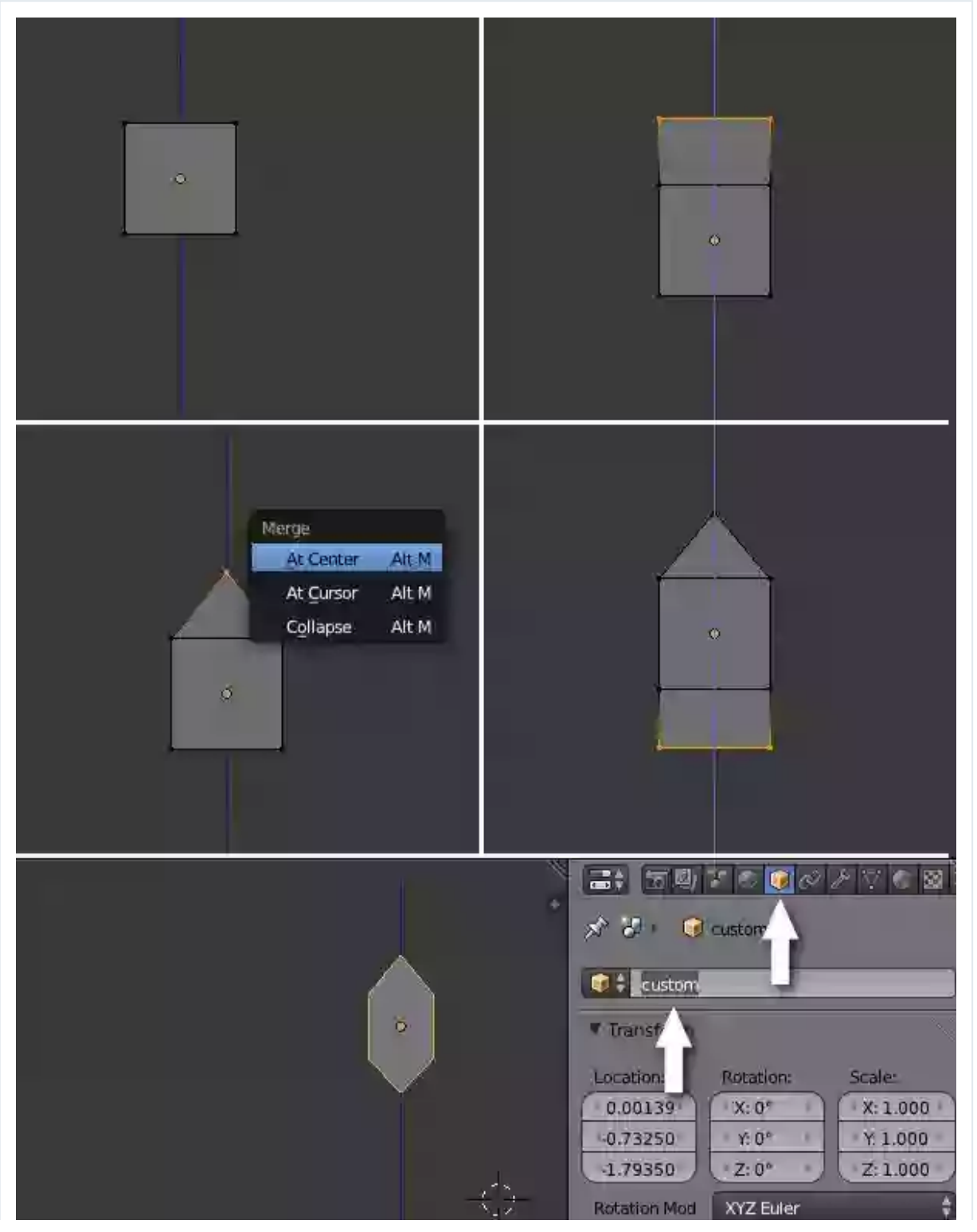
Press **TAB** to get out of **Edit** mode, and press **N** to bring up the **Properties** shelf. Under the **Display** panel, uncheck **Relationship Lines**. This will hide the dotted lines representing the parent/ child relationship between the objects.

Assigning a Custom Shape to the Bones

Step 1

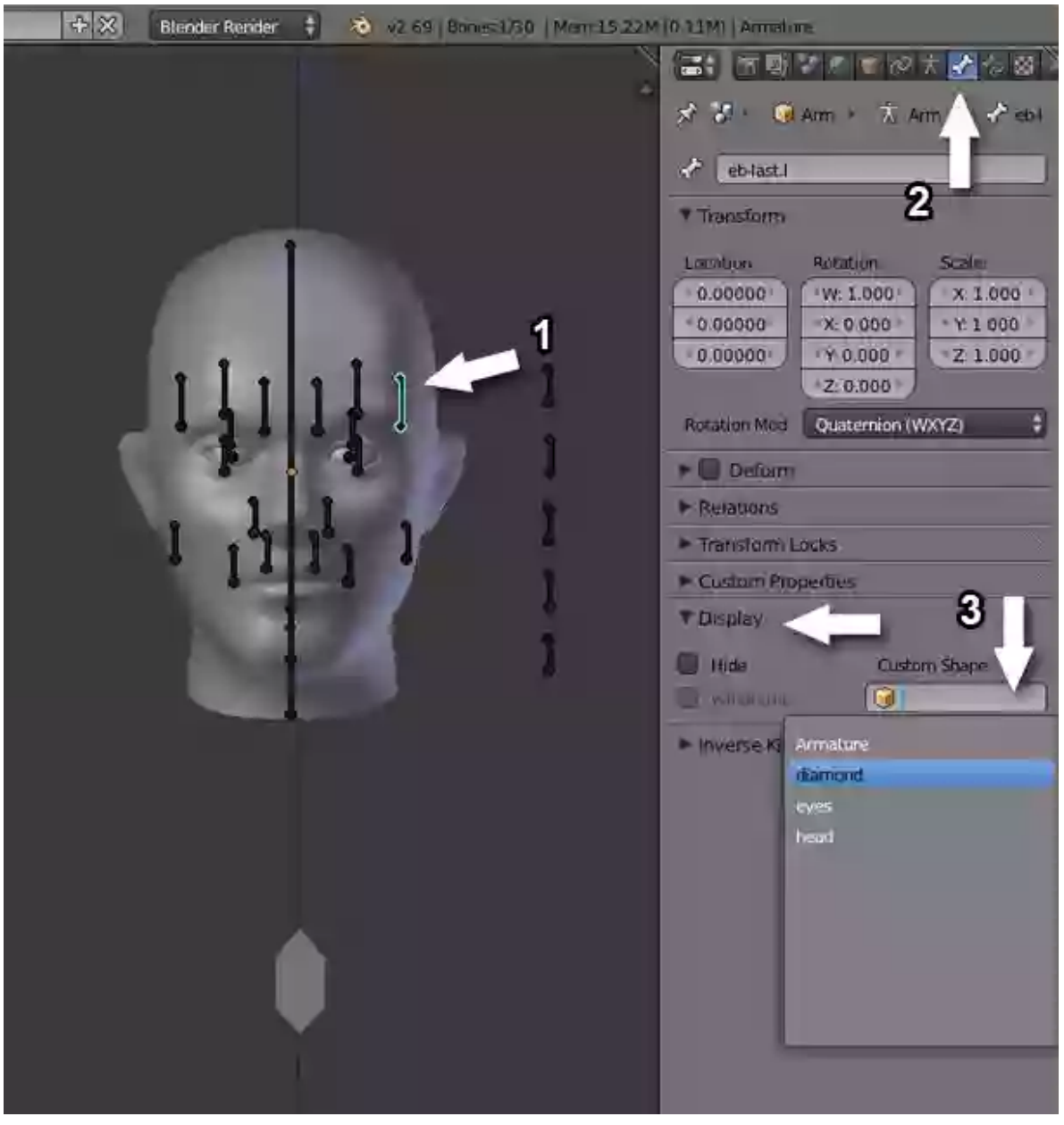
Too many of the bones on the face look the same, so lets give them a custom shape. This will not affect the functionality, but it will give us a nice and neat graphical interface. But to do so, we need to create an object first. So in **Object** mode, create an object using any shape you want (I like to use a simple diamond shaped plane) And then name it **Shape**, or anything else you want

plane.) And then name it **Shape,** or anything else you want.



Step 2

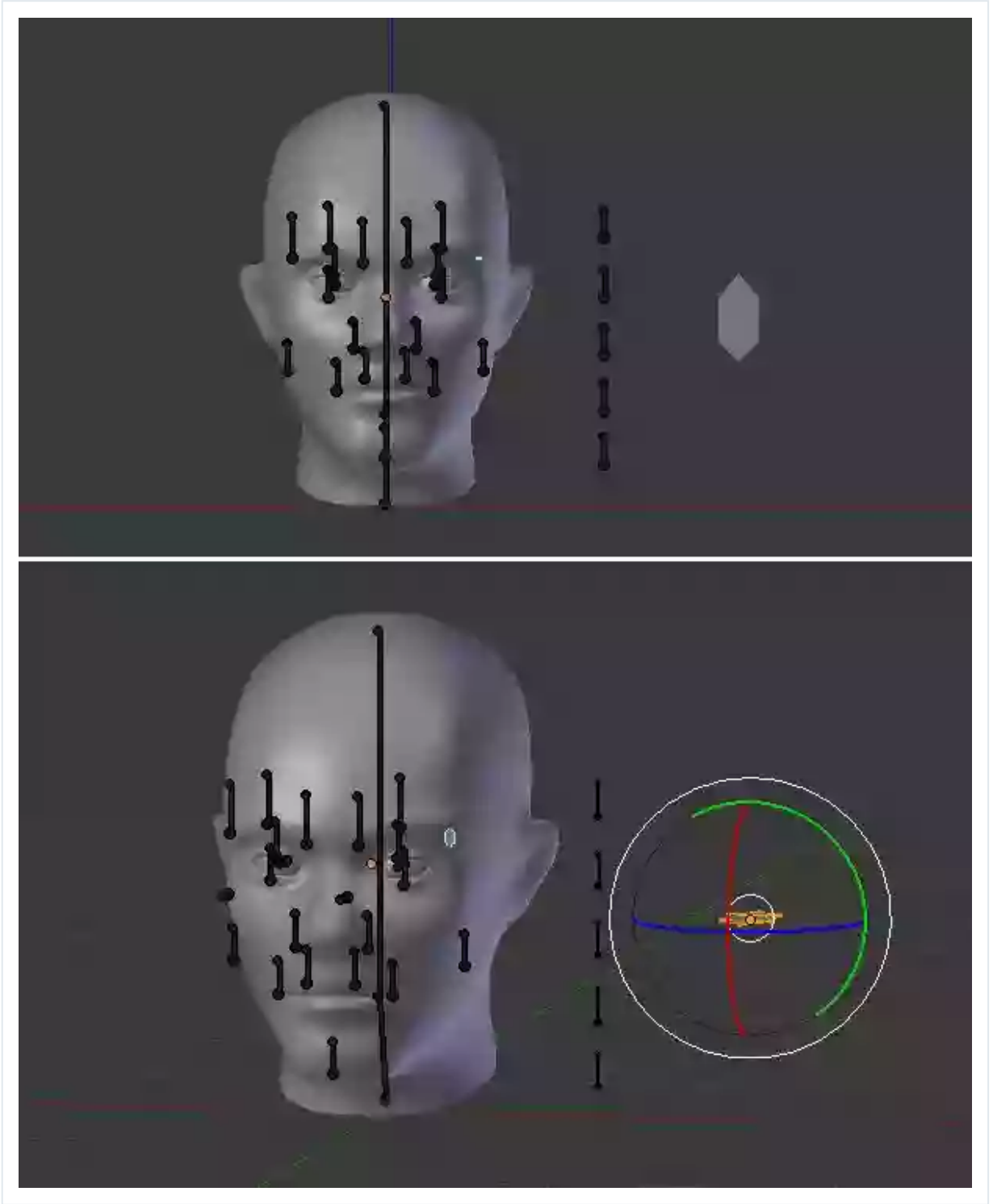
In **Pose** mode, select the bone. Click on the **Bone** properties and in the **Display** panel, select your new object using the **Custom Shape** option.



Step 3

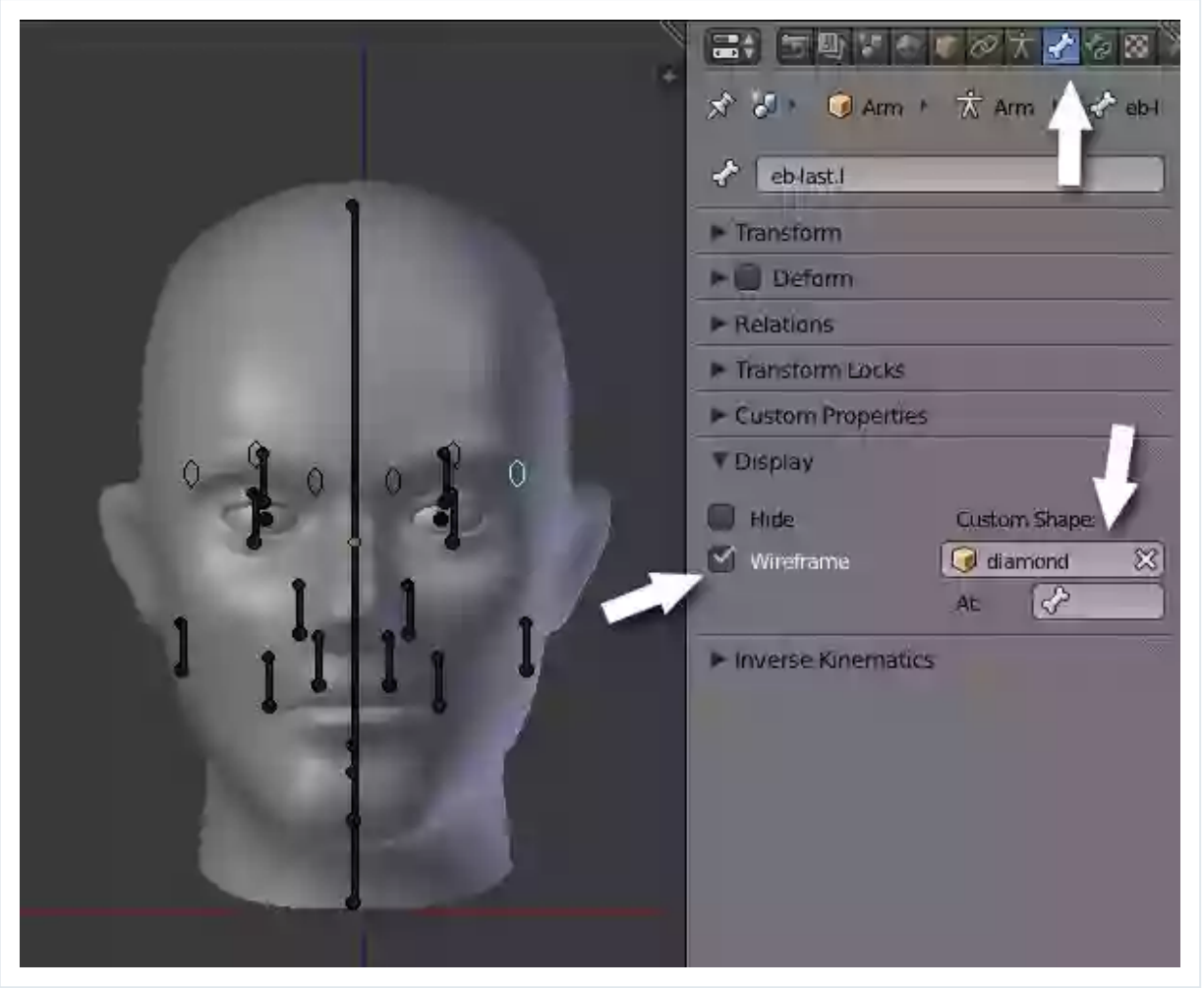
Sometimes the bone may appear too small or too large, or the rotation might be off. To fine tune the look, edit the object *not* the

bone.



