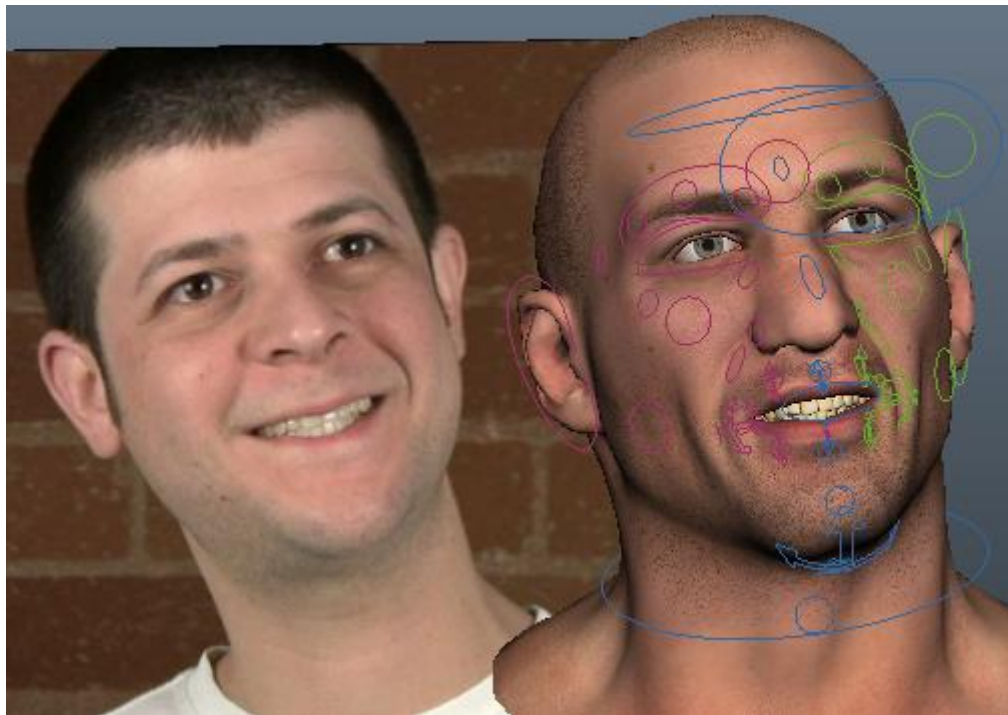


Best Practices In Facial Rigging For FACEWARE™

This document provides a basic outline of best practices for setting up a facial rig for Faceware. From a technical standpoint Faceware can work with any type of rig. Joints, blendshapes, and all custom deformers can be driven and animated by our software as long as they can be keyframed. However, from a creative and artistic standpoint the layout and setup of animation controllers can have a large impact on the quality of animation that can be produced with Faceware.

Building a strong facial rig for Faceware requires tackling two major issues. The first and most vital is making sure the rig can deform well enough to hit a large range of facial poses and shapes. In using Faceware the artist is tasked with mimicking an actor's facial expressions and emotion on the facial rig. If for example the actor makes a mouth shape or moves their eyebrows in a way that the facial rig is incapable of reproducing, than right off the bat the animation will be limited. Second to that, you must consider *how* the artist will pose those shapes. Is the rig easy to use? If they are trying to pose an "OO" mouth phoneme shape can they use a single attribute to turn it on or do they have to translate, rotate, and adjust many different controllers? We must first make sure the tools exist but also consider that the tools should be intuitive and easy to use. Time is always against an animator. No matter how much time they have it is never enough so we want to make their workflow as simple and streamlined as possible.

