LipService 5.0 Documentation

by Joe Alter

FORWARD

As popularized by Pixologic's ZBrush and Autodesk's Mudbox, 3D sculpting in CG has undergone something of a renaissance in the last 5 years that has caused a sea change in the industry.

I routinely see models sculpted by individual users at home with these tools that rival and even surpass anything I see coming out of titans like ILM, Weta, and Pixar. I even see animations comparable with the same (thanks to tools like Maya).

What I don't see happening is highly detailed models getting moved around by these individuals or small studios in any credible kind of way. I don't think the problem is that sculptors can't animate, sculptors have been animating way before CG, nor do I think that Pixar has a monopoly on talent - I think there is a disconnect at the tools level that just doesn't make it practical for an individual.

LipService is a suite of tools rolled up in a Maya node designed to help you sculpt, rig and animate high resolution subdivision surface characters inside Maya without ever having to leave the animation context. Though there are some aspects (particularly sculpting) that have a lot in common with ZBrush and Mudbox, they are very different animals in terms of implementation and aspirational goals.

Even if you wish to continue sculpting in ZBrush or Mudbox, you'll find loads of utility in this software when it comes to rigging, moving and targeting your creations.

LipService has been around for a long time (since 1994) in various incarnations and platforms, it was an easy port because it was not integrated and I generally just hooked it up to whatever package I was working with at the time. This will be our first commercial Maya release, however we've been working on it exclusively in Maya since about 2005. Why so long? It's an enormous amount of code, and we've wanted to 'see what it wants to be' without encumbering it with all kinds of commercial concerns.

We hope you enjoy it, it's truly a labor of love.

Regards,

Joe Alter

CREDITS

Joe Alter - Product Lead
Vladimir Dubovoy - Sr Developer
Scott Wells - graphic design (icons/samples)
Mike McCarthy - Additional docs contributions

Additional samples by Sudhir Verma

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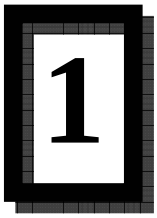


Installation and set up.

HOW TO INSTALL LICENSING

LipService requires a license to run.

We use Reprise Software's RLM for a license manager.

To install a NODELOCK, you do not need to install the license manager. Just load our plugin and send us the 5 line error you get in the script editor when you try to load it. Make sure that you send it IN REPLY to your paypal receipt, or mention that it's for a temp key.

To install a floating license, you do need to install RLM. To do this, download and run our installers (as root/admin). If you go to the RLM folder*, there should be a script in there called 'hostid_rlm.bat' (or csh). Open up a shell and run it.

This will generate a file called 'hostid.txt'. Send me that file, IN-REPLY-TO your paypal reciept and I'll issue you a key. If you've already got RLM installed and are just adding licenses, you just need to send me your current 'joealter.lic' file in reply to paypal.

* on windows it's c:\rlm, on OSX it's /Users/Shared/rlm, on Linux it's '/usr/local/rlm'

2 User Guide

Important Notes

LipService is an advanced suite of tools for sculpting, painting, rigging, and animating medium-high resolution subdivision surface characters.

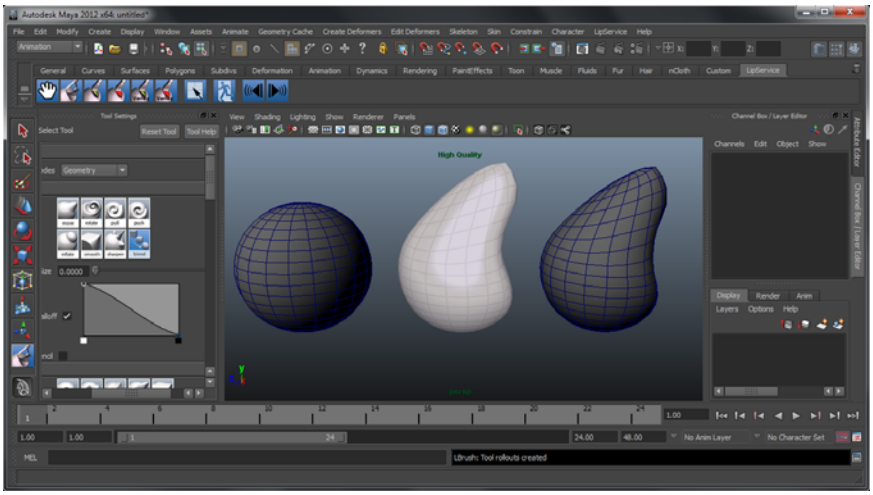
It assumes you've already created the "level 0" model and are basically happy with its topology and shape, uv coordinates, have set up basic skin weighting, etc. It's not a modeling tool, you cannot create new elements with it or delete elements, though you can subdivide the surface and paint more detail.

At any point, you can export any level of the subdivision mesh and/or bake out a displacement map for the upper levels of detail (if you'd like to work without LipService's subdivision surfaces). You will however lose your animation.

All of LipService's functionality is encapsulated in the 'LBrush' plugin and accompanying scripts.

LipService has a number of mel commands exposed. To list them, go to Maya's plugin manager and hit the little 'i' icon next to the plugin.

If you would like to totally wipe LipService from a scene, go to the pulldown menu, LipService->purge all.



Lipservice will bake out whatever sculpting you've done on top of the geometry as a maya tweak.

Some notes on performance

Different video cards have different strengths and weaknesses. The default settings for LipService's display options and LipService preferences are really tailored to the lowest common denominator. So, the first thing you might want to try is to enable a few things.

1. LipService->preferences->damage boxes
This option defaults off, that doesn't mean I think it *should* be off. What this setting does does is only update/redraw the active screen region you're working in rather than the whole viewport. This makes really high polycounts manageable in real time, however the Intel HD line of video accelerators (in particular) is very very very slow at buffer copies due to bottlenecks that don't exist for real GPU cards. You'll find this kind of "gpu" in lots of mobile machines because it's not a separate chip, it's built into the mobile Intel procs. So, if you turn this option ON, and it slows down to a crawl, turn it OFF, otherwise ON is really what you want, it will make big things move fast.

2. LipService->preferences->fallback res
This option sets a threshold resolution (in polygons) that your card can handle reasonably fast. The display will fall back to whichever subdiv level approximates this number while you are interacting (and then redraws full res after). The default is set pretty low, you will want to experiment to find a level that suits your card. A good way to do this is create a default sphere, divide it down to a million or so polygons (in LS) and sculpt - play with this number and keep sculpting. If you're not using our subdivs, this setting will not mean anything.

3. Display Options -
we have a bunch of display options for things like SSAO (screen space ambient occlusion), shadows, etc - you want to play with these to find out what's comfortable for your hardware. Poly count doesn't really matter for these but if you have heavy geom, and loads of options on, maybe it'll get slow. These are not dependant on viewport 2.0, so you can use them in any version of maya.

4. Low-res/med res/high res -
We built this tool to thrive in a multires environment. If your base mesh has a million polygons, it will not be able to take advantage of things like a fallback resolution - which will make interaction way faster. I recommend that you keep the base mesh reasonable and add detail through our subdivisions. I don't recommend that you go all the way down to the pores (add those with a displacement map for rendering), but skin wrinkles and folds of fat are definitely within your reach. You can animate them now.

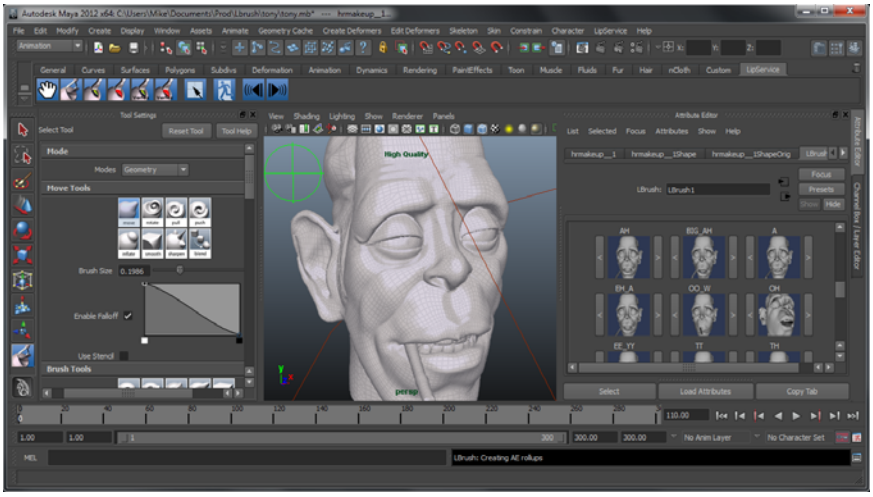
5. Why is applying additional subdivision levels slow?
Because we're dividing more than a base model/UV's - we're dividing all targets.

Tangent Space vs Object Space

Even though we technically perform everything post-rig, you can think of tangent space as 'pre-rig' space and object space as 'post-rig' space. In object space, if you pull a muscle out on the arm, it's shape will not track with the arm, it will always try and pull it in the same direction. If you do it in tangent space, it will track.

All our sculpting happens in world space, post rig. We convert those delta values back to whatever format you're saving your targets in when a cell is stored, so you really don't have to think about space much at all when you're sculpting.

Tangent space requires a set of UVs.