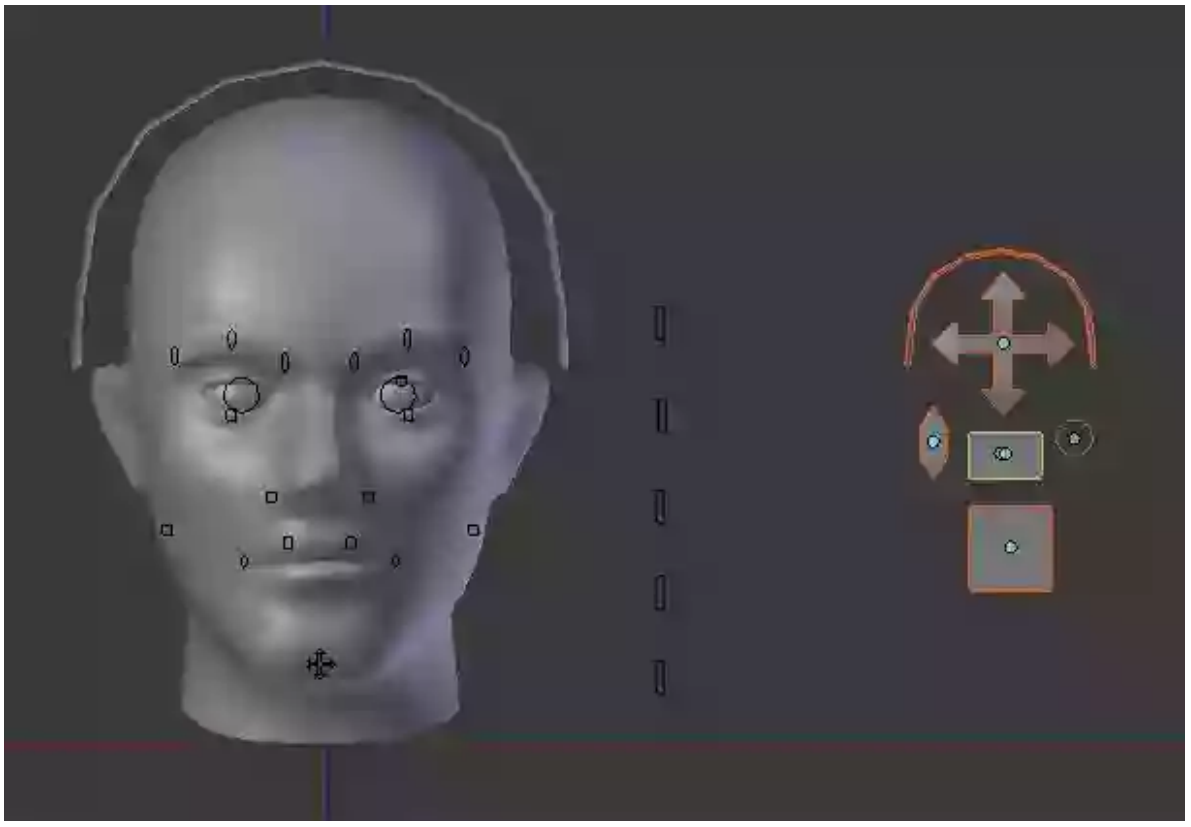
Step 4

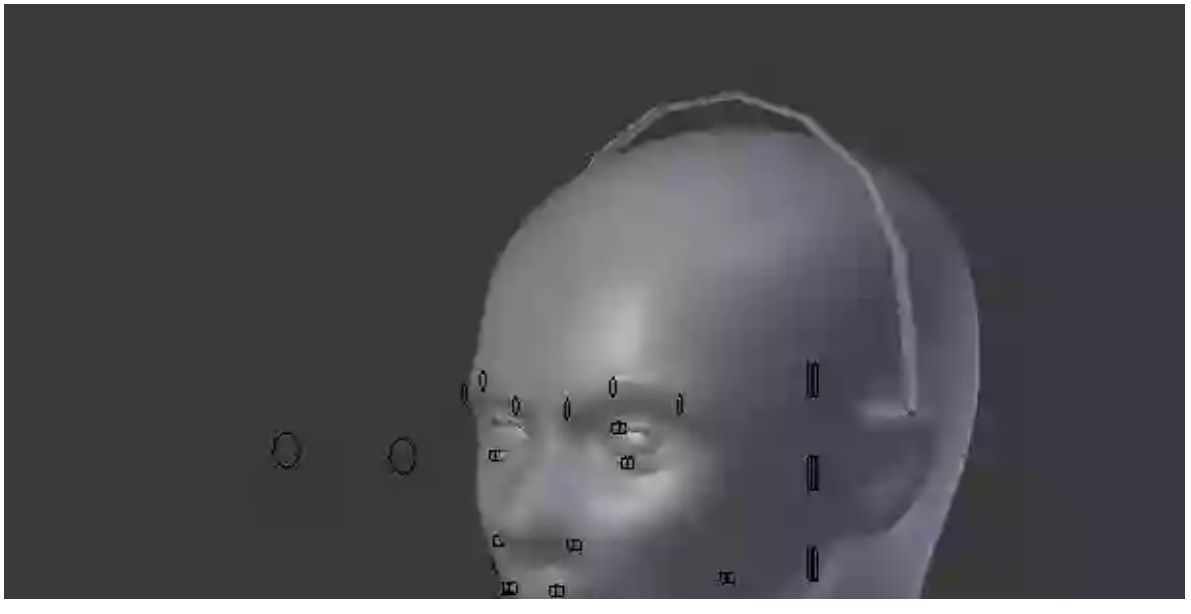
You can also turn on the **Wireframe** option to achieve a more minimized look. Assign the custom shape to all driver bones.



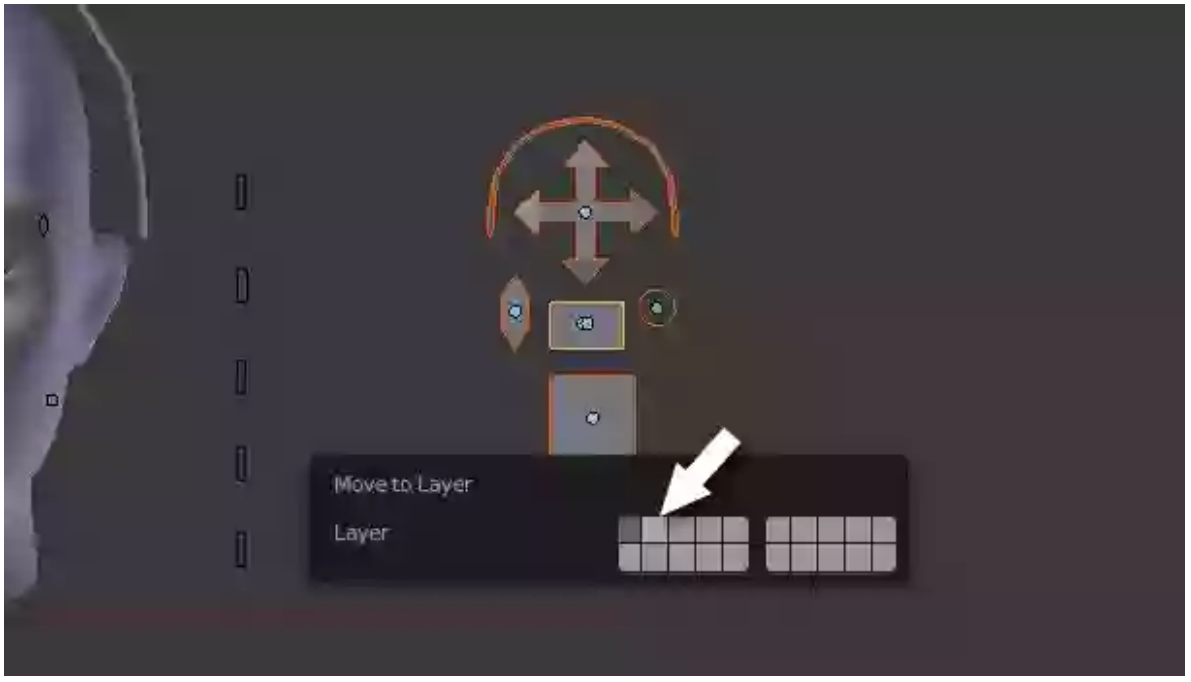
Step 5

Similarly, assign custom shapes to the driver bones, eye track bones and the Head bone. Then turn off **X-Ray** in the **Display** options to reduce the clutter.





You can also move all the objects you created for the custom shapes to another layer. Press **B** and drag select all objects, then Press **M** and select the second block to move them onto a second layer. Switch back to layer one by pressing **1** on the keyboard.



Setting up Shape key Drivers

Step 1

Split the window into two and select the **Graph Editor** for any one view.

Switch to **Drivers** Mode.

Step 2

In **Object** mode, select the **Head**. Then select the first shape key - **EB-angry.l**, **Right Click** on the **Value** slider and select **Add Driver**.

Step 3

In the **Drivers** window:

1. Select the **Shape Key Value** Driver.
2. Press **N** to bring up the **Properties** shelf. In the **Drivers** panel, select **Averaged Value** for the **Type**.
3. In the **Object/Bone** field, select **Armature.**
4. And in the **Bone** field, select the bone which you want to assign the shape key to. Here we want the shape key for angry eye brows, so I selected the eye brow tip bone.
5. Select **Y Location** for **Type,** as we want to trigger the shape key when the bone is moved in a Y location, i.e. vertically.
6. In the **Space** field, select **Local Space**.

Step 4

Again in the **Drivers** window:

1. Add a new **Modifier**, and select **Generator**.
2. Type **-10** into the lower box. Since we want the shape key to be triggered when the bone is moved downwards, the value we use is negative. You can increase or decrease this value according to your liking.

Test it by moving the bone in **Pose** Mode. The shape key should be triggered when the bone is moved downwards. If the bone needs to be moved too much then you can increase the value to **-20**.

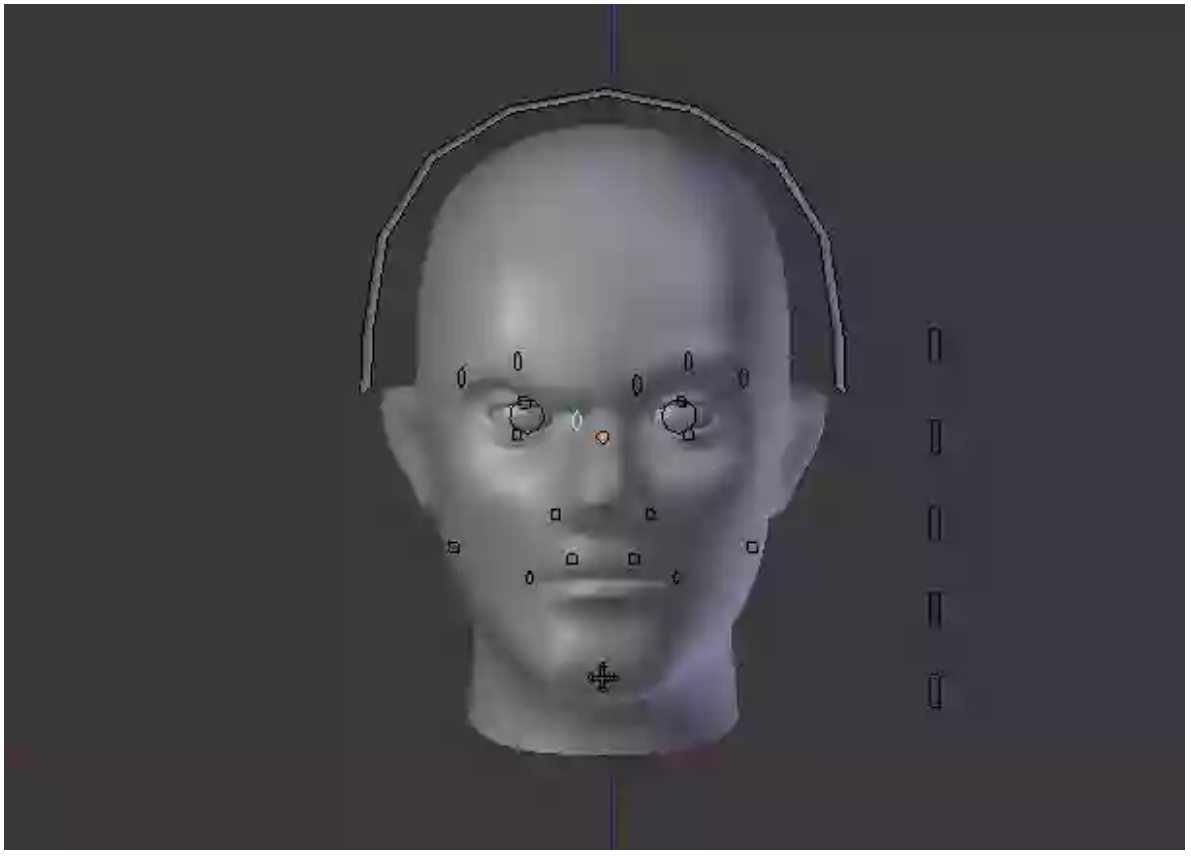
Step 5

Similarly, select the next shape key and add a **Driver**. **Right Click** on the **Value** slider and select **Add Driver**.