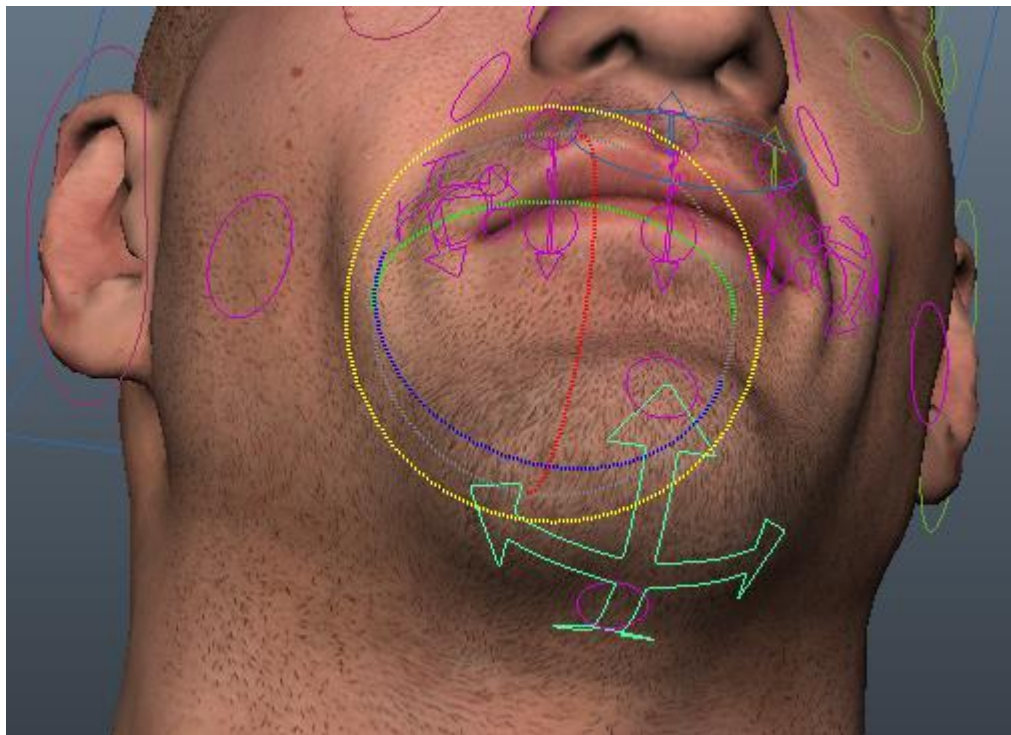


What A Facial Rig Should Be Able To Do - At Minimum

Here we'll look at a comprehensive list of what a facial rig needs at minimum. The way each studio approaches rig design will be different depending on style, technical limitations, software used, artist preference and many other factors. However, whichever way you setup your character there are some vital things it simply must be able to do.

- **Jaw**

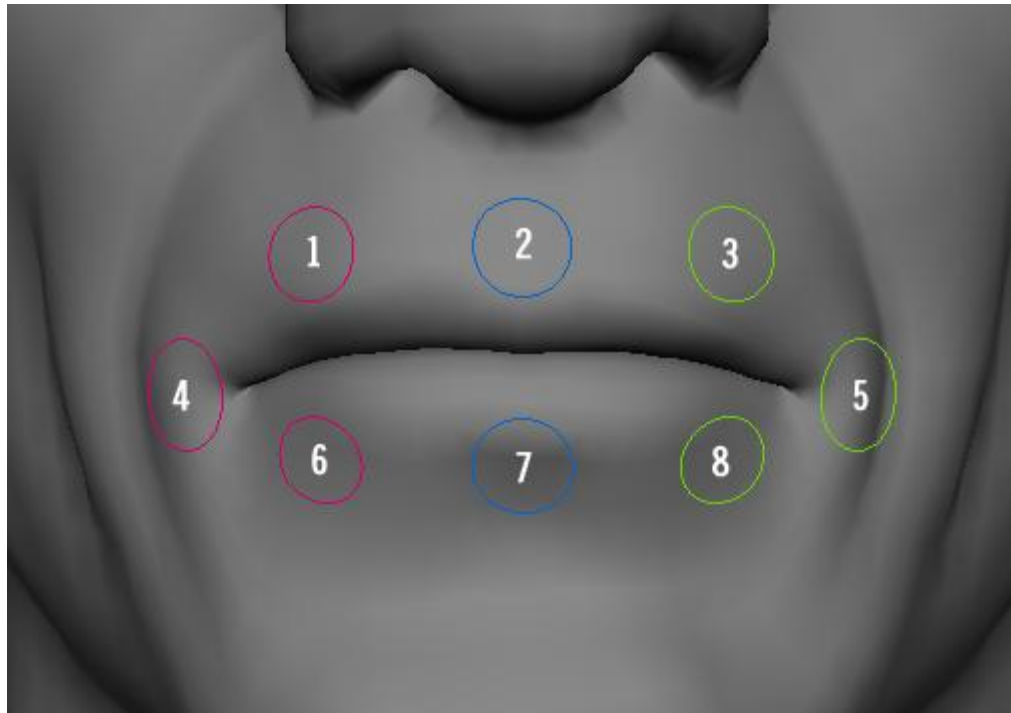
- The jaw controller is responsible for opening and closing the mouth. It is also responsible for moving the jaw bone (mandible) from left to right as well as forward and back.
- When the jaw controller rotates or “opens”, the mouth should open as it would on a human. The lower lip should follow the jaw completely and the mouth corners should split the difference between the upper and lower lips, forming a natural “mouth open” shape.
- If your technical specs will allow it, the jaw control should be able to rotate and translate in all three axis. This allows your animators to have a lot of freedom in creating complex mouth shapes. If you are restricted technically, at the very minimum it should rotate to open and close the mouth, and translate forward and back, as if creating an under-bite or an over-bite with the teeth.