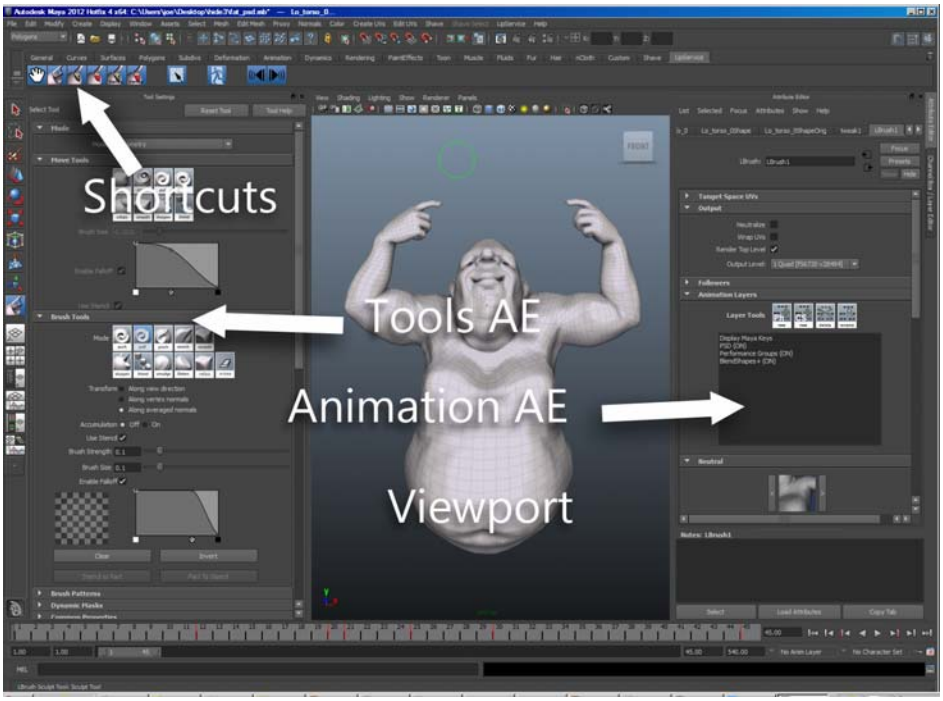
Hotkeys

CTRL+LMB - inverts push/pull tools (except when you're painting with the *clone* tool)
SHIFT+LMB - sets the current tool to 'smooth'
B - resize brush

worth mentioning, we read stylus pressure (unless you turn that off in prefs)

Navigating the UI

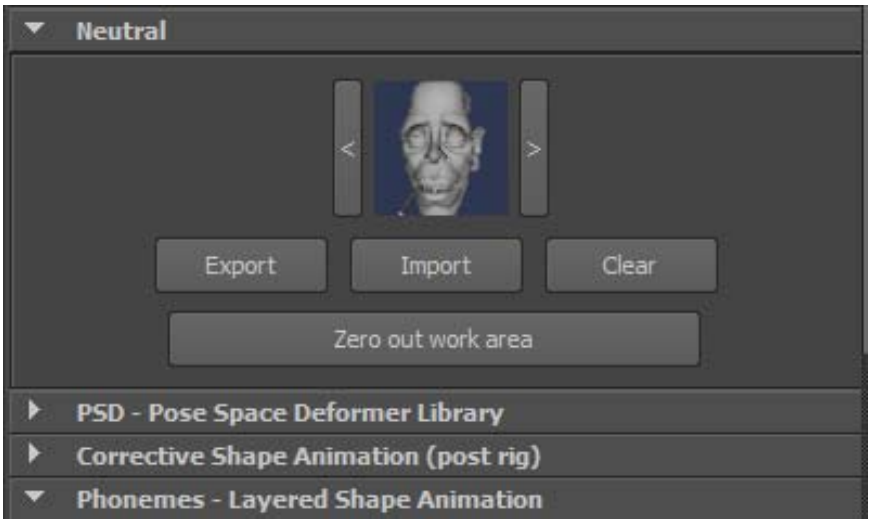
LipService's UI structure includes some shortcuts on the shelf, a tools editor, an animation AE and a viewport.



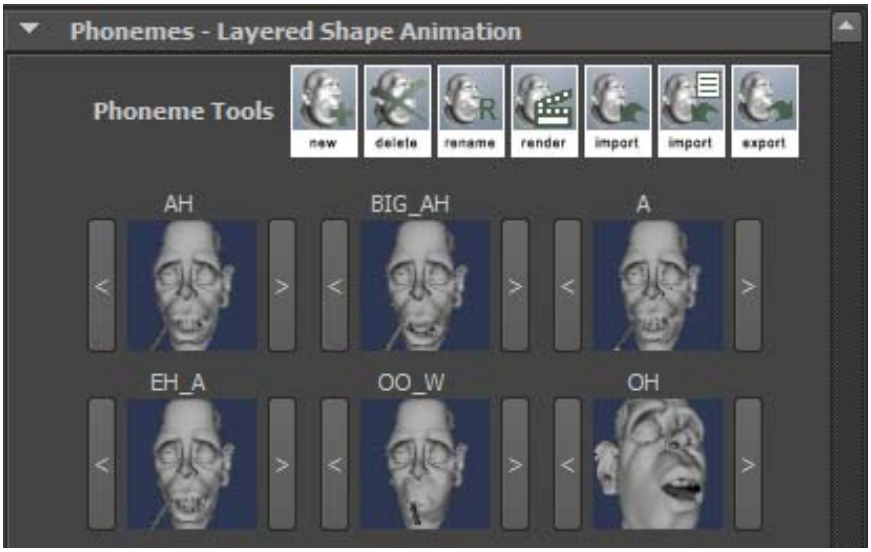
Our viewport is actually Maya's viewport, however you will see a different draw style when our viewport is active.

For sculpting, painting, etc - you'll find all that stuff on the UI column to the left of the viewport (when it's been activated for a particular node) - this is called the ToolsAE - to the right you'll see all the controls that relate to animation and tesselation to Maya.

Within the AnimationAE rollouts, you'll see little squares with left and right arrows on them - we call these 'cells'. The left arrow is for taking the contents of the cell and bringing it to the viewport, the right arrow puts the viewport content into the cell (LipService will create a little image of the content using whatever view you had when you stored it).



When you activate the tools the first time, a 'neutral' target is created for you - you'll see it in the 'neutral' rollout on the Animation AE.

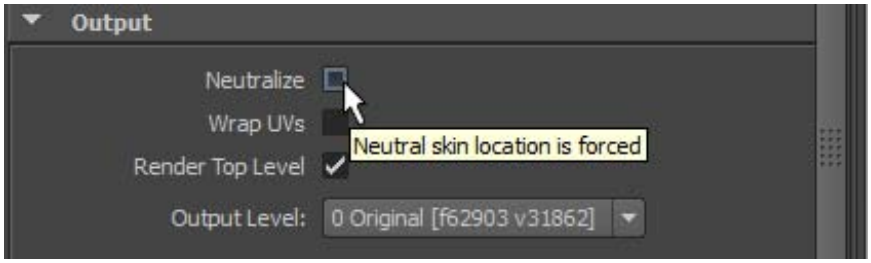


Any time you see something that's surrounded by two buttons '<' and '>' that means that it's a 'cell' - it is where a target is stored. The '<' will pop the shape into the viewport and the '>' will put the viewport contents into the cell.

Initially, neutral's just your Maya geometry, but you can add sculpted features to it. It is your base shape - all of the subsequent cells are all viewed as 'delta's from that neutral shape. Our targets compress on that basis, if a new target mostly the same as the neutral, it will occupy very little space in memory. Infact, if you make a change to neutral you can apply it to all the other cells.

The shortcuts you'll find on the shelf are really just a way to get you in and out of the tool in the modes you want. You'll notice that when you hover the cursor over the shortcuts, in the lower left hand corner of the screen, you'll see some descriptive text - this is true of all of our icons.

A really useful thing in the output rollout in the animation AE is the 'neutralize' checkbox, this uses tangent space to transform all the animation that's happening in lipservice to what it would look like if it were applied to a pre-rig neutral pose. Useful for debugging animation. You can also modify your targets in this space, useful for smoothing over and untangling problems hidden inside geometry when it's in the posed position, ie- inside the elbow on a clenched arm



You'll notice the 'output level' at the bottom, a level of 0 will send the geometry back into the Maya workspace (when you view and scrub animation) at the same resolution it came it. You can also send it in at a higher resolution, this resolution does not affect the render resolution unless you turn off the 'render top level' override. This is also the resolution that any subsequent plugins you apply will see.

Getting Started

Sculpting/activation

A LipService node only operates on one geometry - so whever practical, you want to 'combine' geometries (like teeth, tongue, etc) into one model before you start. We can, however sculpt and animate on multiple nodes, it's not as intuitive, but will work (however painting and stencils are not supported in multi-node mode)

To get into sculpt mode for the first time, you want to select your polygonal object, and single click one of the ‘sculpt’ or ‘move’ icons on the LipService shelf. The shelf contains shortcuts you will frequently use for getting in and out of LipService's interactive work area.

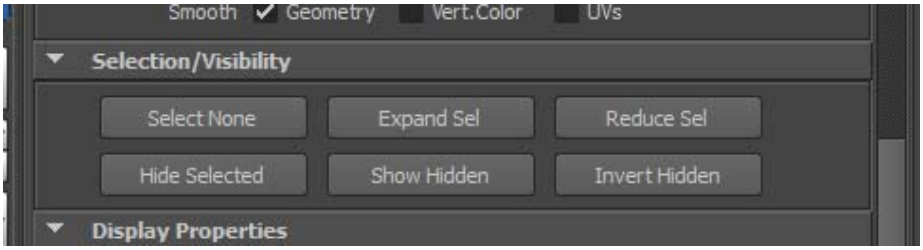
A LipService node will be applied to your model and take you into sculpting mode (pictured below).

Returning to sculpt mode from maya is the same (single click the shelf icon).

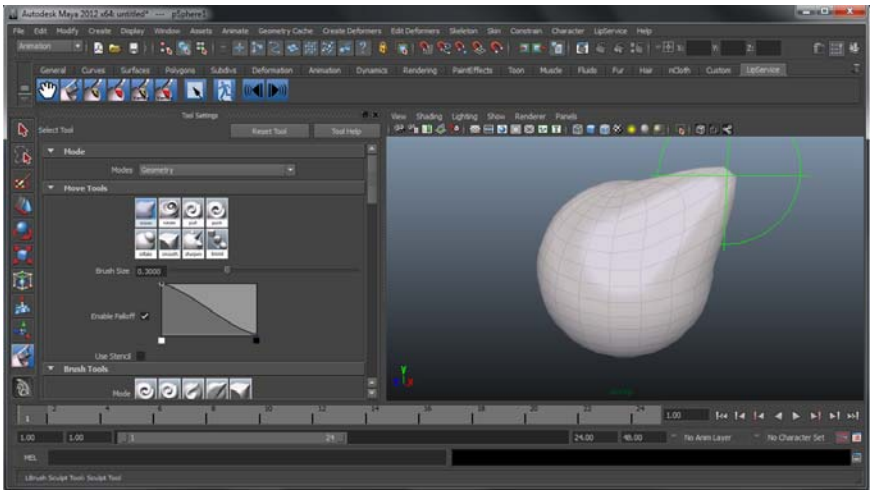
To Exit sculpt mode just hit the ‘exit’ icon on the shelf.