Step 6

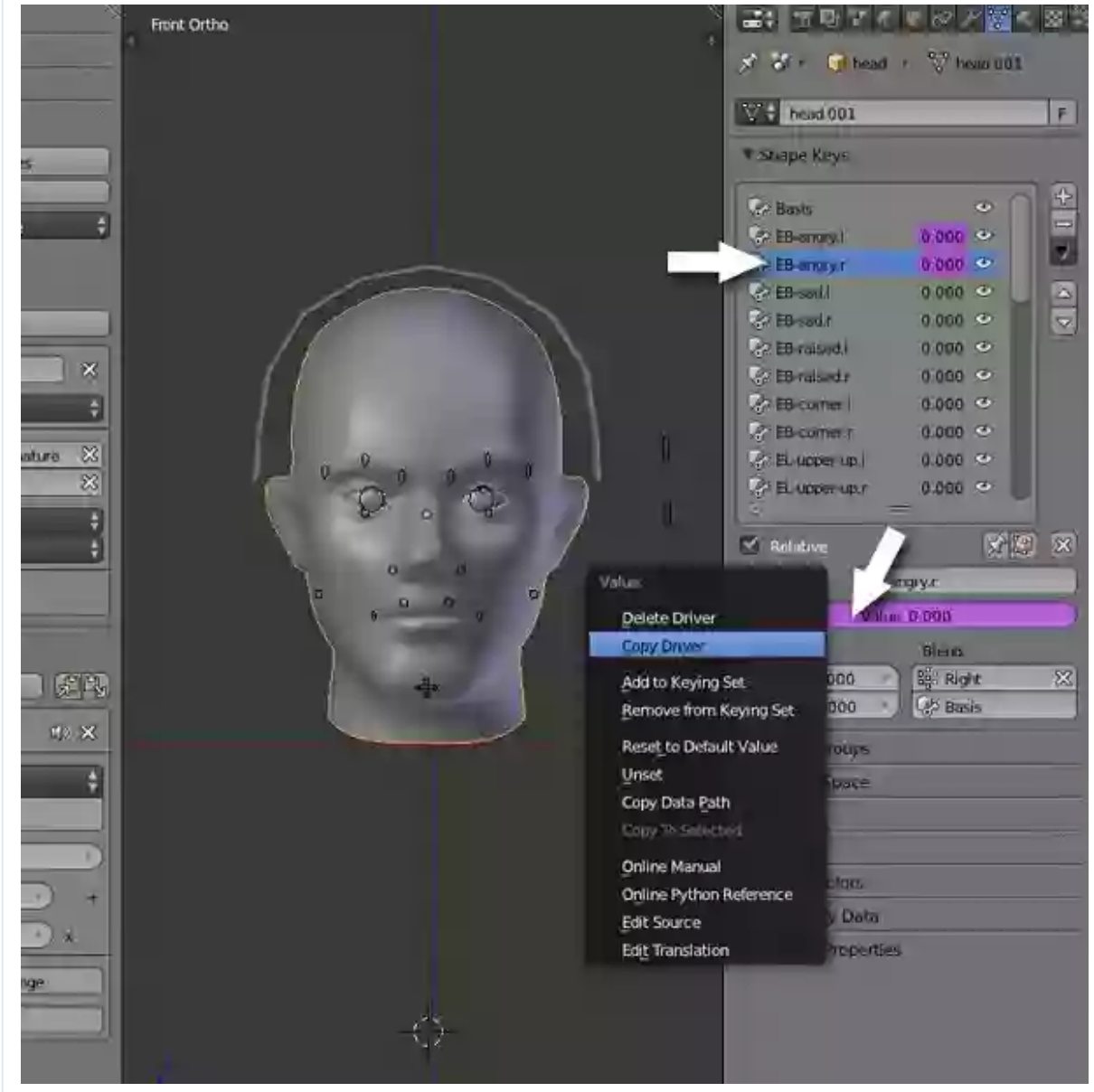
1. Select the shape key **Value Driver**.
2. Press **N** to bring up the **Properties** shelf. In the **Drivers** panel, Select **Averaged Value** for the **Type**.
3. In the **Object/Bone** field select **Armature** and choose the appropriate bone. Here I have to selected **EB-angry.r**
4. Select **Y Location** for the **Type,** as we want to trigger the shape key when the bone is moved in a Y location, i.e. vertically.
5. In the **Space** field, select **Local Space**.
6. Add a new **Modifier**, and select **Generator**.
7. Type **-10** in for the **Coefficient** value. We use a negative value because the bone is to be moved downward on the Y axis to trigger the shape key.

Test by moving the bone in **Pose** mode. The shape key should be triggered when the bone is moved downwards. If the bone needs to be moved too much, increase the value to **-20**.

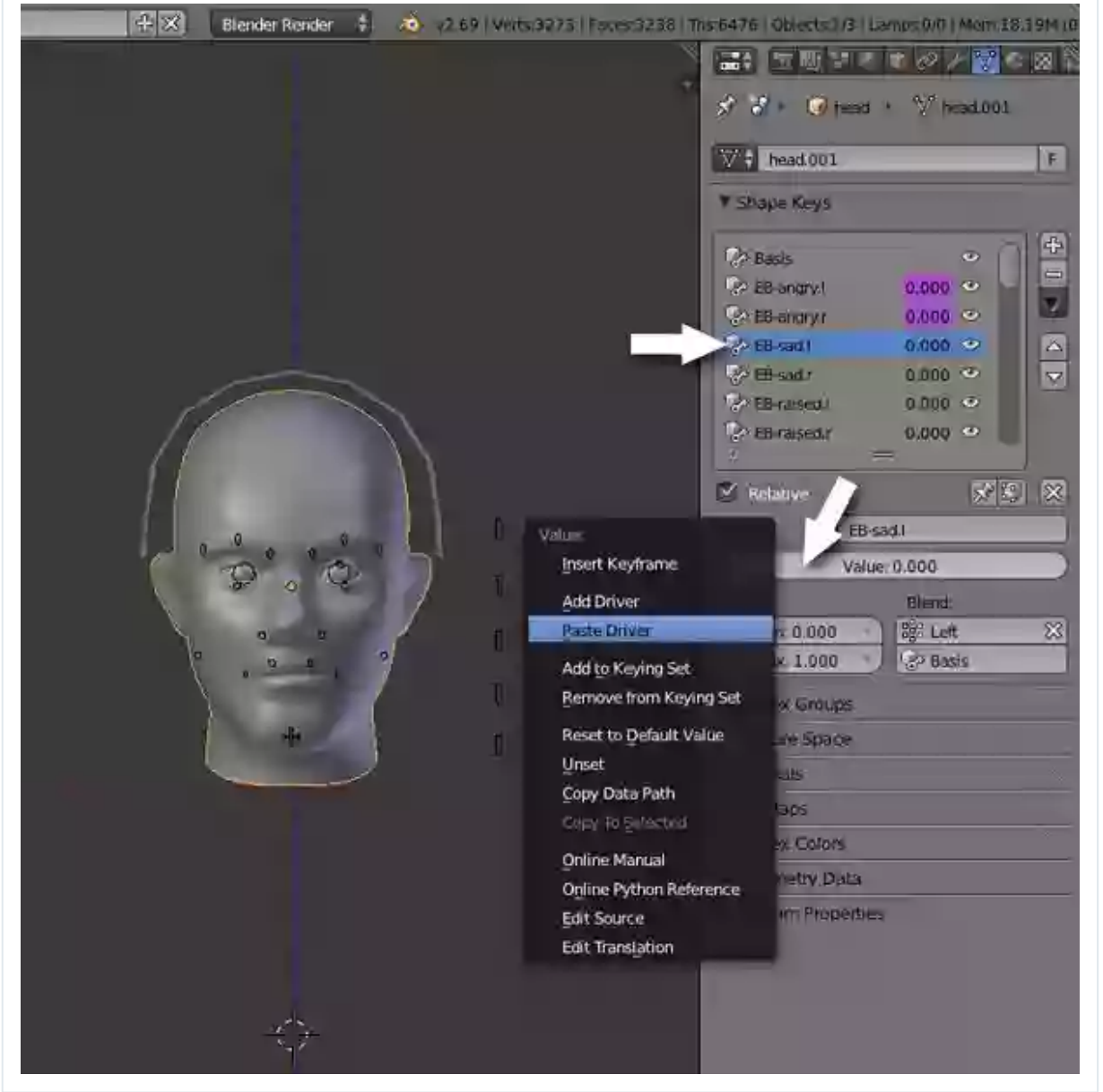


Step 6

To save time we can copy a driver setting and paste it onto a new shape key, instead of repeating the steps. We can then change only the name of the bone, transformation type and the modifier settings accordingly. To copy a driver, hover the mouse over the **Value** of a shape key which already has a driver (indicated with purple). **Right Click** and select **Copy Driver**.



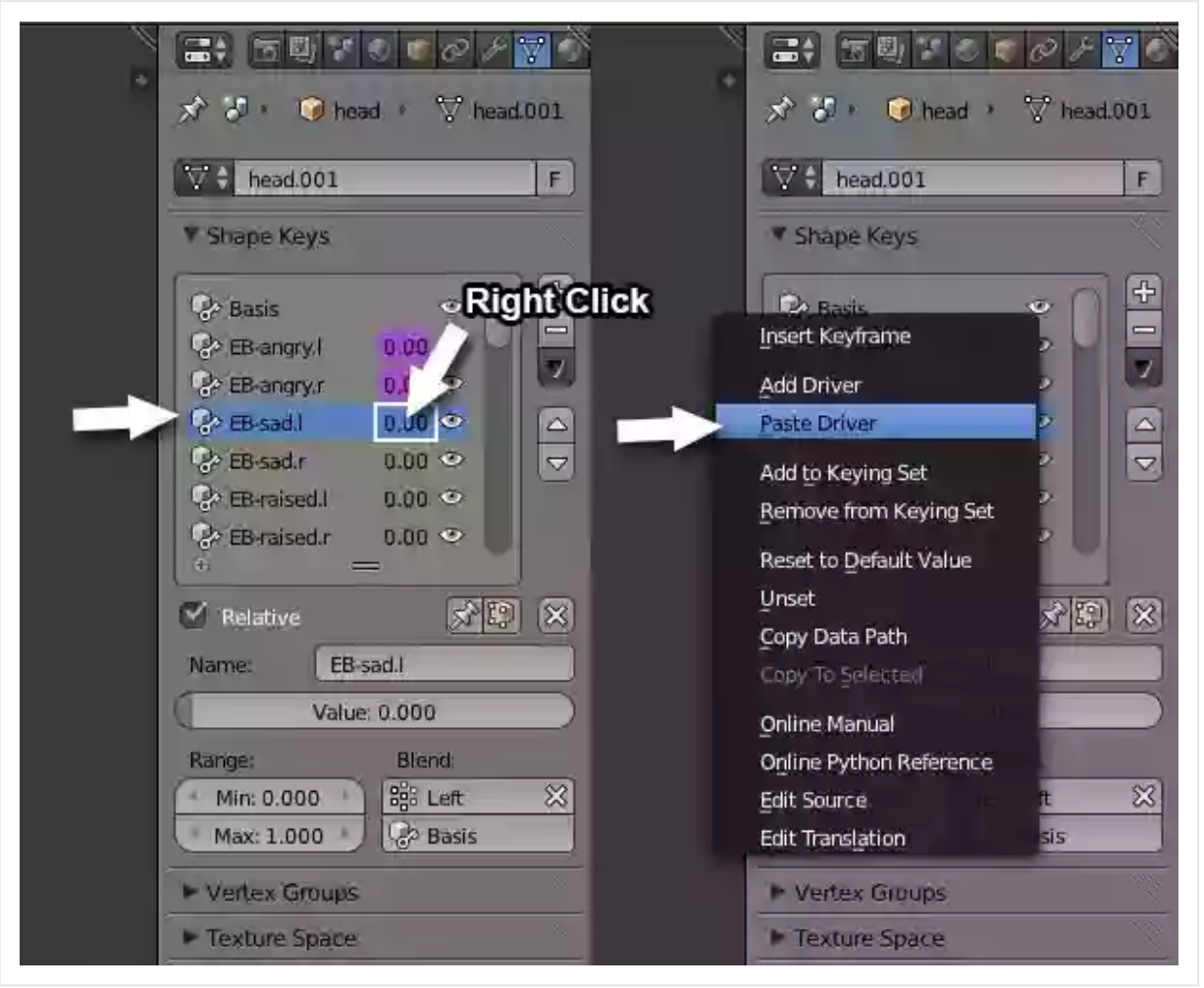
Select the next shape key and **Right Click** on its **Value** slider. Then click on **Paste Driver**.



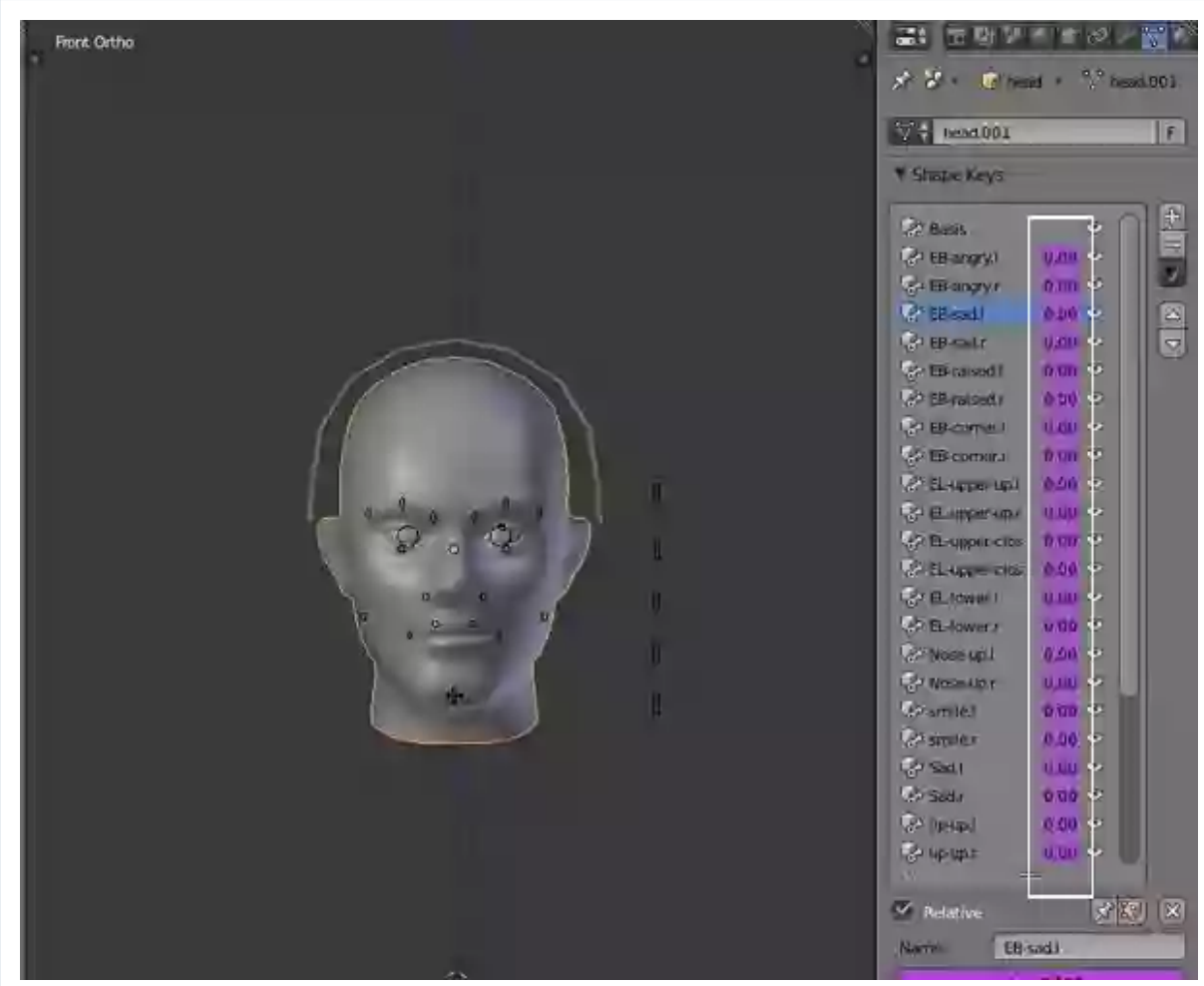
Step 8

Go ahead and paste the driver onto all the shape keys. We don't have to copy it again, so just keep on pasting the driver into the value. You can also **Right Click** on the **0.00 Value** right next to the

shape key in the list, to add, copy and paste the driver.