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- **Mouth/Lips**

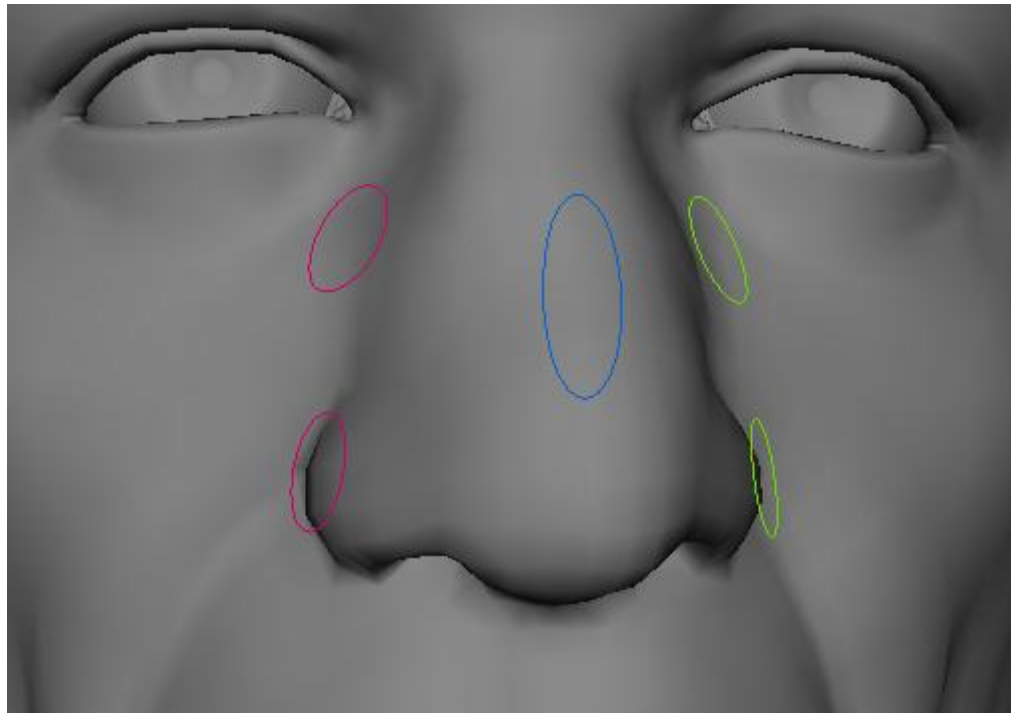
- The mouth and lips should have a minimum of *eight* controllers. One for each mouth corner, and three for each lip (left, right, and center). These controllers should move the entire “meat” of the lip and be skinned carefully to allow fine blending between them.
- Lip Rolling/Curling: It is imperative that the animators have the ability to “roll” the lips in or out. Think about how you roll your lips in when making an “M” sound or how you roll them out when pursing your lips as if to whistle.
- Maintaining Volume: The skinning around the mouth must be done carefully as to preserve volume when the lip controllers are being used. Preserving volume in the lips and face during animation is a great challenge. Proper skinning and joint placement (or sculpting if you’re using blendshapes) is the only way to enable the animators to maintain volume and produce believable facial animation.
- Moving the lips up and down: In using Faceware you need to be able to show and hide the teeth. Being able to move the lips up or down to do this is extremely important.