Inside the tools editor, you will find all the sculpt tools you need in various rollouts and our gl drawing will take over in the main view, you can set various aspects of that display in our ‘display’ rollout. At this point you can just begin sculpting. Point the cursor at a piece of geometry and mouse down and drag.

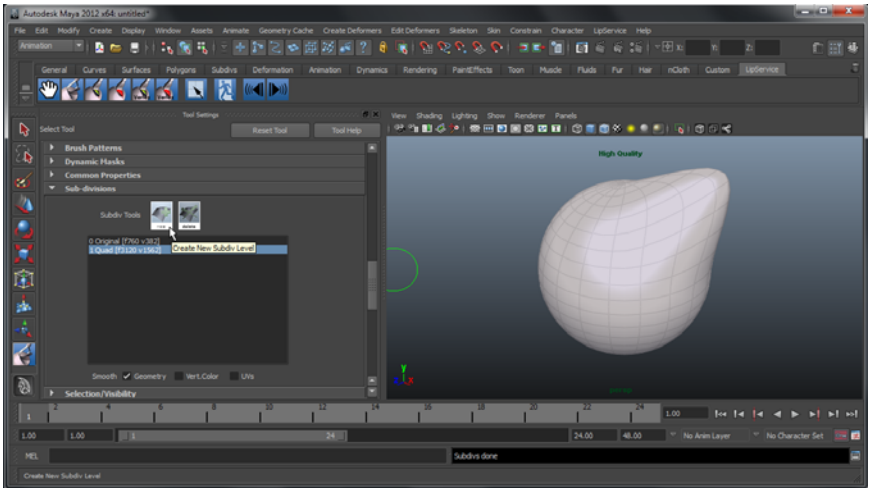
LS pays attention to your poly selections in maya. We provide a shortcut for exiting sculpt with maya ready to pick polygon selections - this is the one with the arrow and the crosshair square. Sculpting will be restricted to your selections.



Unlike Maya's viewer, we can show/hide selected polygons - this is very handy getting stuff out of your way (maya only shows/hides objects)



To subdivide open up the ‘subdivision’ rollout and ‘add’ a level. Selecting any of the levels will switch you to working on that particular level of the geometry. It’s not strictly a rule, but in generally you want to work your way up to higher levels, refining shape as you go.

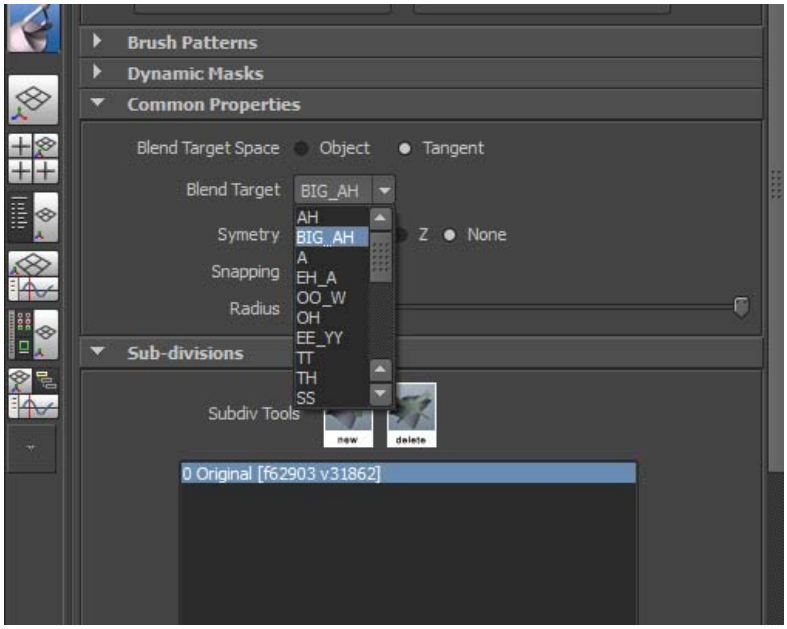


The viewport work area is a temporary scratch pad. If you want to save your changes for use when animating, you need to ‘put’ into a cell (which we will discuss later).

The ‘move tools’ rollout is for ‘drag’ types of sculpting operations. In all cases, you pick the area (clicking on the model) and drag the mouse to the right or left while LMB is depressed. This will convey the magnitude of the operation. When LMB is released - the change is done.

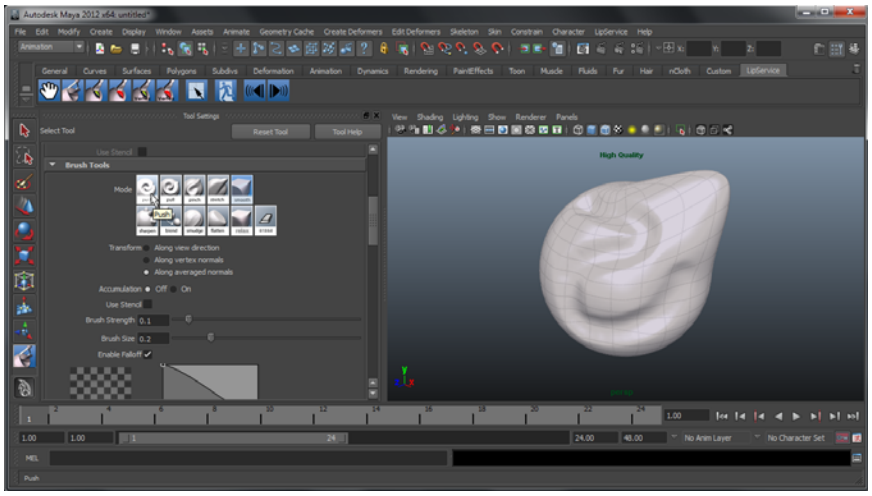
The ‘brush tools’ rollout is for click-draw types of operations where you basically want to rub some kind of change into the model using one of the brush tools. 'push' for example will push geometry away from the camera, 'pull' does the opposite.

You'll also find a few other options there like, 'along smoothed normals' which instead of going towards/away from the camera, will travel along the surface normal.



There's also a rollout called 'common properties' - these are some settings that apply to both the sculpt and move tools (to avoid redundant UI). You can do things like mirroring, changing the space you're sculpting in, changing a source target to pull from for the blend brush, etc.

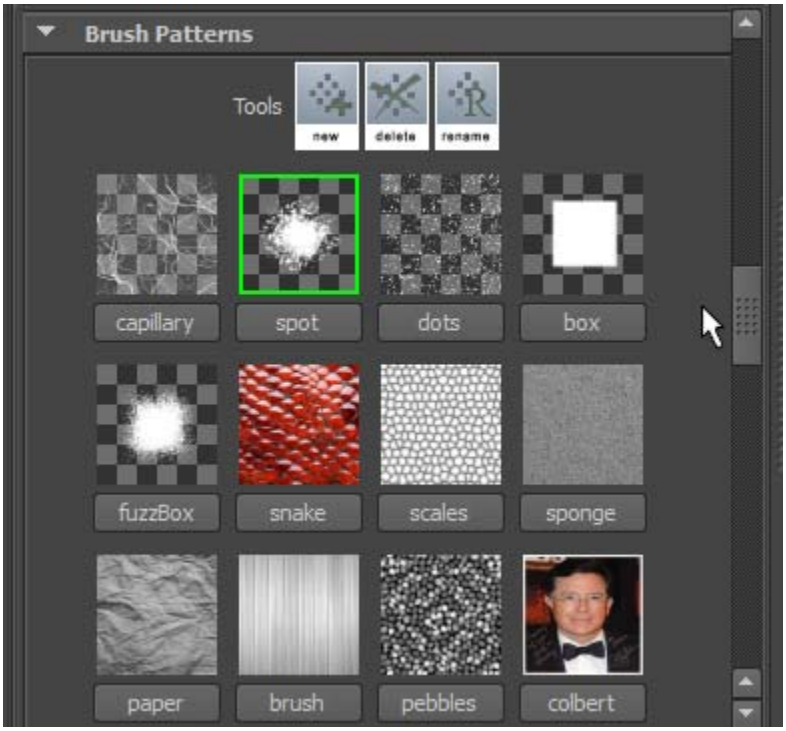
The blend brush is super useful for combining features of one target into another. It's sort of like a 'clone from layer' brush. By default, this is set to neutral and is a nice way to undo stuff in a certain area.



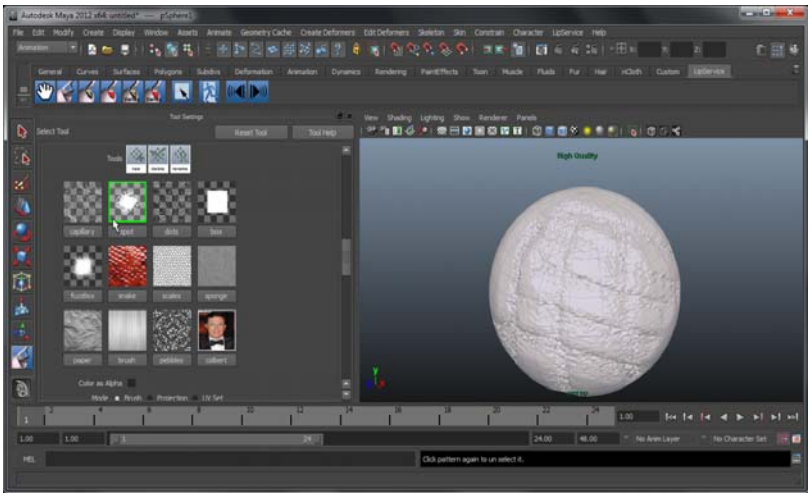
You'll note that in brush mode, there's a pulldown for 'geom' 'color' 'stencil' 'color texture' 'color stencil'. If you have geom selected, you will be moving points around. If you have 'color' selected you will be painting colors into vertexes, and finally if you have 'stencil' selected, you will be painting a stencil mask on to them. If you switch from 'stencil' to either 'color' or 'geom' then the area you've just painted red will be 'protected'. Note that you can turn that off with a checkbox.