Paste the Driver for *all* shape keys.

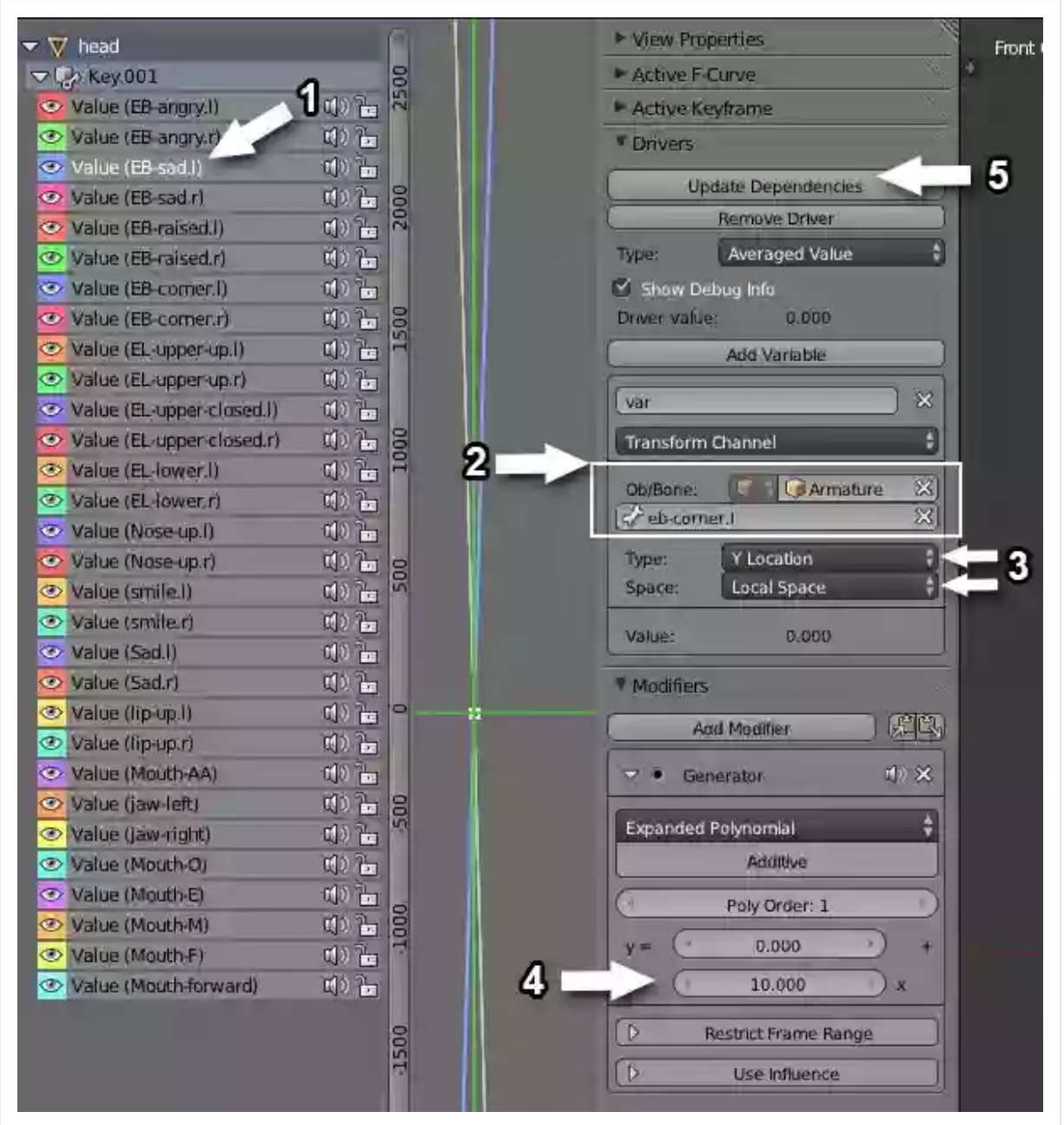


Step 9

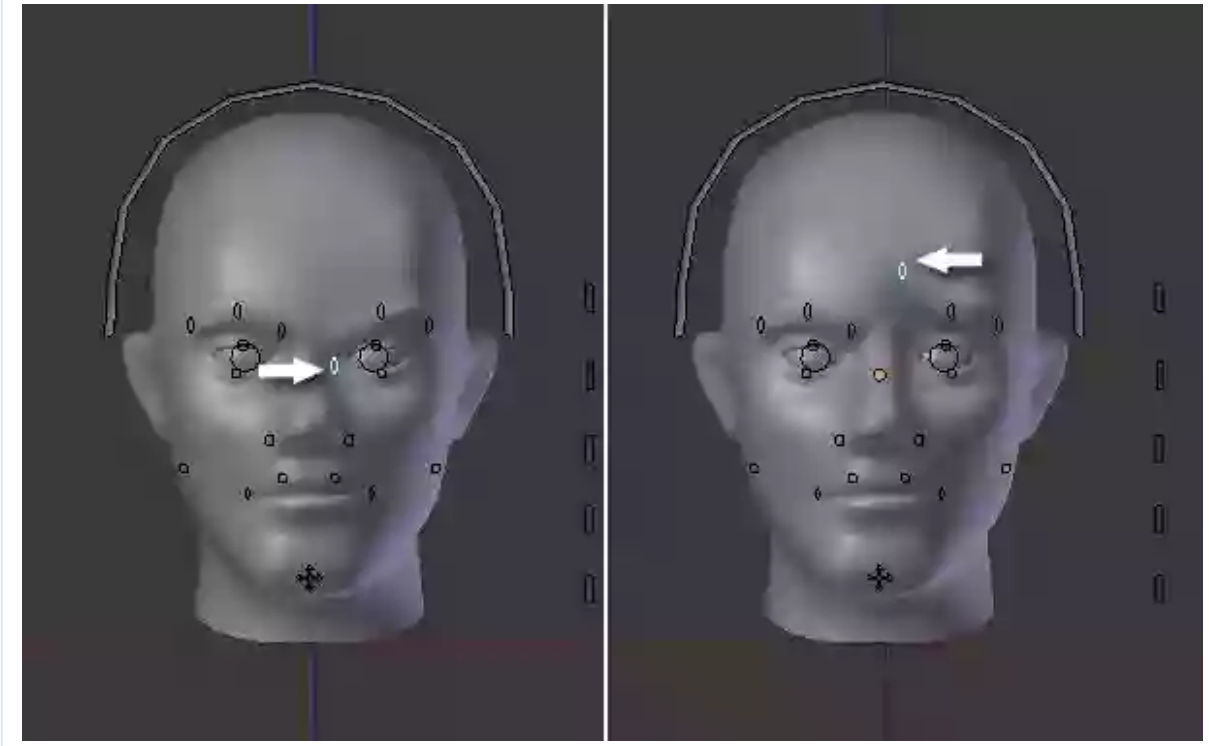
Assign the **Driver** values.

1. Select the next driver in the **Drivers** window.
2. Assign it to appropriate bone. In this case I need to assign it to the corner eye brow bone, to which we also assigned the angry shape key driver. This one bone will trigger two shape keys - **EB-angry.l** when moved downwards, and **EB-sad.l** when moved upwards.
3. Since we want to move the bone vertically, we will select **Y**

3. Since we want to move the bone vertically, we will select **Y location** in **Local space**.
4. In the **Generator Modifier**, type **10** (positive) into the value for **Coefficient**. We need to trigger the shape key when the bone is moved upwards, therefore the value here is +10 and not -10.
5. Finally press **Update Dependencies**.



Test by moving the bone up and down in **Pose** mode.



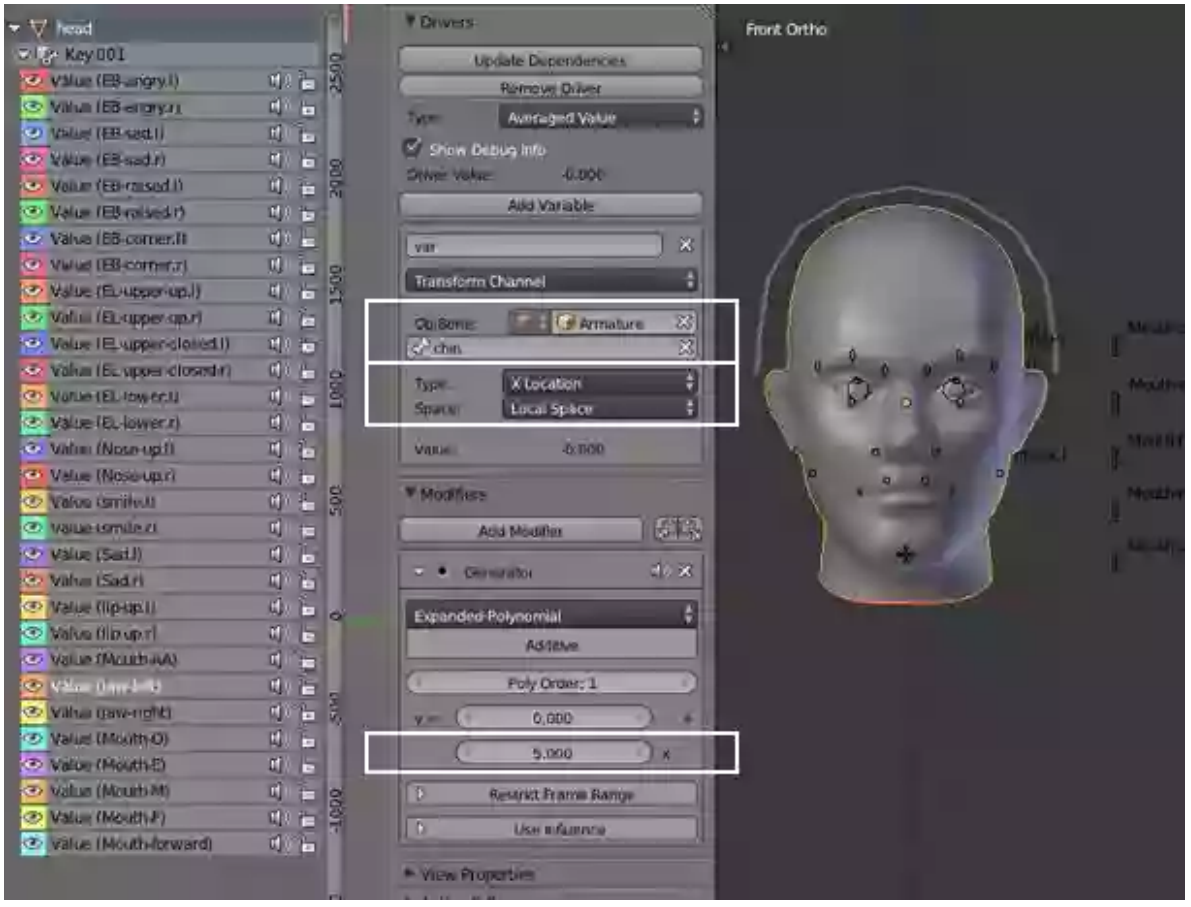
Step 10

Similarly update all the drivers with their corresponding bones, type and modifier values. And finally press **Update Dependencies**. Things to be kept in mind are:

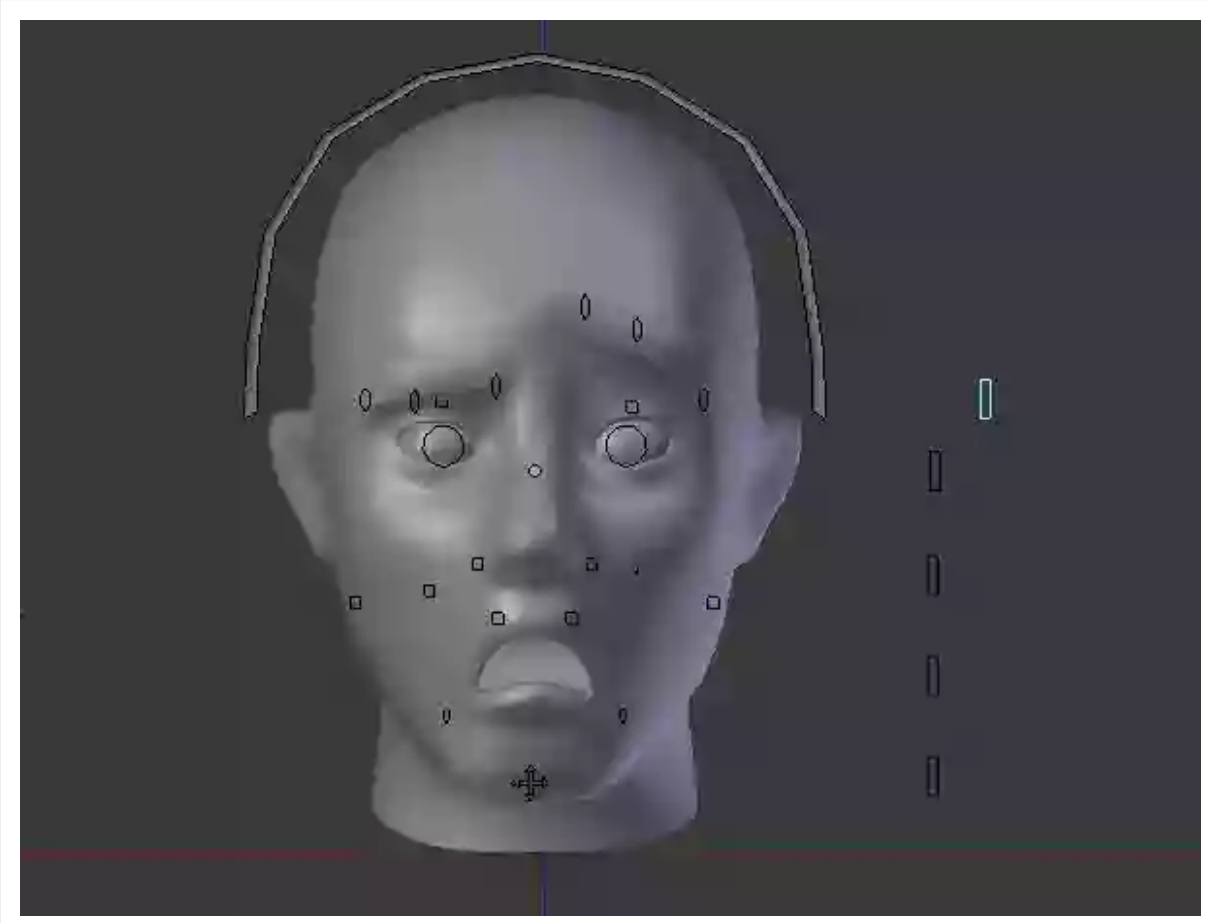
1. Select the appropriate bone for which you want to trigger that particular shape key. One bone can be assigned to many drivers. For example, here I have assigned the **chin** bone to the **jawright**, **jawleft**, and **Mouth-AA** shape keys.
2. Choose the correct **Type** according to the movement of the bone. If a shape key should be triggered when moving the bone vertically, then select **Y location**. If you want to trigger a shape key when the bone moves horizontally, select **X location**. Here I have

when the bone moves horizontally, select **X location**. Here I have used **X Location** for the **jaw-left** driver because I want it to be triggered when I move the chin bone horizontally (right) along the X axis. You can also experiment with **Rotation** and **Scale** types. For the **Mouth-AA** driver I have selected **Y Location**, because I want it to be triggered when the bone is moved up and down vertically along the Y axis.