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- **Nose**

- Nostril flare: Make sure there is a way for the animators to “flare” the nostrils as well as “squeeze” them shut. Imagine when you have a stuffed up nose and you try to breathe in through your nose. It’s the opposite of a flare.
- Moving the nose up and down: If you look in the mirror and stretch your mouth downwards you’ll see how the sides of your nostrils and the tip of your nose move down slightly. Provide a way for the animators to do this. At minimum, allow them to move the nostrils up and down to fake it.
- The nose is all cartilage but occupies a large percentage of the surface area of the face. It cannot be left static or we risk having part of the face not moving and thus looking strange.



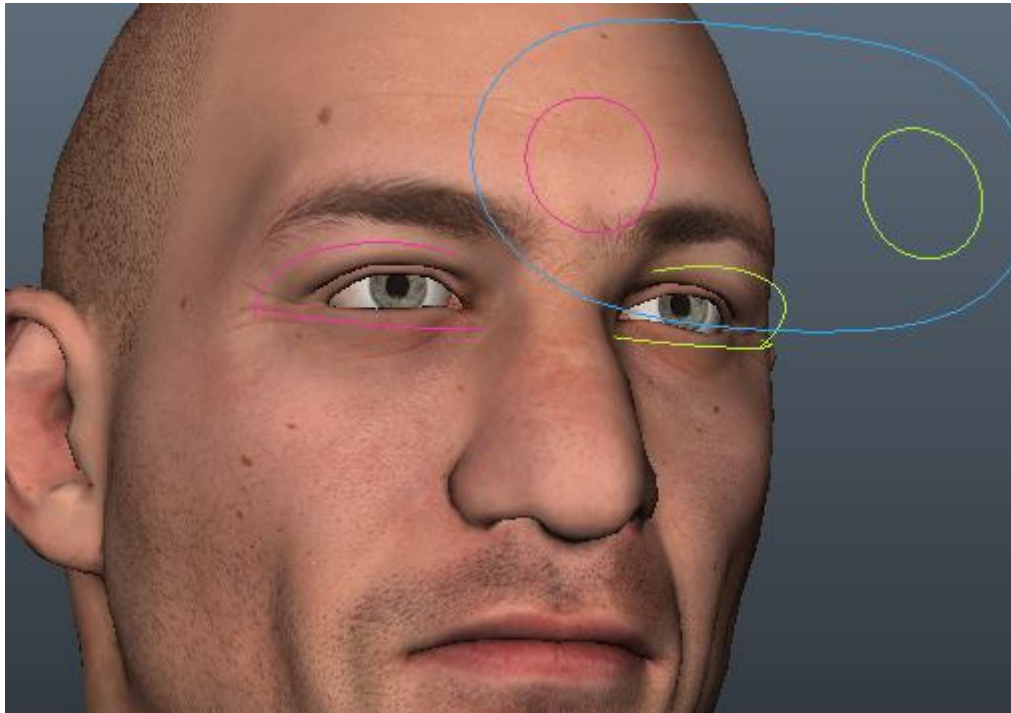
- **Tongue**

- There should always be tongue controllers. At the least it should be able to curl up to the roof of the mouth for “L” sounds as well as move left to right.
- Although the tongue is typically not animated with Faceware, the mouth shapes will at one point or another require tongue movement in order to animate lip sync correctly.