[IMAGE] show geometry stencils

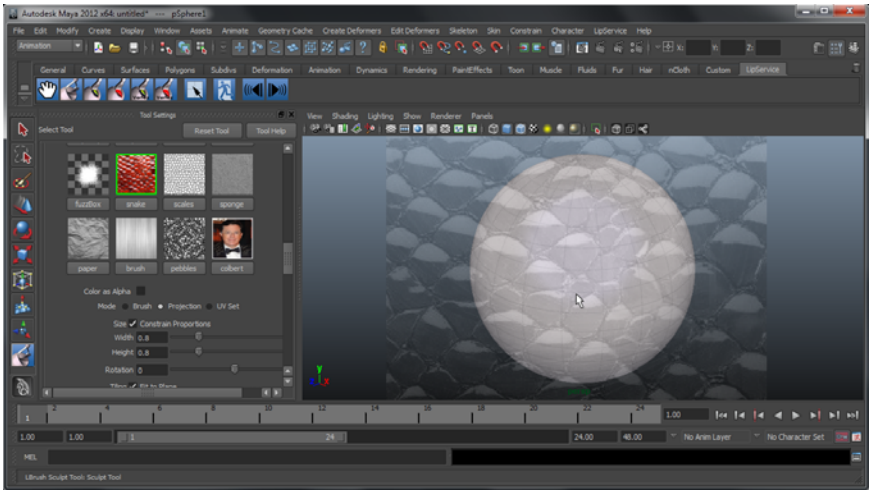
For brush tools, the magnitude is set by a combination of 'strength' slider, by the falloff settings, a texture tool, and by the tablet pressure (if you have a pressure enabled tablet).



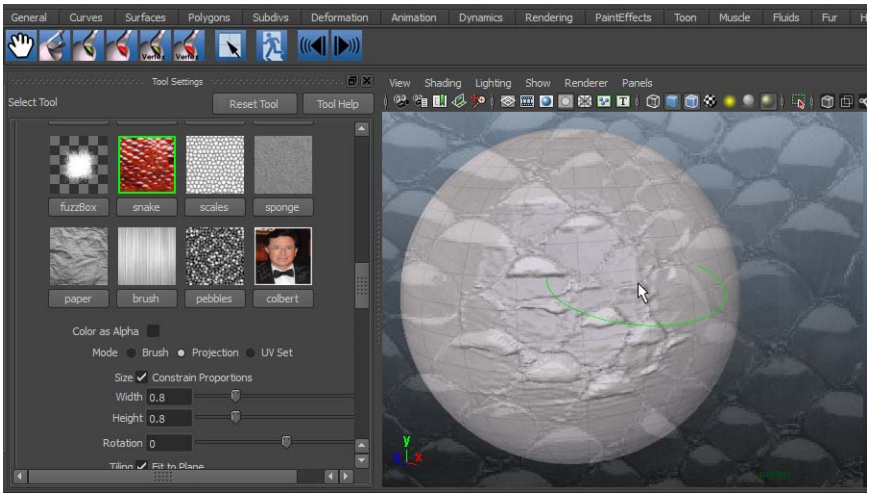
For the brush mode, you also have a number of texture options available in the ‘texture’ rollout.



Enabling a texture pattern is simply a matter of clicking on the texture, which will highlight in green. Disabling that texture requires an additional click, which will unhighlight the texture icon. By default you are setting the brush texture. That is, you are going to be stamping the brush texture into your model as you paint around with either geometry, color, or mask.



You can also paint a texture on using a screen projection by checking the ‘projection’ checkbox and placing the texture on the screen (place, click). Note: You can adjust the display opacity of the texture so you can better see what you’re doing.

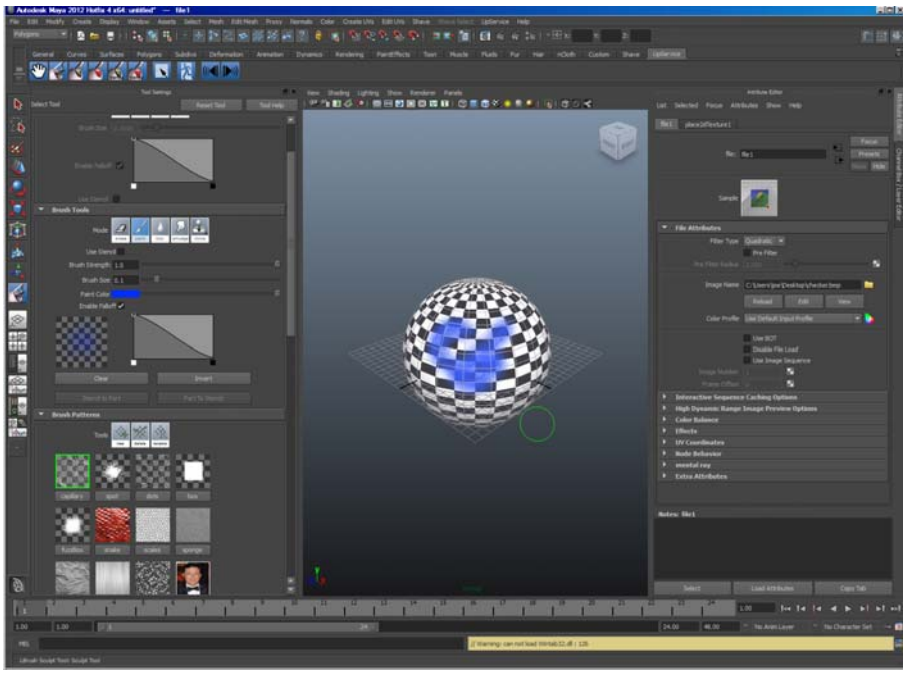


Texture Painting

Painting on Color Texture

LipService also includes a top notch 3d paint tool.

When you go into paint mode, you are assumed to have to have Maya surfaces applied to your model and color textures applied to them. If there isn't a texture there, LipService will create one for you (however you're better off creating your own initial one since you can name it) . When you start painting, LipService will paint directly into the associated texture. The file will not be updated until you exit out to Maya or change modes, so if you hit render - the texture will not be reflected in the render until that time. Not that the brush is a circle, you don't have to paint in a distorted ellipsoid like Artisan.

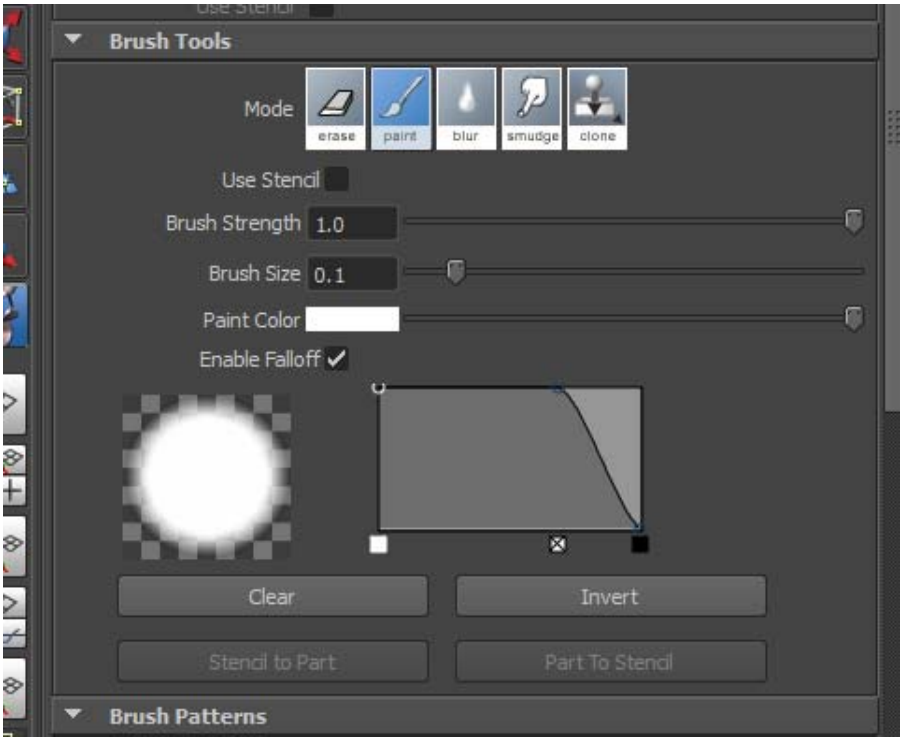


Hitting the 'texture paint' shortcut, will throw you into paint mode. You can just start painting - your strokes are going directly into maya's color textures. You can paint on as many materials

at once as exist in your geometry, the strokes get parsed into the correct textures at their current resolution.