3. In the **Modifier** value, choose a *positive* value if you want to move right or up, and choose a *negative* value if the bone needs to be moved left or down.



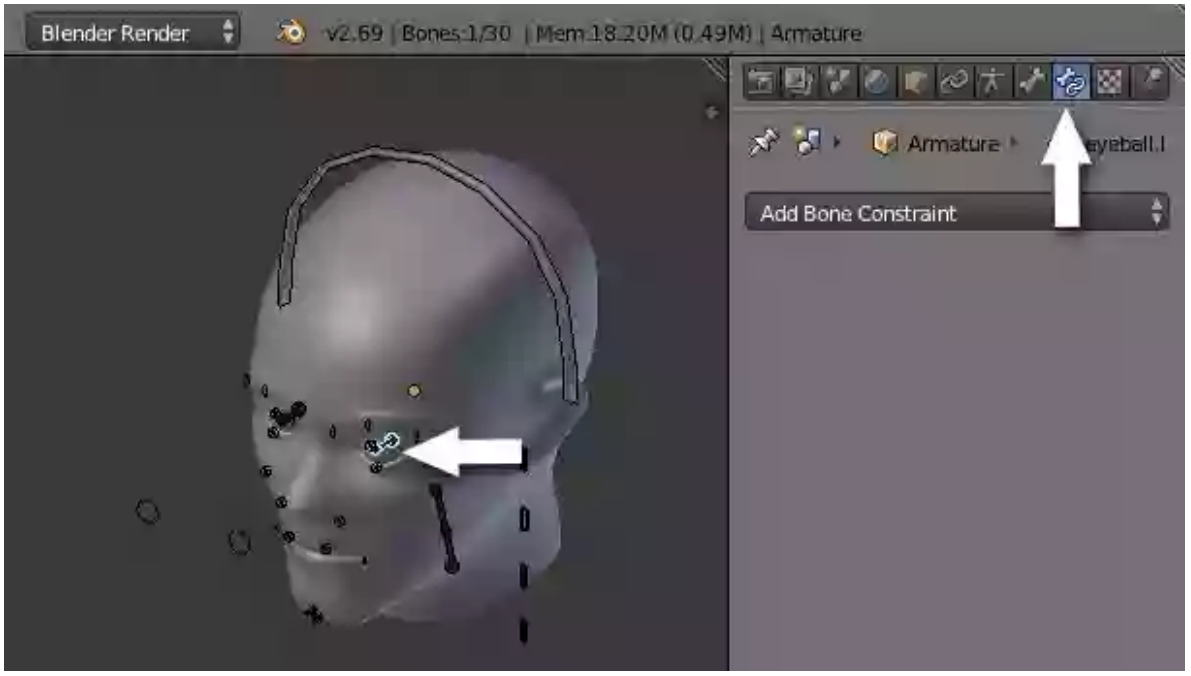
Again test the bones in **Pose** mode. Press **Alt-G** to reset the location of the bones and **Alt-R** to reset the rotation.



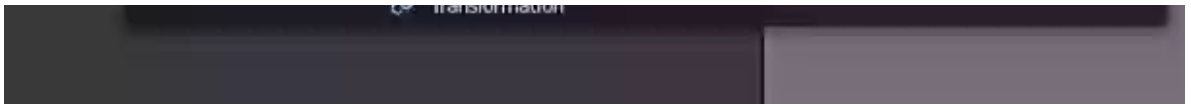
Eye Bone Settings

Step 1

In **Pose** mode, select the left eye bone (here it's named **eyeball.l**), and turn on **X-Ray** if it is not visible. In the **Properties** panel, click on the **Bone Constraint** button.



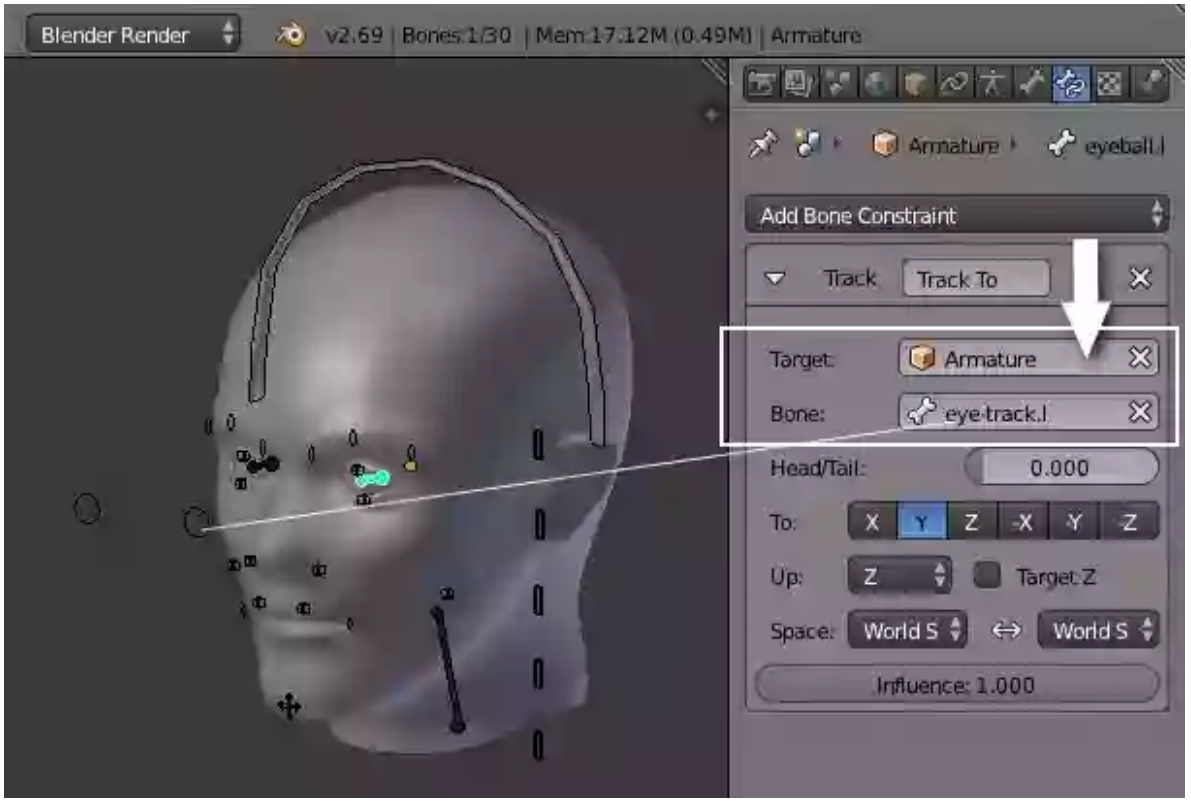
Click on **Add Bone Constraint** and select **Track To**.



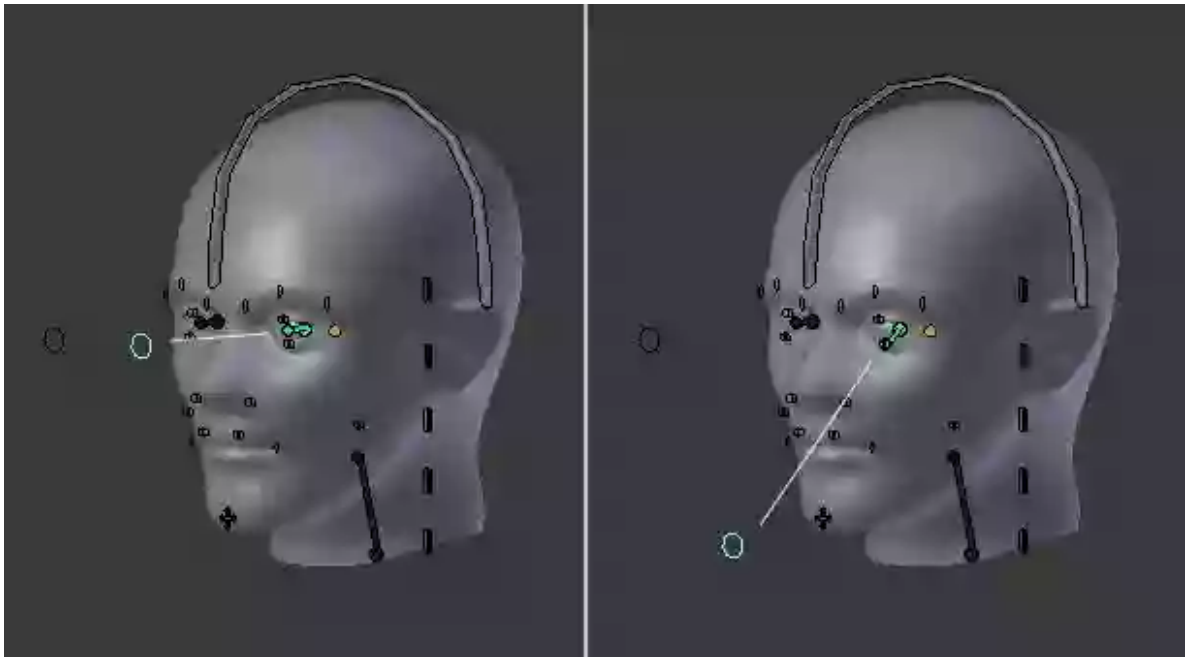
Step 2

In the **Target** field select the object you want the eye bone to track to (here we have **Armature**.) And in the **Bone** field, select the

eyetrack.l bone we created. Now the eye bone is tracked to the eye track bone.

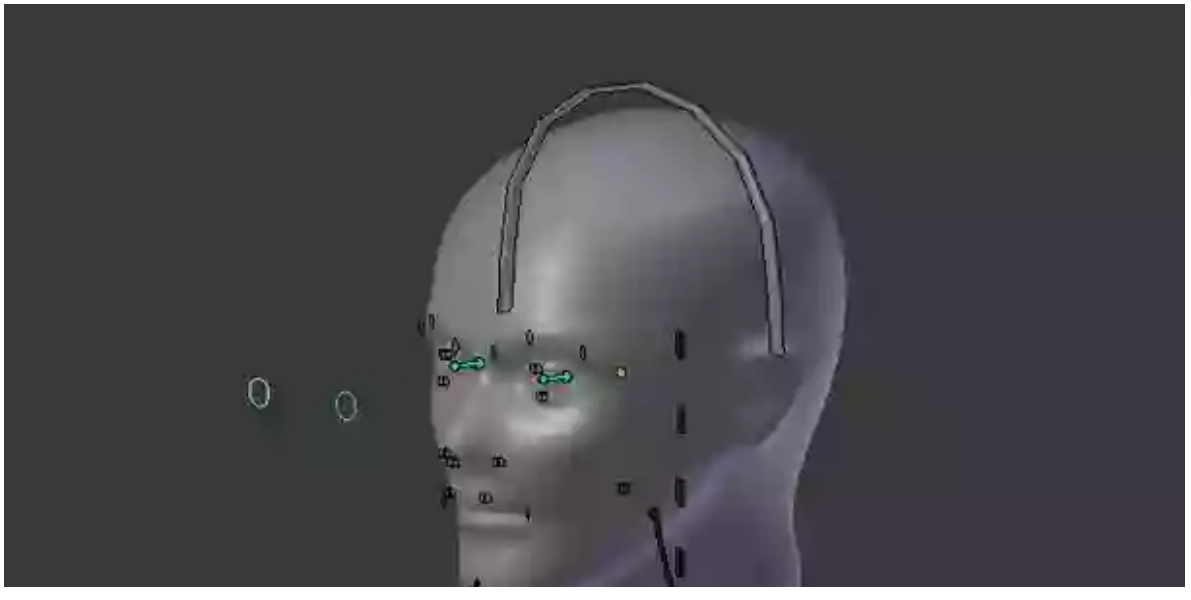


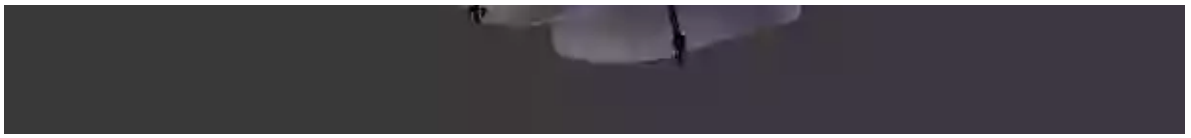
Move the **eyetrack.l** bone and you will see that **eyebone.l** is tracking wherever the bone is moved. (The white line in the image below is superimposed.)



Step 3

Similarly, do it for the other eye bone.