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- **Eyes**

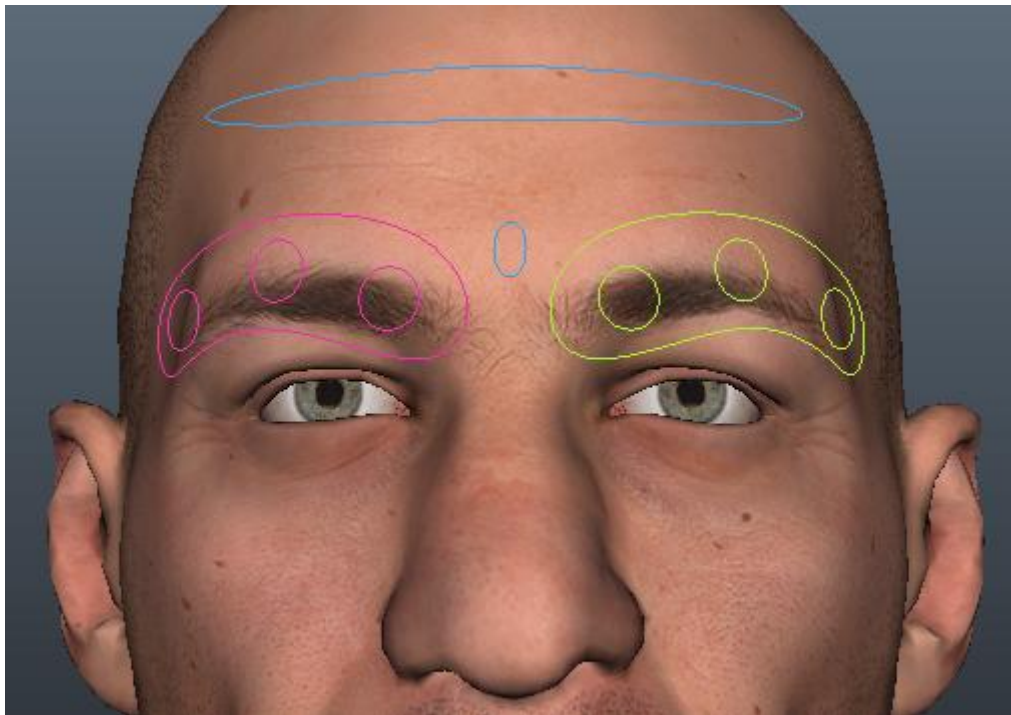
- Eye Direction: The animator should be able to control the direction of the eyes. If possible allow them a way to control each eye individually to allow for “to camera” eye poses. Ideally there is one controller that controls them both and an extra two individual eye controllers they can edit on top of that.
- “Soft Eyes”: The eyelids should dynamically follow the direction of the eyes. When we move our eyes, there is subtle movement in our eyelids as the eyeball moves underneath them. Your facial rig should include this.
- Blinks: Provide a “blink” attribute for the animators so they can quickly make a character blink.
- Eyelids: On top of a blink attribute the animators should be able to control each eyelid individually in order to make “squint” and other extremely important eye shapes. Emotion reads almost completely from the eyes and the upper face, remember to give the artists enough control in these areas to bring this out.
- Lower eyelids: Make sure the lower eyelid controls do not move the upper cheeks. In Faceware this is a difficult thing to work with and it’s important these things be separate.



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- **Eyebrows**

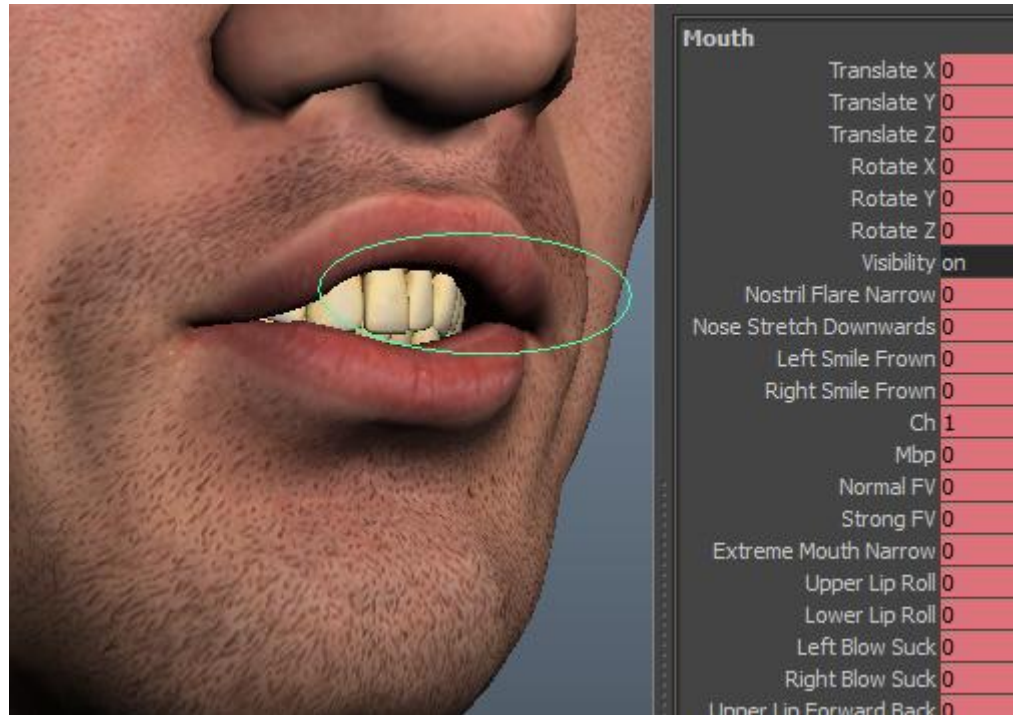
- There should be at least three controllers for each eyebrow. Outer, middle, and inner. This allows the animators to cover a wide variety of eyebrow shapes. This is especially important if the character's neutral eyebrow pose makes them look angry or upset. If the character looks mad by design and then there isn't enough eyebrow control, they will *a/ways* look mad, throughout every animation.
- Brow squeeze: Provide a way for the animators to squeeze/furrow the eyebrows. This can usually be done with the two inside brow controllers. Make sure they are skinned or sculpted so that the furrow pose looks nice.
- Emotion comes from the upper face, it is imperative the animators have control in this area.