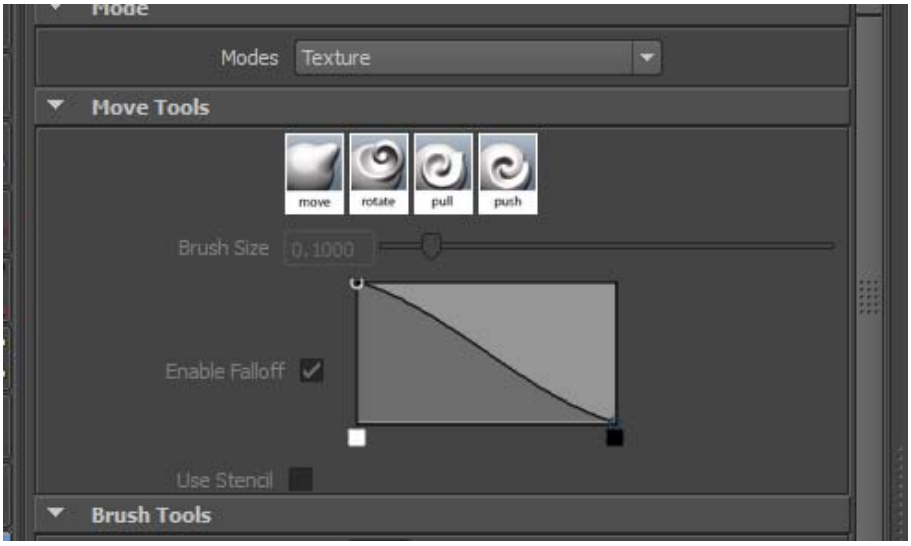
It's a good idea to already have a color map [file textures only] on your selected surfaces to paint texture before you start painting, however if you don't have wone LS will create one for you.

Brush Tools

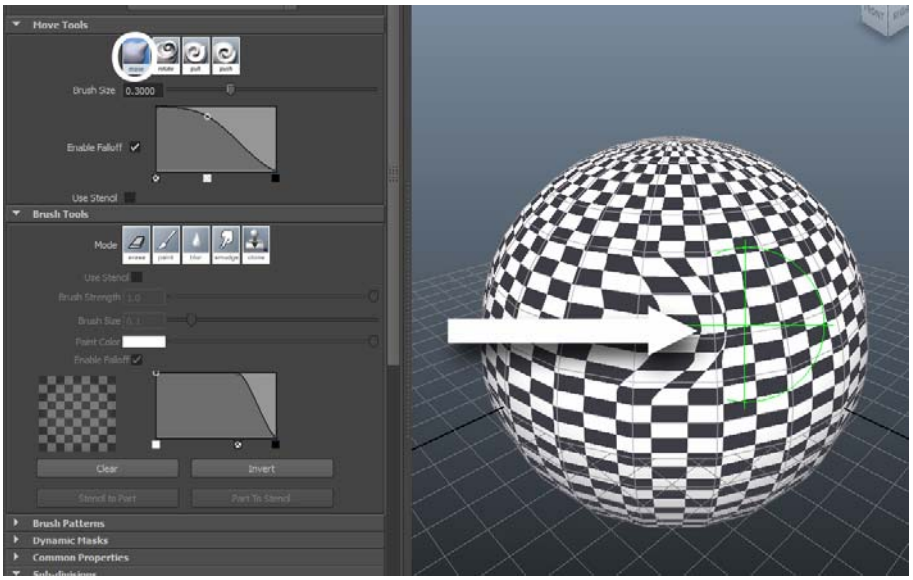


You'll notice that in texture paint mode, you have a different set of tools in the Brush Tools rollout. They do pretty much what you expect them too, ***however the 'clone' tool uses the CTRL key instead of the ALT key (because alt is used for camera orbit).***

Move Tools



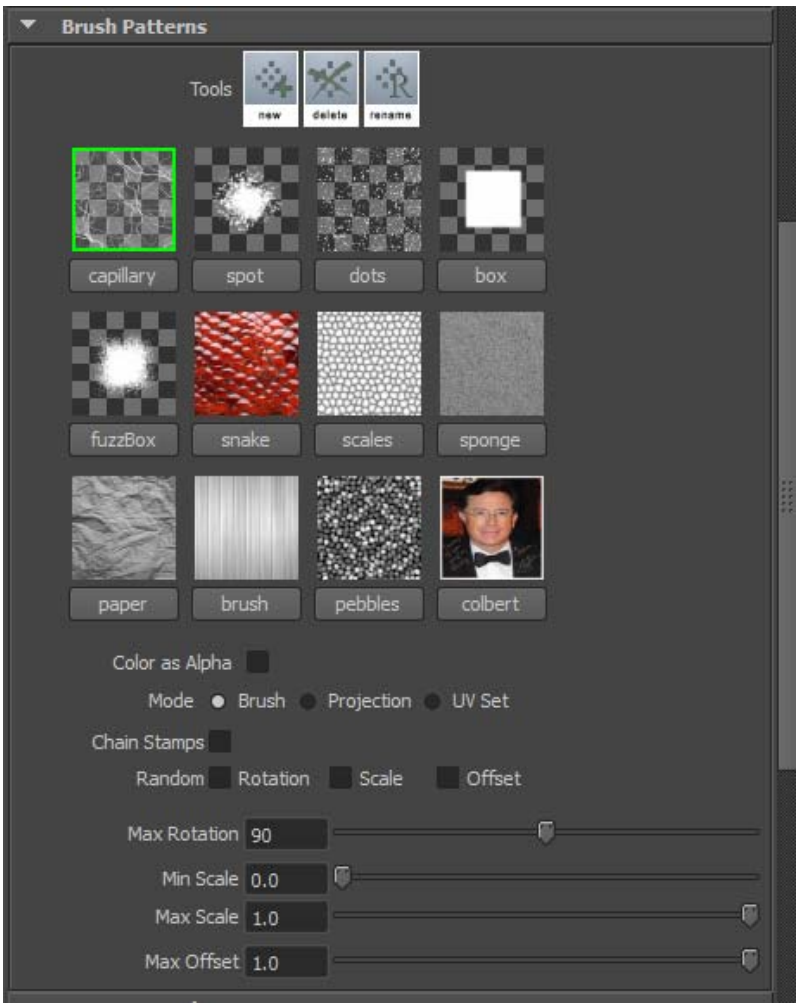
Like the 'brush tools' - move tools also has a different set of tools who also do what you'd expect. The move can be useful for some alignment tweaks.



Using Patterns

To use a pattern brush, you just need to open the patterns rollout and select a pattern. It will get highlighted in green. These patterns have alpha channel, and will be multiplied by the brush color you've selected in the brush tools rollout. So, for example if you don't want to

apply any tint, you want to pick white in the brush tools. The brush falloff you've selected in the brush tools rollout will also be applied.



By default you're in 'brush' mode, this means that the texture will be applied to the span of the brush on your paint surface and repeated at each step. 'projection' mode lets you drag out an image to paint through, and UV lets you paint through the texture as if it was applied to the object as a texture (using its uv's).

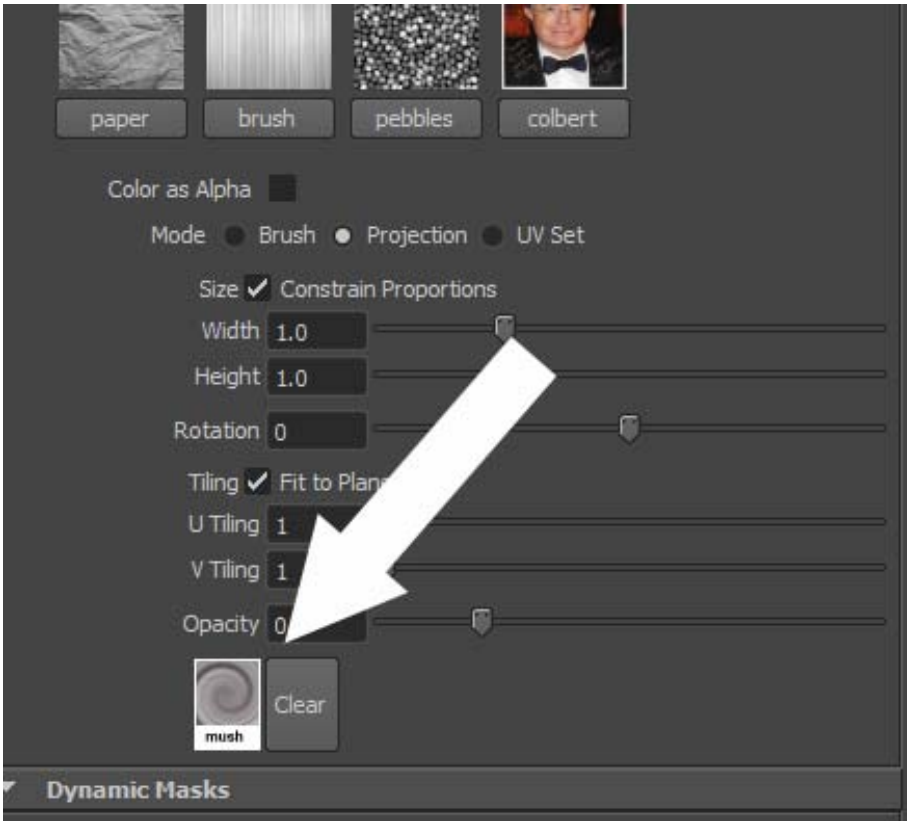
You can also randomize painting by clicking the 'rotation' and or 'scale' and or 'offset' checkboxes next to "Random".

Texture "Mush" Alignment Tool

In the geometry section, we showed you how to paint through a projected texture, you can of course do that in color texture mode too. Just pick on a pattern [it'll get highlighted with a

green border], then pick 'projected' and move the mouse (don't click yet) out into the viewport. Once you click, it is placed. You can update position/scale/rotation with the sliders.

You'll notice a 'mush' button at the bottom of the rollout - this only appears in projection mode.



If you click on the 'mush' button in the patterns rollout, you can now mush around the projection image - you're not mushing any texture around on the model, just the image that gets painted through when you resume painting. If you want to reset it to it's original shape, press 'clear'.