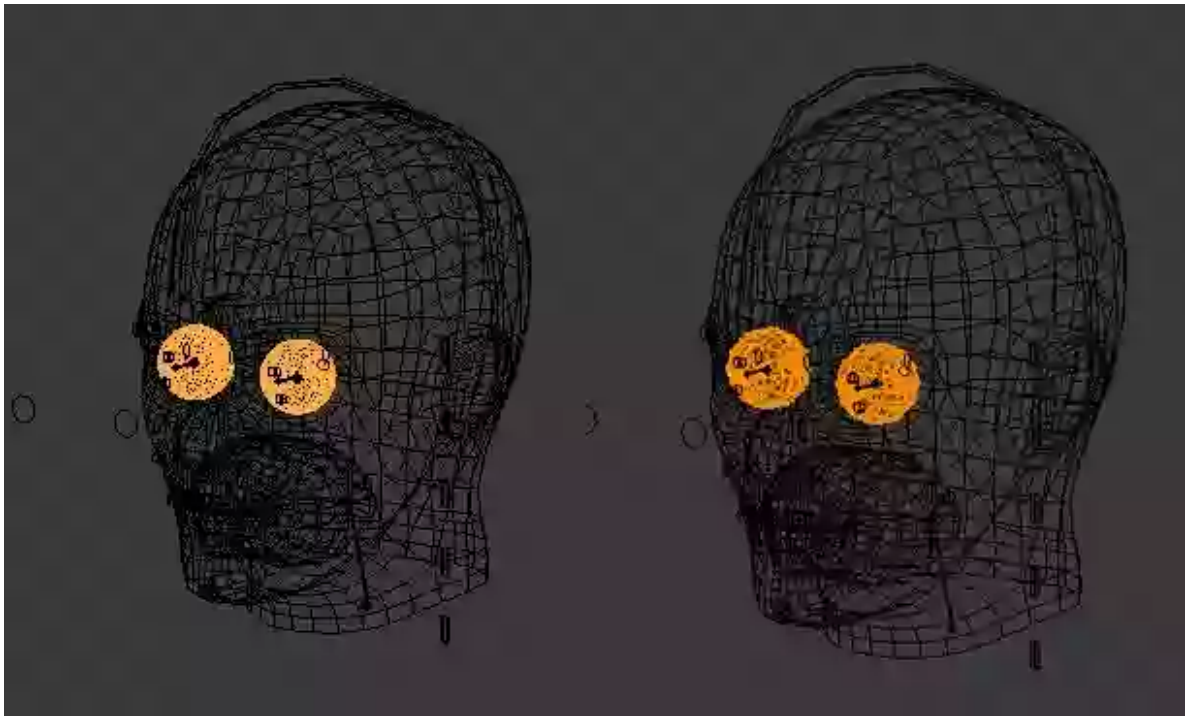




Step 4

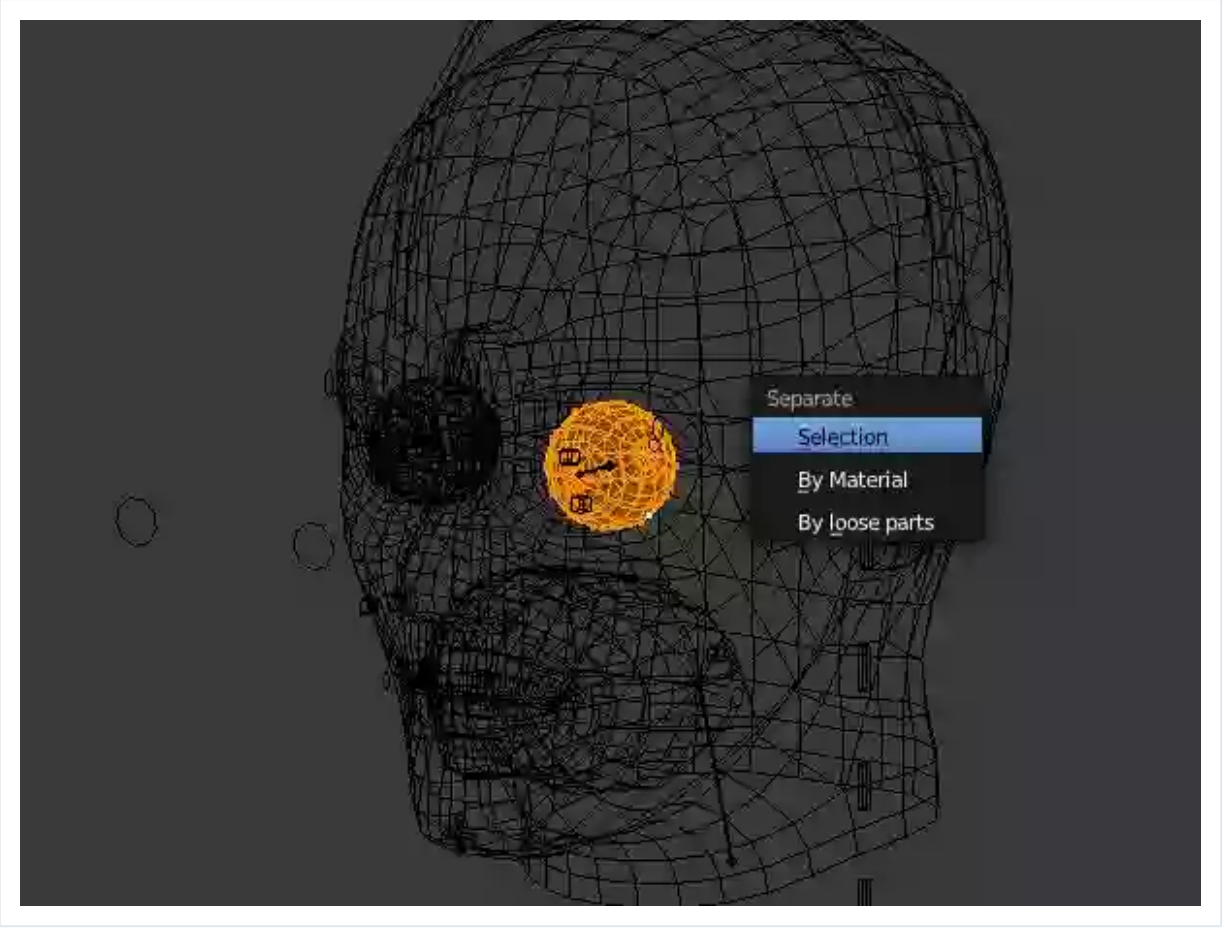
Now select the eyeballs. We made them a separate object in the previous part of the tutorial, and now we'll further make each ball

a separate object. With the eyeballs selected, press **TAB** to enter into **Edit** mode.



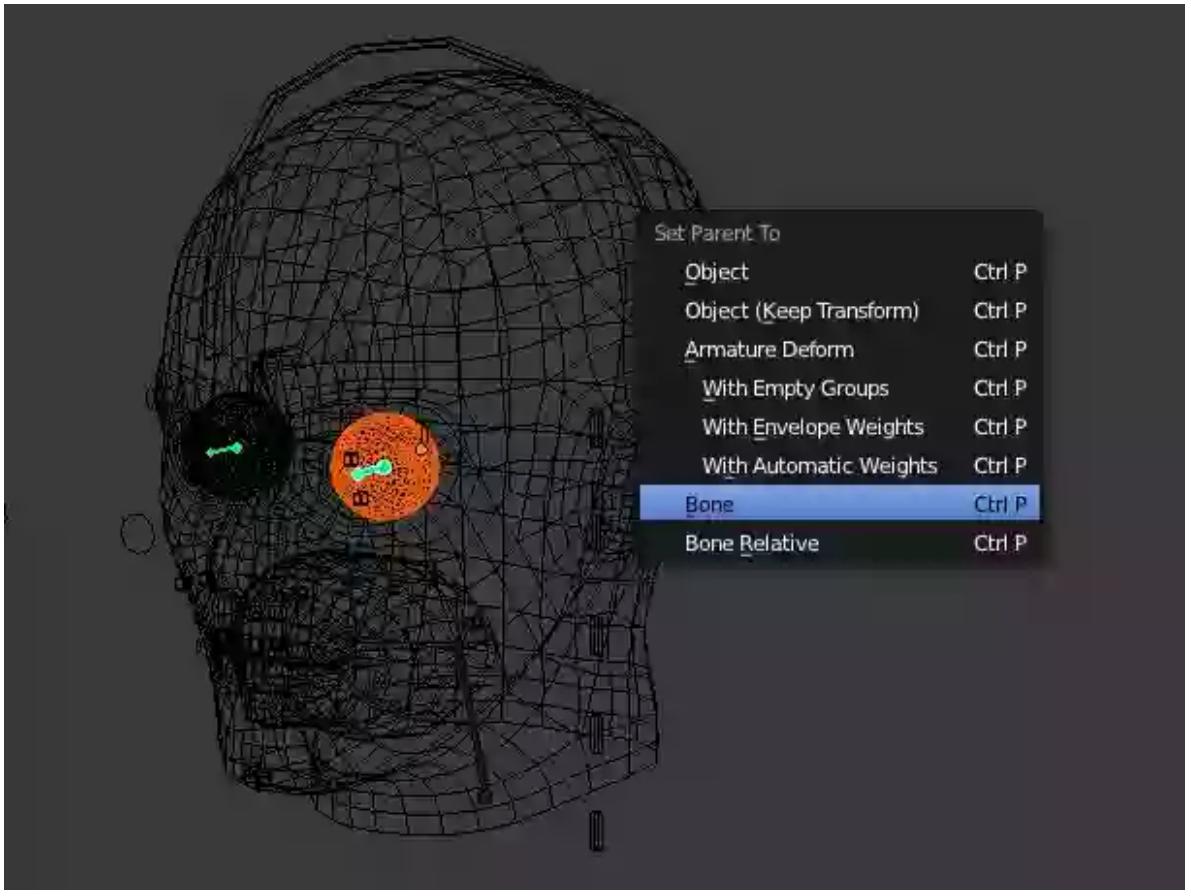
Step 5

Select one eyeball, press **P** and click on **Selection** to make the selected vertices a separate object.

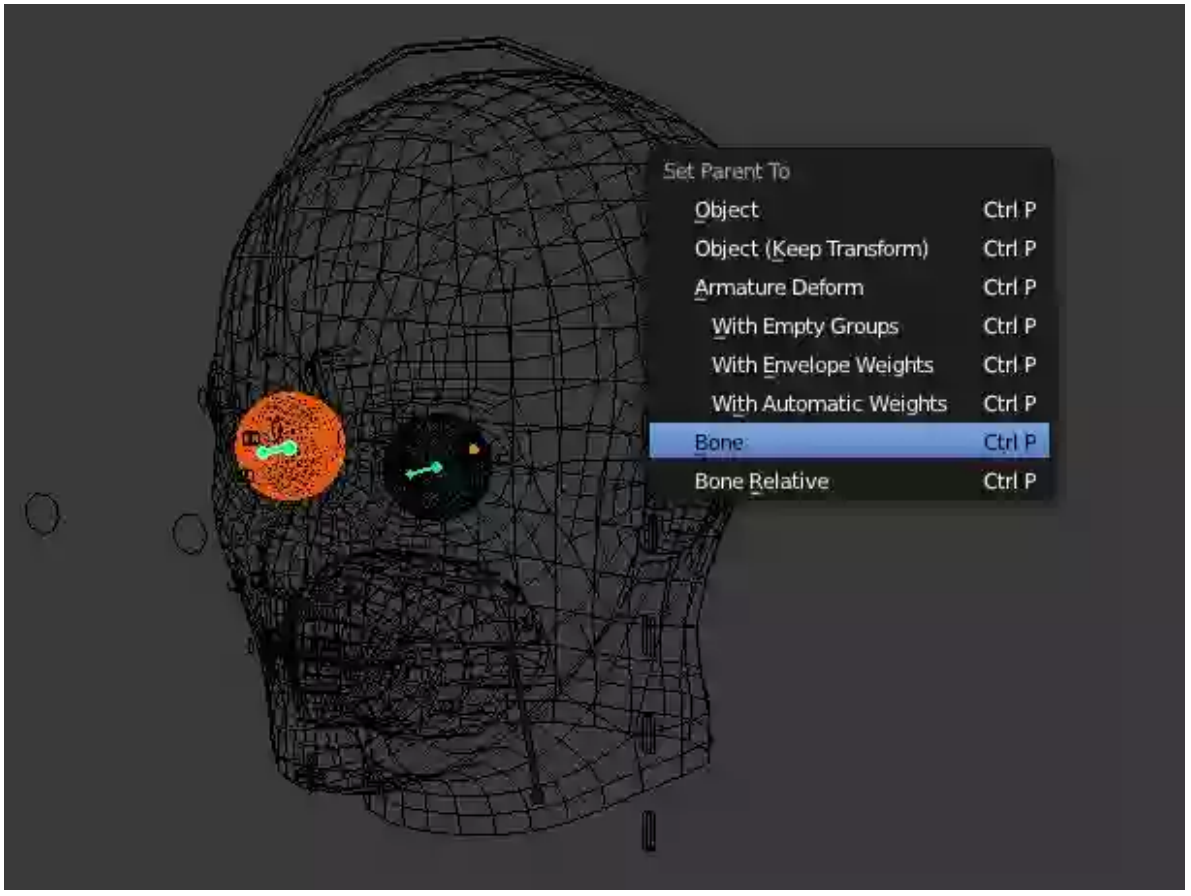


Step 6

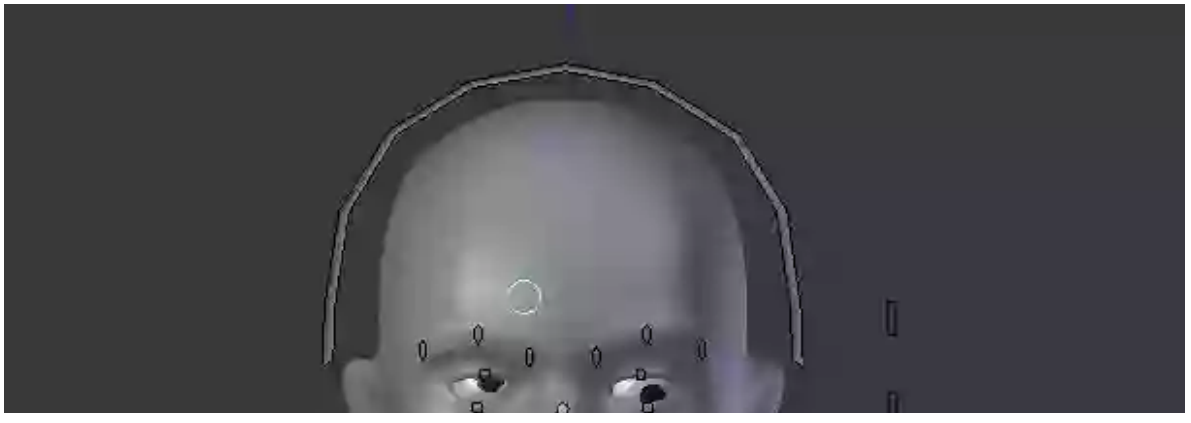
Select the left eyeball and then *hold* **Shift** to select the left eye bone (**eyebone.l**). The armature *must* be in the **Pose** mode. Press **Control-P** and select **Bone** to make the bone a parent. Now the eyeball is assigned to the bone.

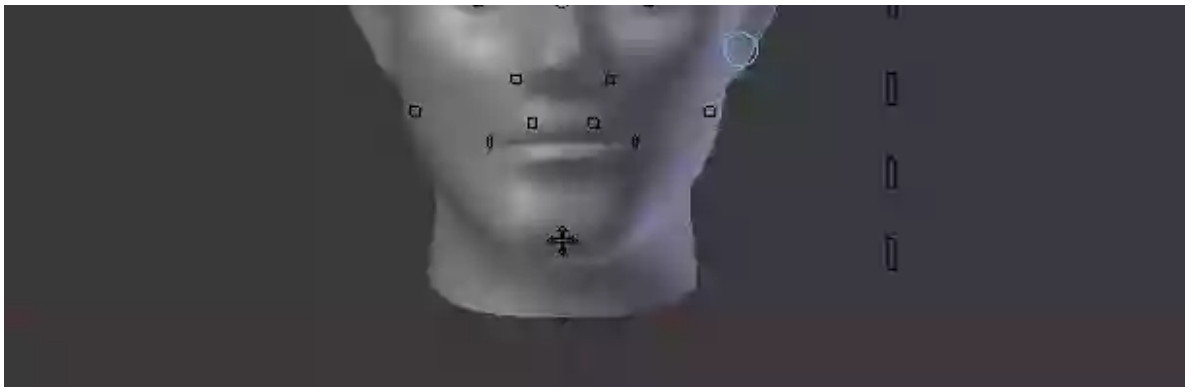


Similarly, parent the right eye bone to the right eyeball.