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- **'OO' Shape and Other Phonemes**

- Providing pre-posed phonemes within the facial rig can save an immense amount of time in animation. The 'OO' pose in particular requires the use all 8 mouth controllers on top of some of the cheeks, nose, and chin. This takes time to pose and manipulate and can be a frustrating task. Providing a pre-made pose in the rig allows the animators to work faster and produce better results.



- **Cheeks**

- The cheeks should be able to move up and down. Preferably this is broken down into two sections, upper and lower cheeks. Upper cheeks are the area surrounding the cheek bones and below the eyes. Lower cheeks are the more fleshy area to the sides of the mouth and nose.
- The cheeks are the part of the face where it becomes easiest to see "disconnect". Often in facial animation you see the cheeks moving almost as if they are some sort of lone, fleshy object moving separately from the rest of the face. On one hand we want to prevent this, but we also need to give the animators the control they need to move them properly. It is better to have them moving and feel a bit disconnected than for them to be stuck and look static.
- Nasolabial folds should move with the cheeks/mouth. If they don't have their own controllers than they should be skinned/sculpted so that they do not remain static when the rest of the face is moving.

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Making A Facial Rig Easy To Use

As with any animation tool or application we should aim to provide the artists who will be using the character rig with an easy to use and intuitive setup. Small things we do in the rig setup process that may at times seem insignificant to the rigger can, in production, save countless hours as well as keep your animators happy. Happy animators will always animate better. Proven fact! Here is a list of some simple things every facial rig should do:

- If controllers exist in the scene (as opposed to sliders) they should always be color-coded and easily identifiable. We suggest that three different colors be used for “left”, “right” and “center” controllers.
- Controllers should be easy to select. Try to place them in the scene so that they are not obscured by the facial mesh or any other props or objects. If they must be partially inside the mesh, considering locking or “freezing” the mesh so it does not block controller selection. Make sure the artists have easy access.
- Non-keyable attributes should be hidden. This will prevent keyframe clutter as well as make the animator a little more comfortable that they are only keying things they know they should be. It also might save your technical artist from mid-production needing to transfer animation from a broken rig to a new fresh scene.
- Intuitive GUI Design - Shape your curve controllers in a way that shows the artist what they are meant to do. For example, if a controller moves in only one direction, use an arrow to show them which way it is suppose to move. Do not just make every controller shape on the face a circle or a square. Give the shapes significance.
- Controller names should be descriptive and clear. Don’t make the animator guess what it does. For example, a technical name like “MKL_bip01_head_l_side_nostril” is confusing. Try a more artist-friendly name like, “L_nostril_ctrl” or “Left_Nostril_Control”. If name-changes will break your export process, consider writing a script to rename the controllers before export.
- If possible, hide all of the objects in the scene that don’t pertain to facial animation. This includes but is not limited to the body mesh, rig, props, extra controllers they won’t be using, environment, lights, cameras, etc. Keep the scene clean so they can focus on what they do best: animate.
- Setup facial cameras so the animator has easy access to see both the facial mesh, and the interface if it is off to the side. Lock the cameras to the face so that if body animation is applied they can still focus on the face.



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