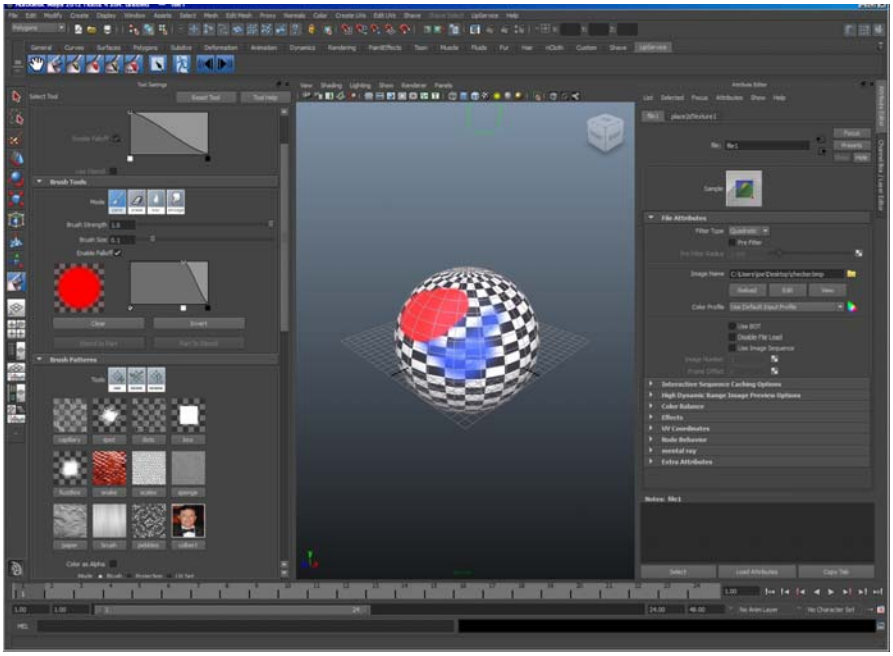
This is really handy, for example, if you're painting a photo you've grabbed of someone's face onto a model that doesn't match the texture perfectly - ie - lining up the features like eyes, nose, mouth.

Once you've mushed it into place you can just paint with the new projection.

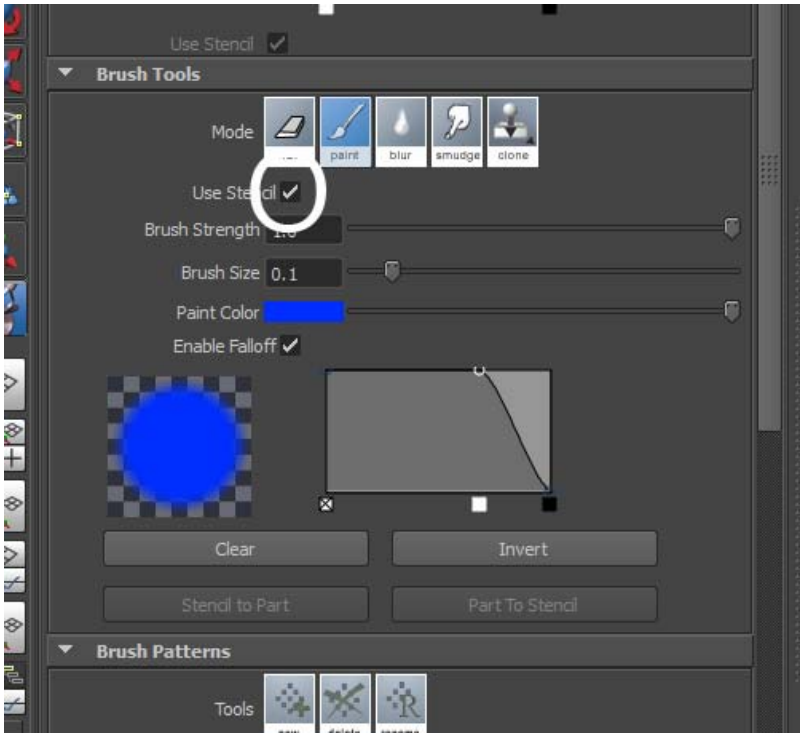
Stencil Texture Painting [masking]

Like geometry/vertex modes, you can also create stencil textures. (there's a shortcut)

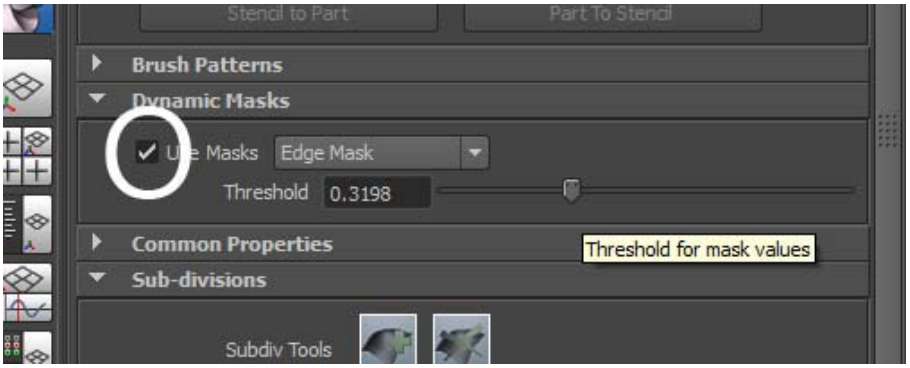
You just click on it, and start painting a mask. This does not get stored in your image, it's only used for creating a mask to paint through - it's marked in red



When you go back to color texture paint mode [use the shortcut on the shelf], you will notice that there is a 'use stencil' checkbox in the brush tools rollout, check this and you'll see your stencil mask again, now when you paint the red areas will be protected as you might expect.

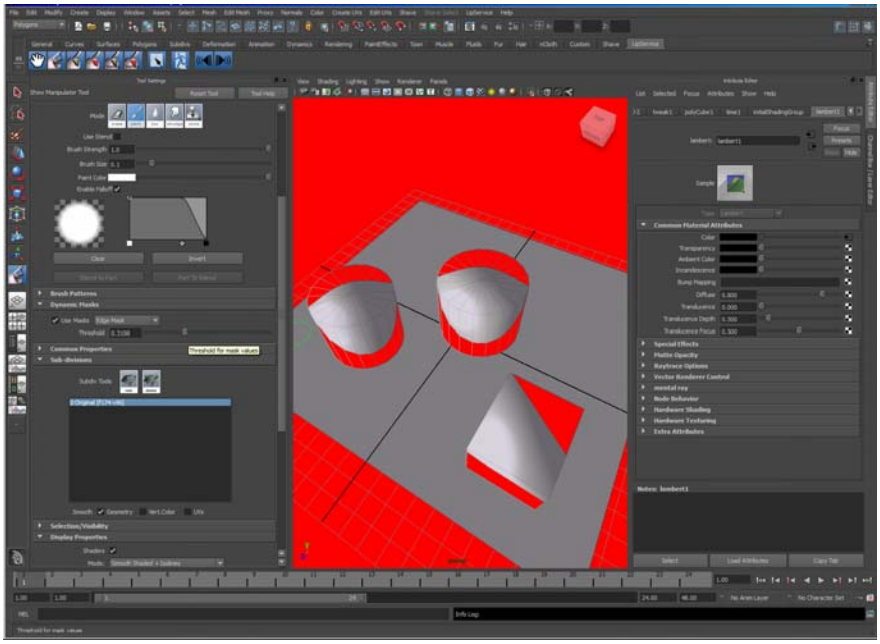


Dynamic Stencil Masks



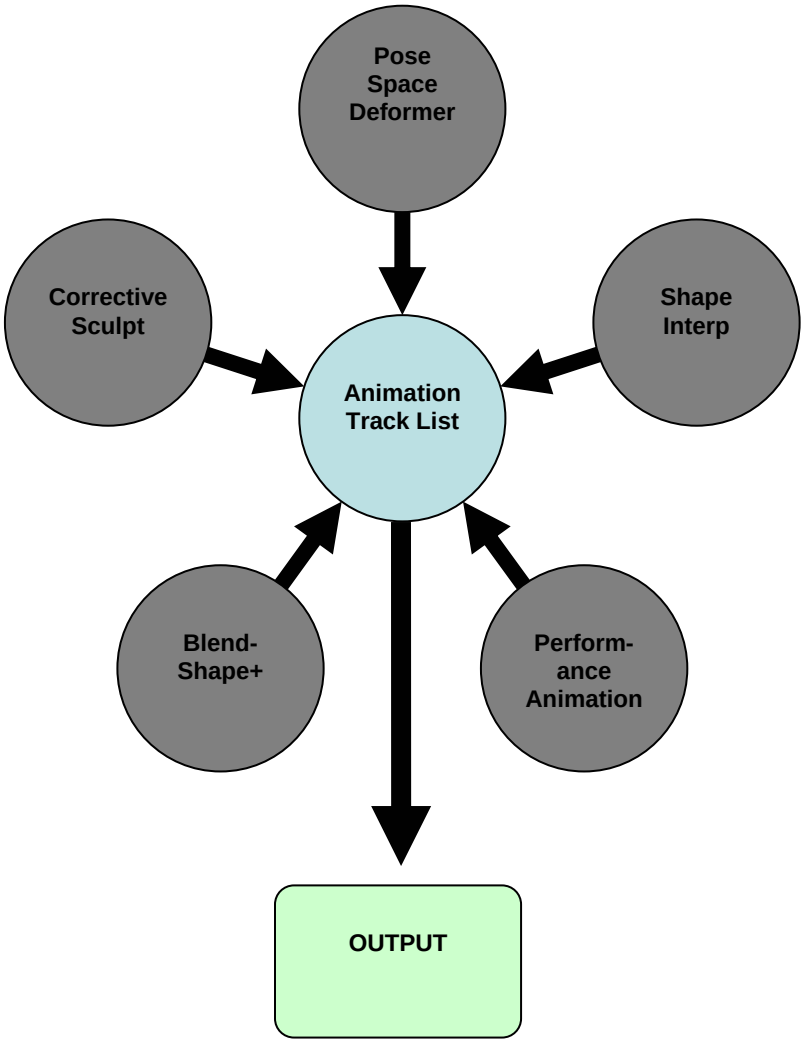
One neat thing is you can also make use of dynamic stencils which are created based on surface normal's orientation to the camera, you've got a couple adjustments for those as well.