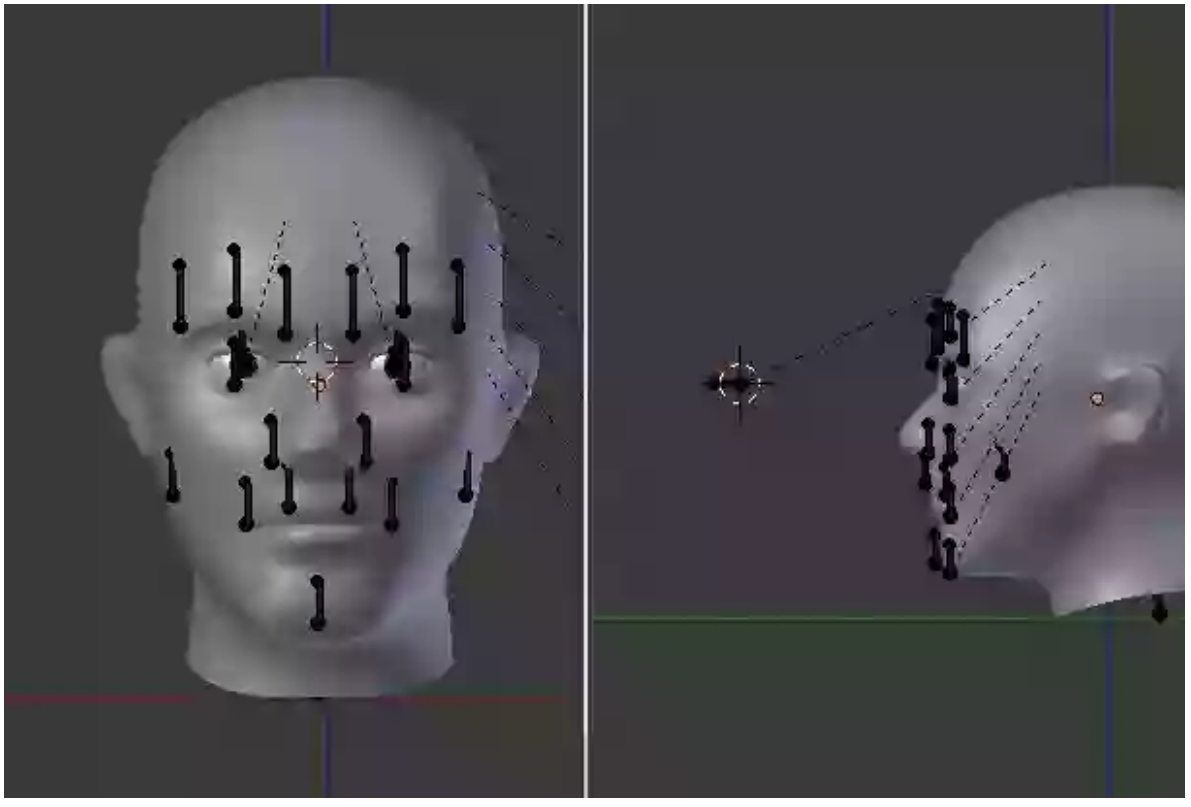
Now we can see that the eyeballs follow the tracking bones.



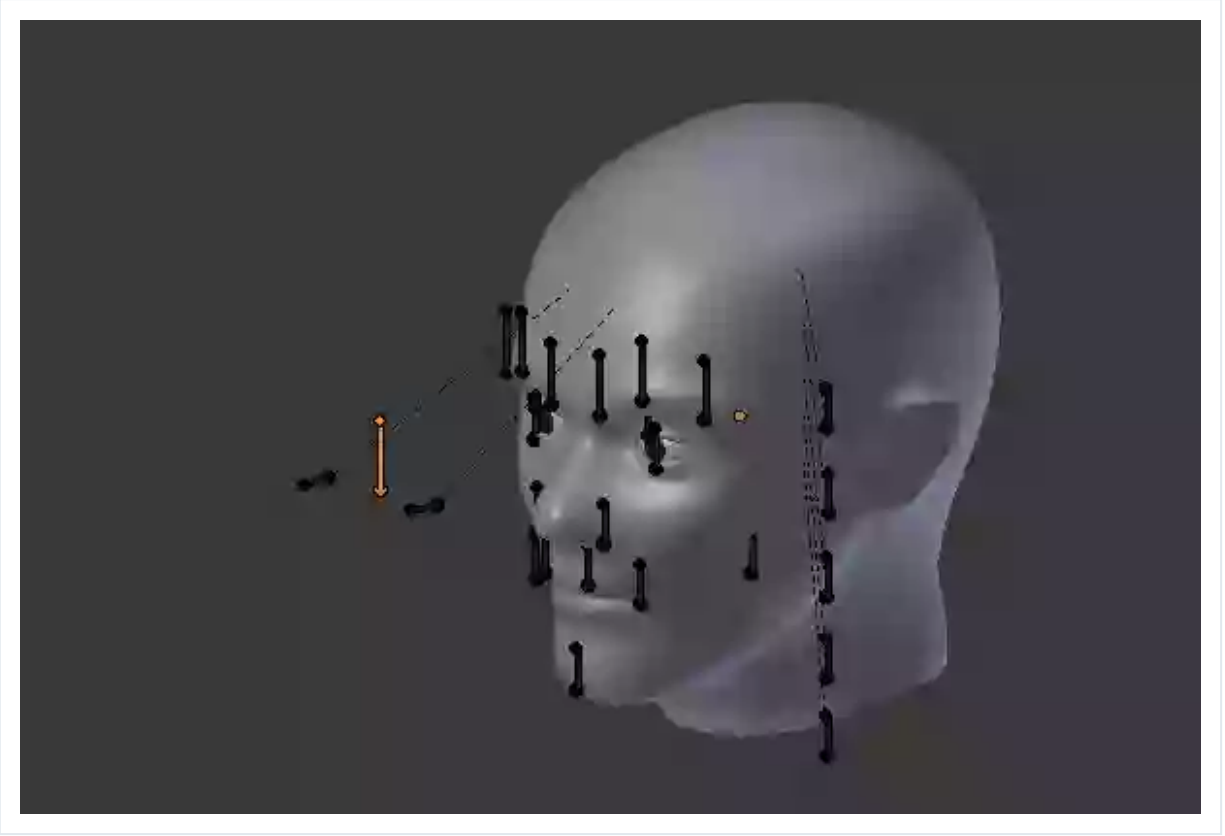


Step 7

Lets create one more parent bone which can govern both of the tracking bones, so that we only need to move one and the rest will follow. With the **Armature** selected, press **TAB** to enter **Edit** mode. Click at the center of **Armature** to move the 3D cursor to the center. In a side view click near the tracking bone.

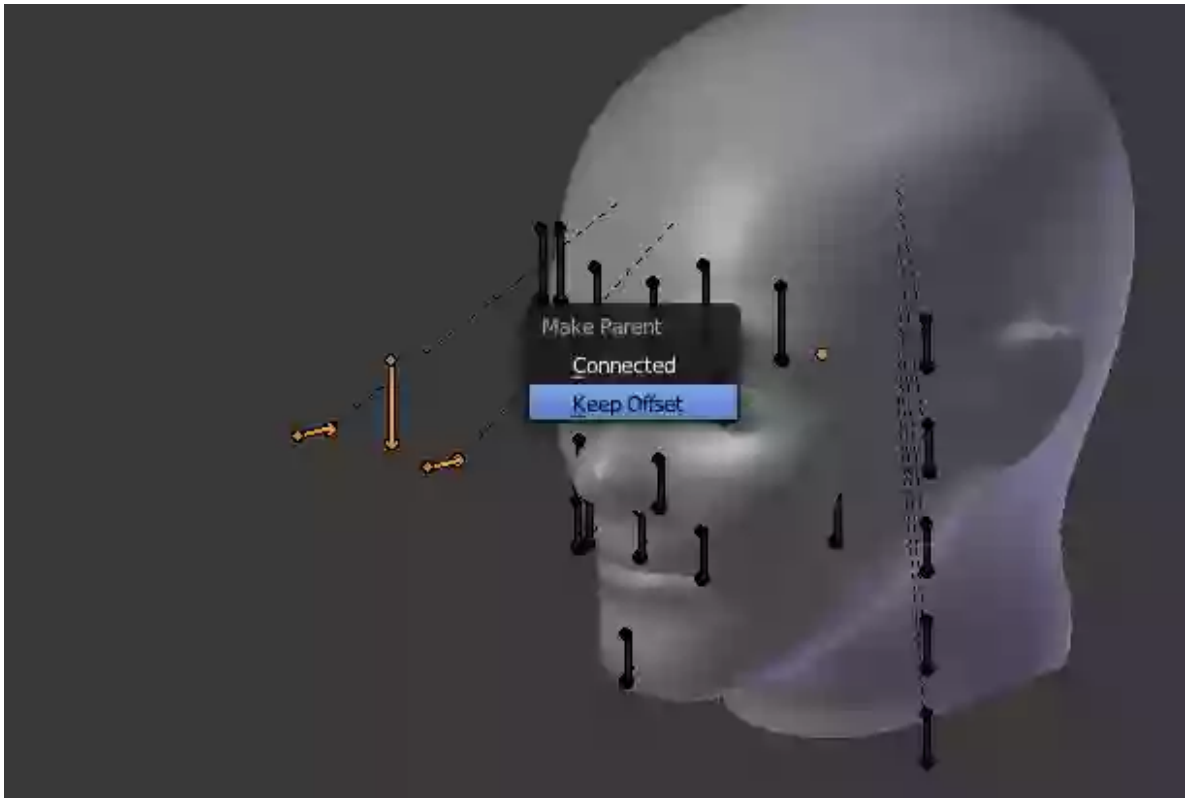


Press **Shift-A** to add a new bone. Make sure it's in the center of the tracking bones, and name it **eyecontrol.**

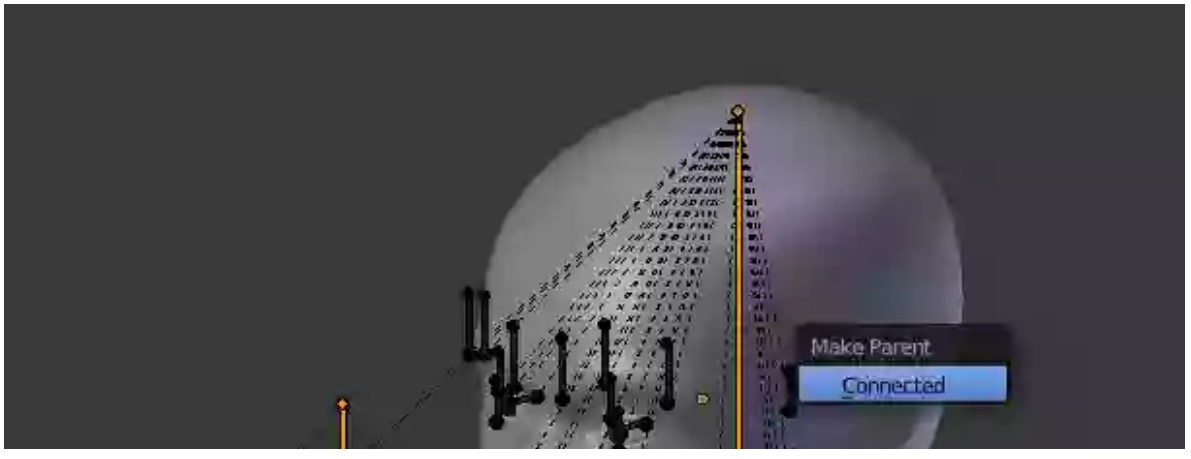


Step 8

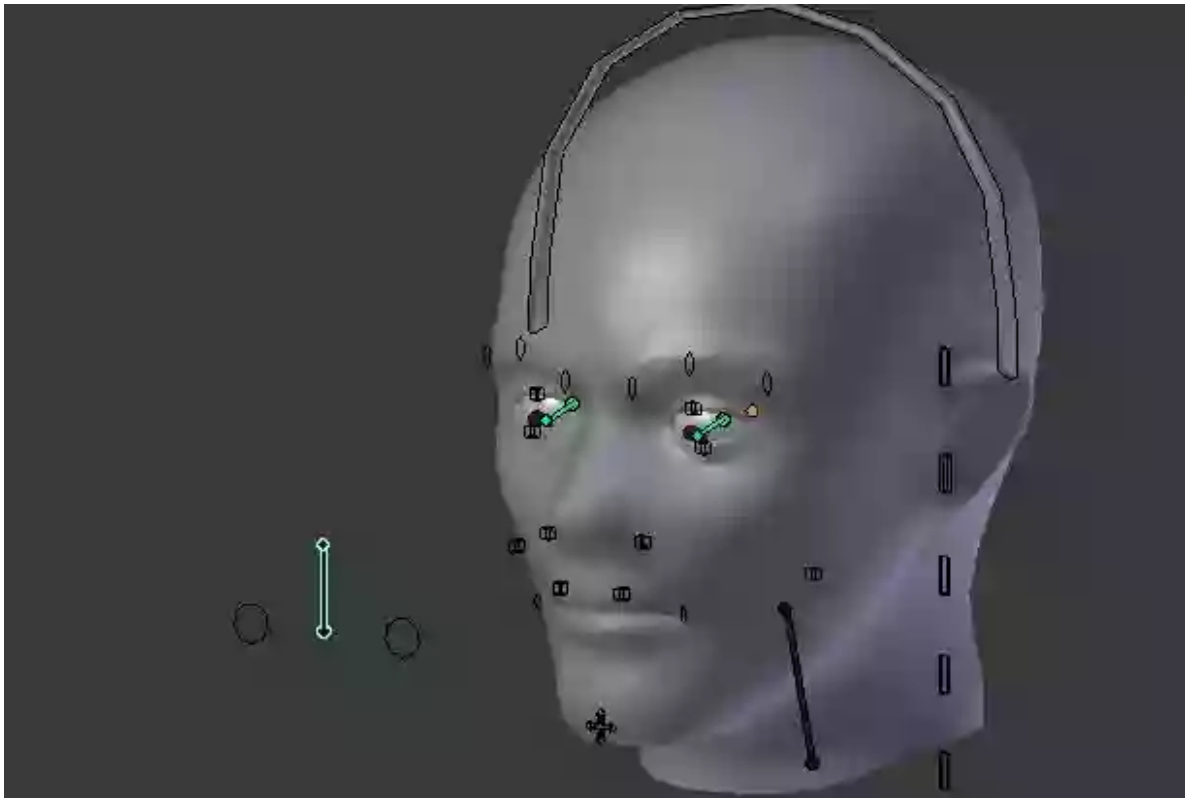
Select the two bones first and then select the new **eyecontrol** bone. Press **Control-P** to make it the parent bone, and select **keep Offset** to keep the current position.



Now select the **eyecontrol** bone and then select the **Head** bone.
Press **Control P** to make the head the parent. Select **Keep Offset.**

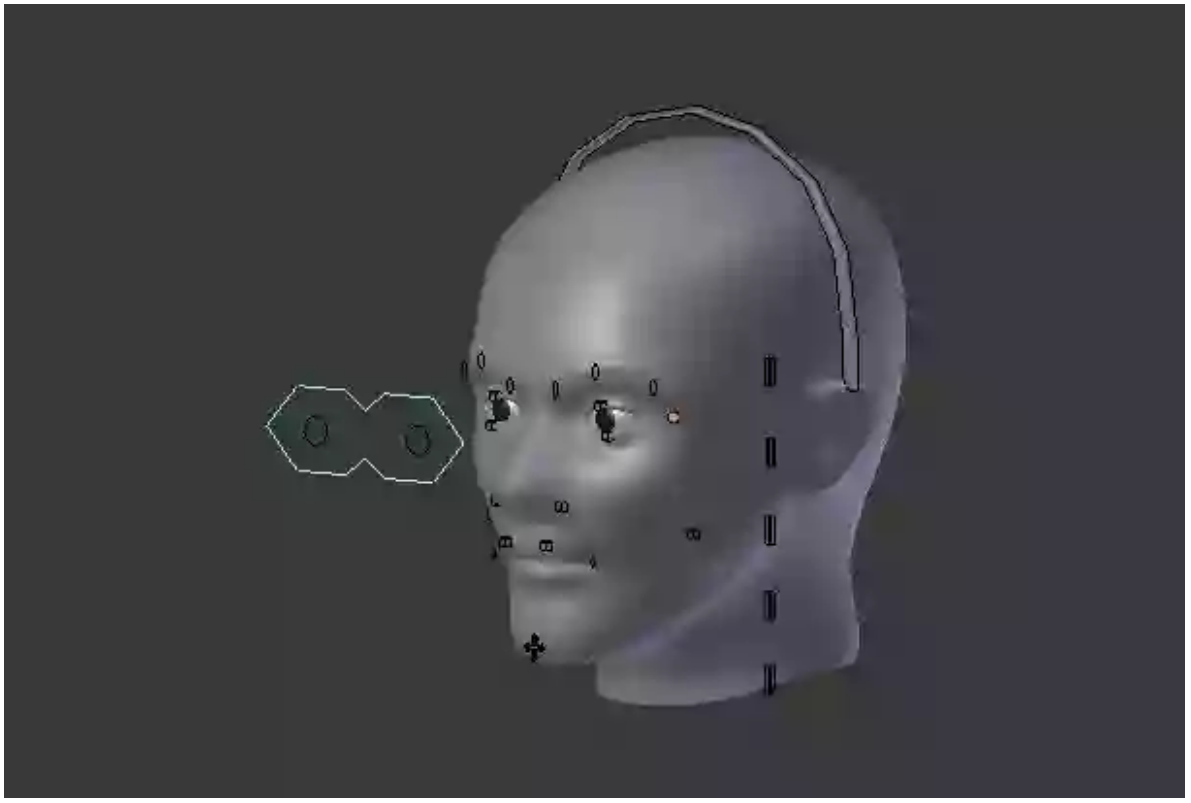


Press **Control-TAB** to enter into **Pose** mode. Now by moving only the **eyecontrol** bone we can move both eye track bones. And when you need to tweak the eyes individually, you can still move them using the individual eye track bones.



Step 9

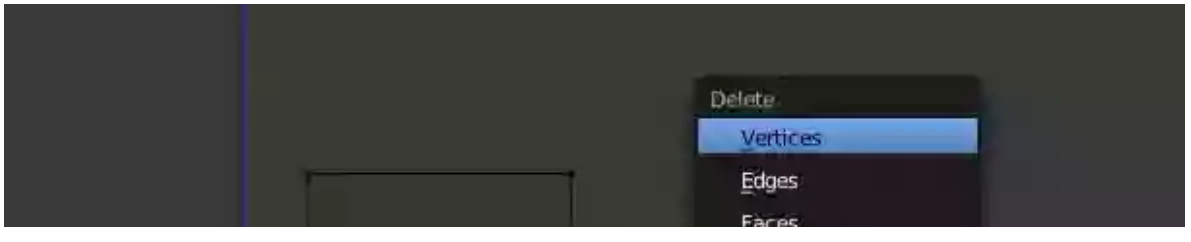
Create a new object and give the bone a custom shape.



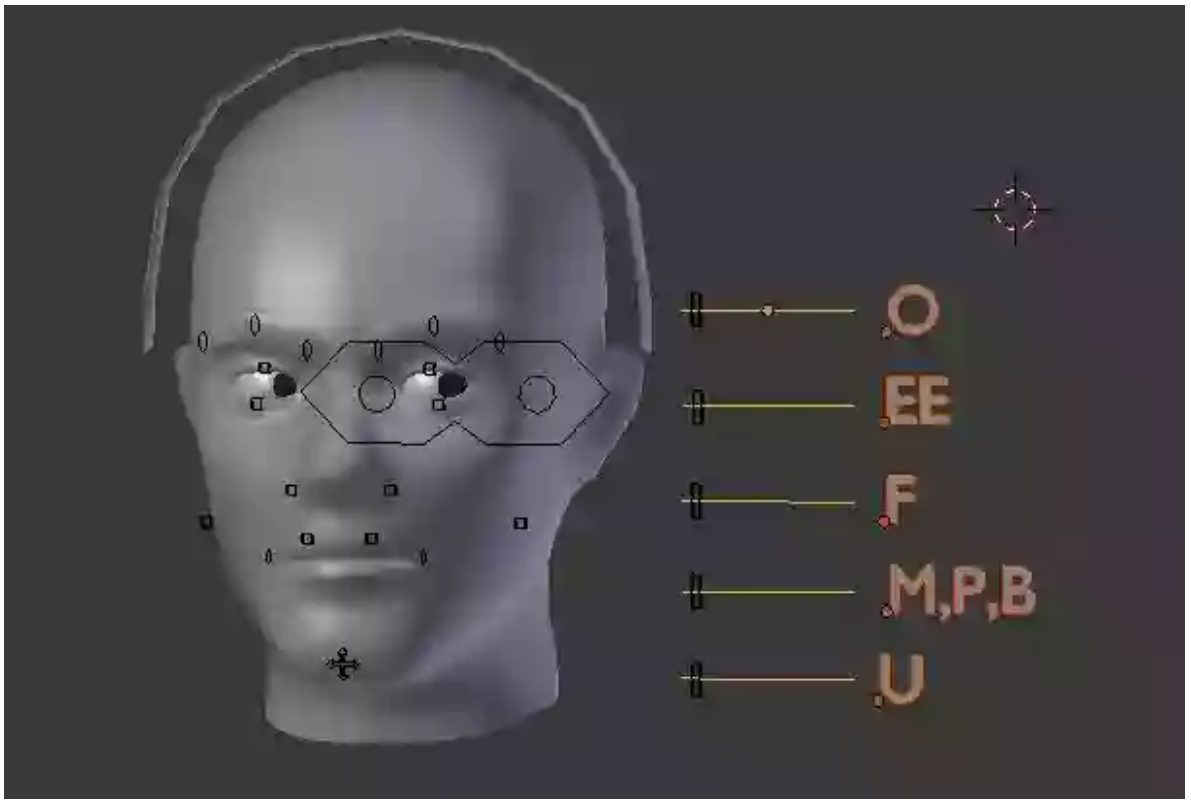
Enhancements

Step 1

Switch to **Object** mode and add a new **Plane**, then delete two of its vertices to make a line.

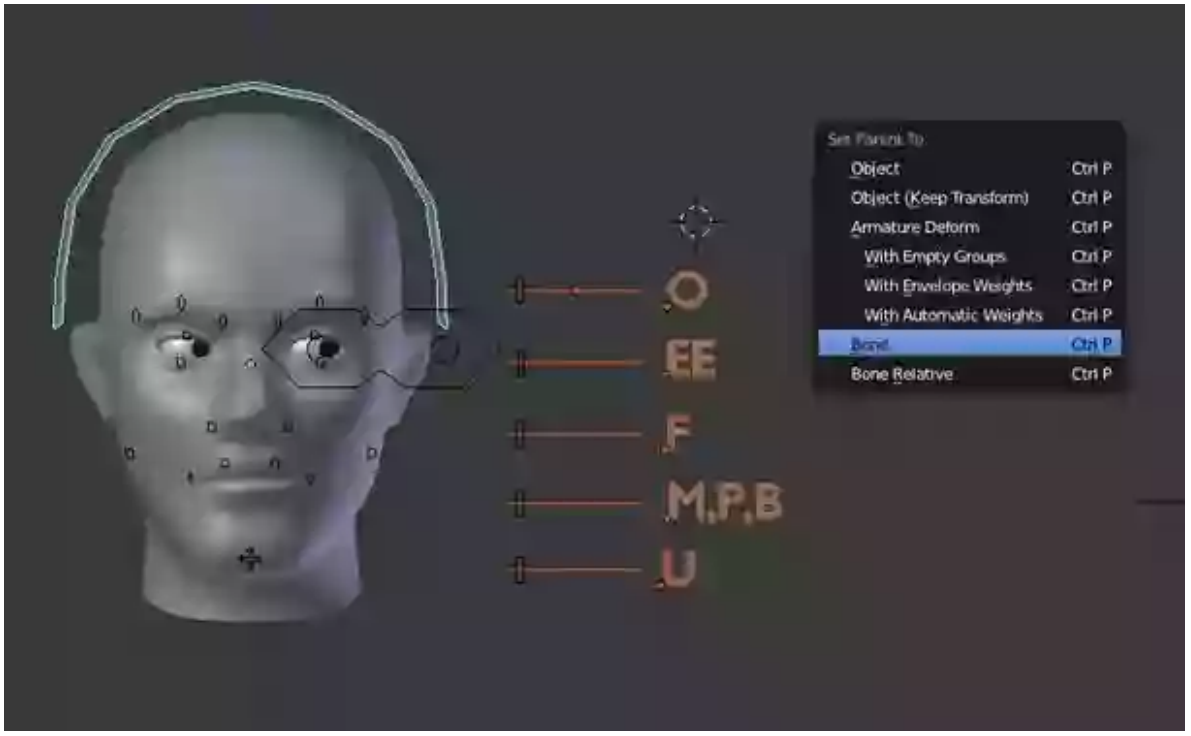


Place the object near the phonemes controllers (in **Object** mode) and duplicate the lines (in **Edit** mode) as shown in the next image. You can also add text beside each of them.



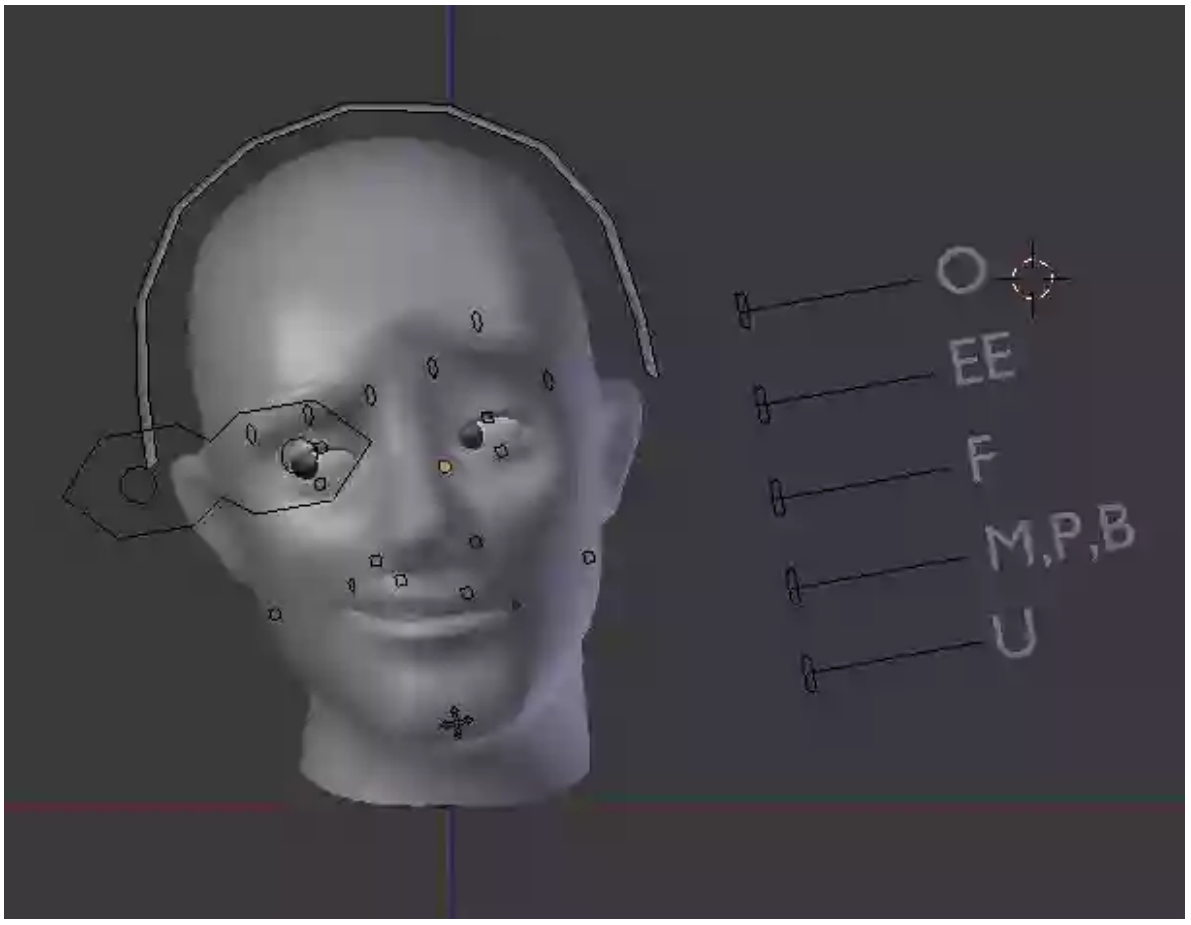
Step 2

Set the **Head** bone as their parent. Select the new object, the text objects and then the **Head** bone, press **Control-P** and select **Bone**.



Conclusion

Our basic face rig is now ready.



Karan Shah

Karan Shah is a 3D Artist and Animator from India. He is a BFA Graduate with specialization in sculpture. An inclination towards the digital medium made him a self taught computer artist. He is a currently freelancing..

Frankie
4 years ago

Is there anyway to apply automatic weights using this method so that I can add items to the face and they will also transform with the movement without having to create an individual shape key for the other item?

Reply

zouhair amin
4 years ago

Thank you very very much

Reply

Jay Brave
5 years ago

Thank you very much

Reply

Emilio
5 years ago

Thank you

Reply

Efreet
6 years ago

Thank you for this very detailed tutorial!

Reply

Greg P
6 years ago

I am just starting too get into Blender's rigging and animation, I am sure I will back many times to review this, there's a lot to learn!

Reply

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