These masks are procedurally generated and will be updated each time the camera moves. Right now we only have a couple types of dynamic masks, but we'll add more soon.



Animation

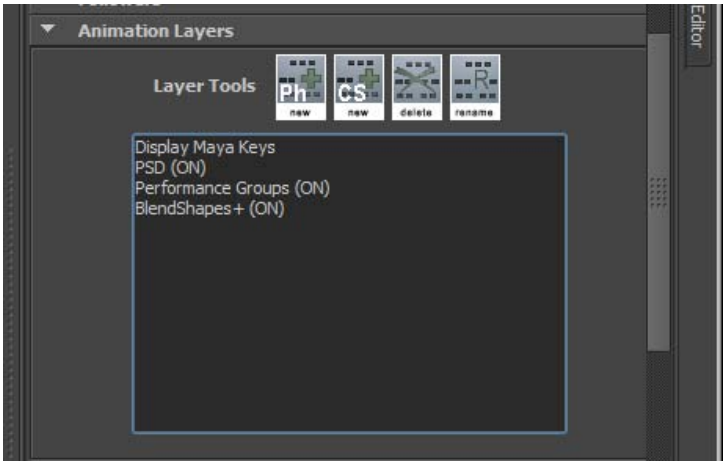
The Animation Track List



The animation track list can be thought of as the "Layers" window in Photoshop - it's the center of your animation world.

You can create new layers of animation of the same or different types, you can toggle them on and off for evaluation or display, etc.

We try and do this for you in a number of cases, like CS (corrective sculpt)- we create one for you if you start animating corrections, however you should be cognoscente of what's in the layer view. You'll use it a lot as your animations grow in complexity and you want to be able to revise things in pieces.



Each of our other types of animation have representation in the track list, however some types (Like PSD and Blendshape+) only have one entry (you cannot add more). The reason for this is because with PSD, it's not an animation layer - but an applied library. BS+'s reason is that you basically can add quite a number of shapes in there already, which can all be animated separately.

Note that you will see only the keyframe hatches from the currently selected track in the maya timeline, our keys appear in BLUE.

If you select "Maya keyframes" you won't see any of ours, just Mayas.

In anycase, we don't just offer different types of animation because some people are comfortable with Blendshapes, some people want Shape Interp (phonemes), and other people want PSD and Corrective Sculpt, we do that because those different types are actually better suited for different kinds of motions.

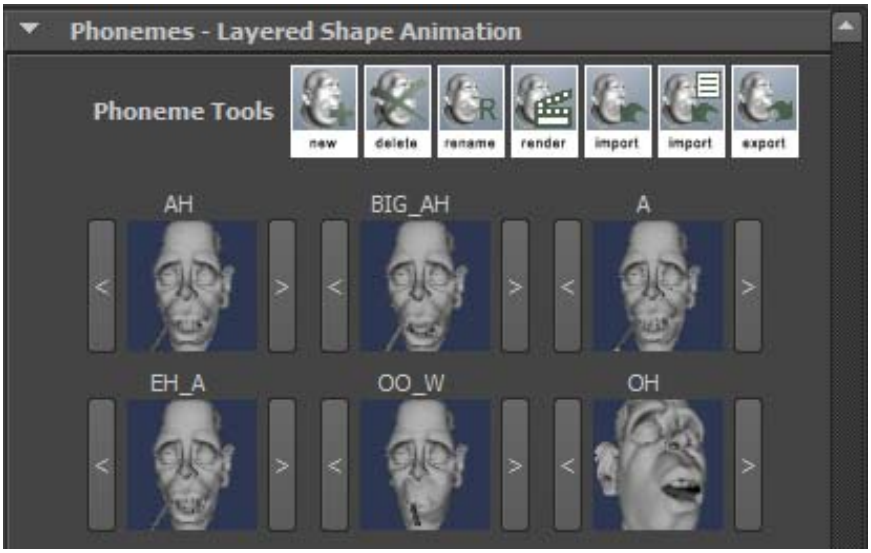
For example, a talking face is probably going to be best done with multiple layers of shape interp (phonemes), and some performance animation - however a bending arm is better done with a rig - however rigging doesn't get you all the way there, we give you some tools to animate details on top of that. PSD is more of an automatic thing that you teach to do a better job on sets of motion, corrective sculpt is for going to a frame and just fixing it. Blenshape plus is not really great for fixing things, but is great when you want to embelish with a flexing muscle mass, or veins popping out under stress, etc.

It's important to understand the differences on these approaches, because it means planning your sculpting around them.

For example, while you're sculpting PSD libraries, you want to build in things that the body does when you just move it around, you want to *leave out* the embellishments. Even on a face, you might want to leave out things like veins popping out on the neck, maybe that'd be better as a blend that you can animate with a set of sliders.

Phonemes [shape animation]

Open the AE, and look at the attribute editor under Lbrush1, you will see these rollouts. (you can also get there by selecting ‘Animate’ on the pulldown menu)



Opening up the ‘phonemes' rollout reveals something like this (for a scene that’s had all its shapes created already)

Shape Animation is when you interpolate between a bunch of keyframed shapes, hitting those shapes at 100%. We actually run an a spline animation path through each and every vertex, even the high res geometry, for this reason 'phonemes' mode is not represented by animation curves. If you're used to blendshapes, this is something different. Unlike blendshapes, your targets get hit.

You can layer phoneme animation layers by adding tracks in the animation layers rollout. So for example, in one track, you can use phoneme cells that move the eyebrows around, and in another you can use the ones that have actual speech phonemes in them. The tracks will sum.

Keys can be copied, pasted, moved, deleted, etc. The keys will only appear when the LBrush node is selected and the facial animation rollout if open and activated.

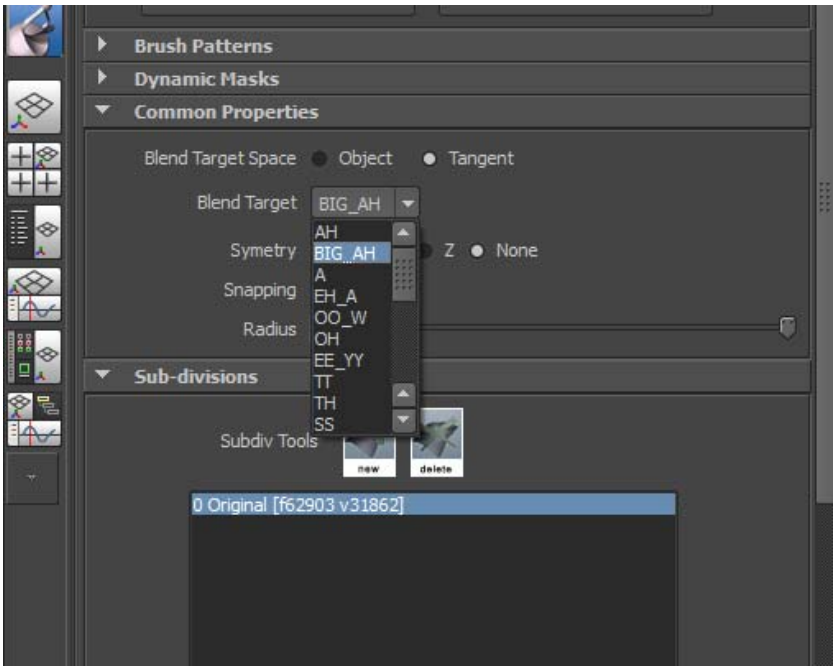
Unlike a ‘morph’ our shape interpolation is curvilinear - you basically have a catmul-rom curve for each vertex of the base model.

Animation is accomplished simply by clicking on the face targets (in the image area). Key frames will appear on the timeline for those keys in blue for whatever animation track you have selected currently.

There is no graph to edit though, because there is actually an animation spline for each vertex, so it's really more about adjusting timing of the keys and the shapes of the cells.

Our facial animation tool is meant to be a ‘wysiwyg’ (what you see is what you get) interface for animating shape.

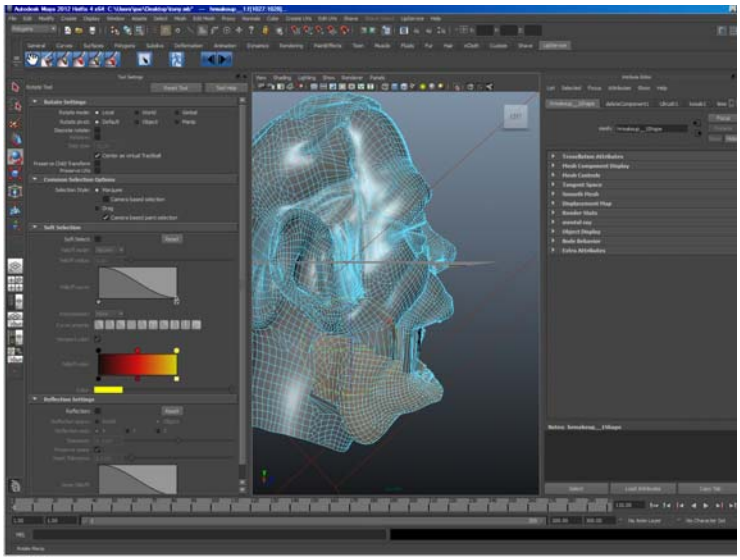
We offer you some sculpting tools that allow you to 'blend' in pieces of one target into another using a brush - this lets you create new targets with a great deal of ease. You can chose what target the blend is coming from under 'common properties' in the tools rollout. VERY HANDY



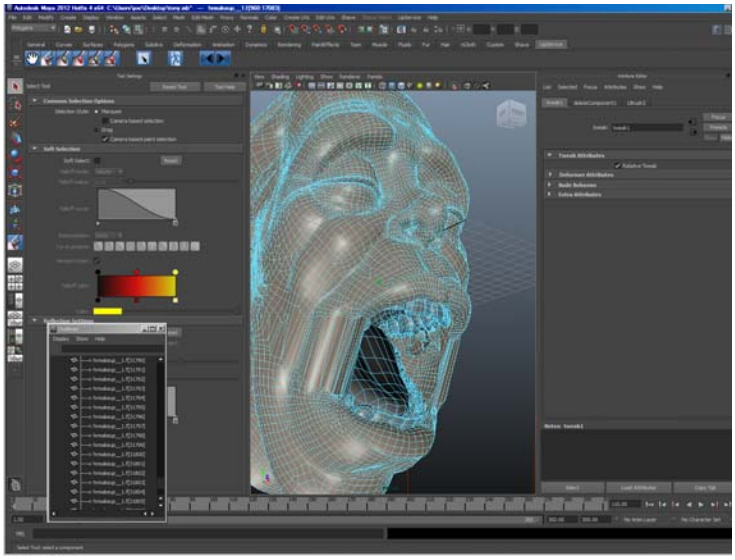
SET UP SOME QUICK SELECTION SETS
It's useful to create a number of quick selection sets on a shelf for things like, the lower jaw/lip, lower teeth, tongue, upper lip, upper eyelids, lower eyelids, left eye, right eye. You can pick these while you are sculpting.

AN EXAMPLE - OPENING THE MOUTH

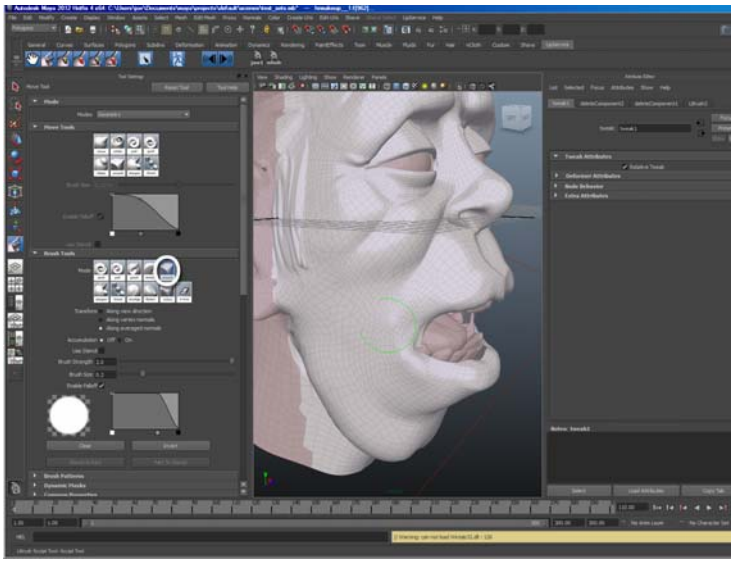
For example, to open up the mouth you could do it like this :
select the lower jaw/teeth/tongue



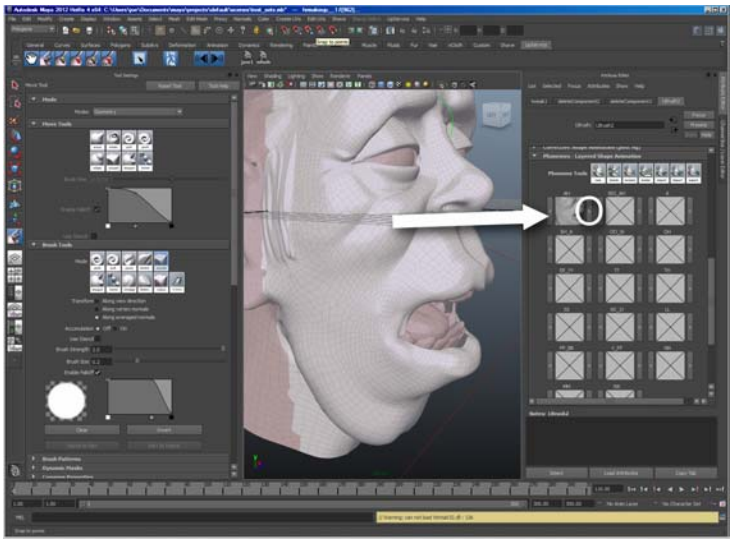
and rotate with maya’s rotate tool
Now select the whole face



Select the face set, and go back into sculpt



smooth out the cheeks



To save that into a target cell, just click on the ‘put’ [>] arrow to the right of the cell from the LBrush1 tab.

Animation is just a matter of clicking on the cell’s picture area. A line will appear on the timeline like any other maya key, except it will be blue, and this will represent a key for that particular shape.

Generally, you want to set up phoneme shapes that correspond with the labels that we provide, but you can also create additional shapes with your own labels.

You can create multiple tracks of facial animation, and only the keys from the current track will be displayed on the timeline

I’m not going to give you a lecture on animating with phonemes, but you generally want to break things down into their component sound. You’re not spelling. For example, the line “you’re not spelling” would look like this :

EE-RR ... NN AH TT .. SS PP EH LL EE NN GG

You can use things like ‘MM’ to close the mouth in between words, or ‘EH’ to go slack jawed. I like making a second ‘MM2’ wih the lips tightly pursed together and go ‘MM’ ‘MM2’ ‘MM’ to give some good looking compression motion when the character swallows or really emphasizes the MM sound.

However, really any shape can be in the phonemes section in addition to mouth shapes - stuff for animating eyebrows, eyes, tongue - anything. You can use those extra shapes for a bigger set of phonemes, or just for multi-track animation.

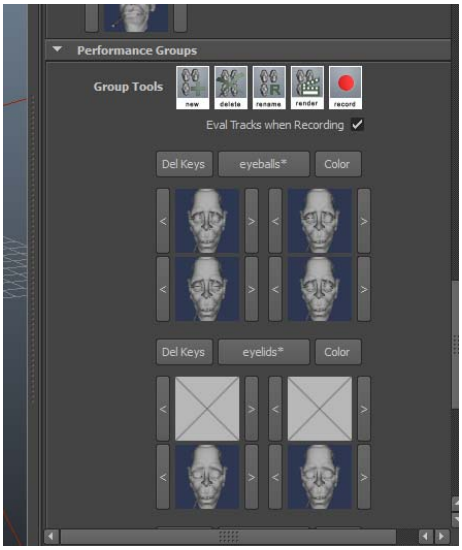
Some notes on rigging, We store all our targets in tangent space, so it doesn’t matter weather bones are before or after the node for facial animation, however if they are before, making weight adjustments on the skin can change the shape of the face.

To avoid the phoneme animation from looking too regular, I like to make multiple versions of a few of the open mouth phonemes like AH, A, EE, etc. Also you can animate Blendshape+ tracks on top of those to liven them up further.

Performance Animation [puppeting]

Another method of facial animation available to you are performance groups. You set up a performance group by putting targets into the 4 cells for the group.

If you click on ‘test’ on the group and then move your mouse around in the viewport you will see that as your mouse approaches the windows corners, it blends in targets that correspond to the 4 targets. Center is neutral.



You can create live performance animation for the group by hitting the record button. Useful for eye blinks - some eye motion, eyebrows, etc. You can layer performance tracks right over key framed ones.

Each group is animated separately.

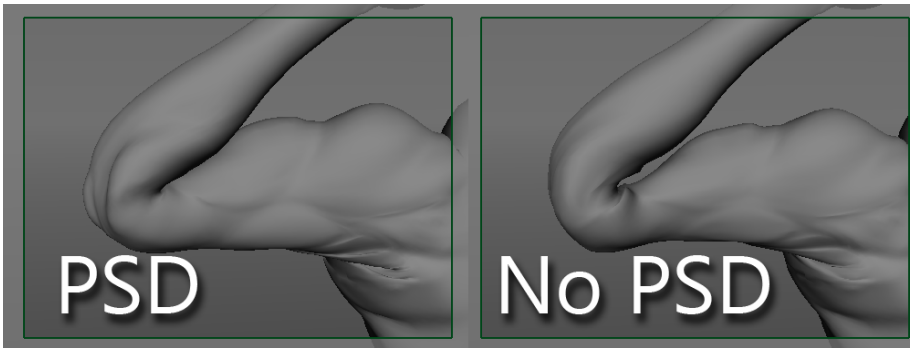
Note - *unlike phoneme animation or corrective sculpt, this is in fact a morph - so you really don’t want to do anything but secondary animation with it.*

Body Rigging - ‘PSD’ - Pose Space Deformation

“Rigging” an animated character entails creating a skeleton, binding skin to that skeleton, and then animating the skeleton. Unfortunately, the binding process is usually just a transformational weighting scheme, so it’s not very easy at all to keep complex areas such as shoulders, elbows and the crotch area behaving well at all - not to mention that they are static

so there are serious limitations on what sort of artistic input you can have on a model's shape once it starts moving.

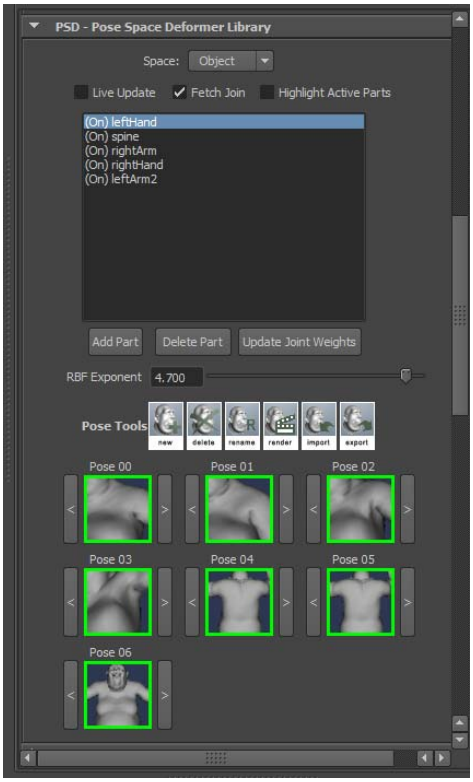
We address this in a couple of different ways. The first one I want to discuss is “Pose Space Deformation”. This technique, first discussed in JP Lewis’s 1998 paper, is basically a process of “training” the deformer by example.



Scene by Sudhir Verma

What you do is build up a library of different poses where you’ve posed the rig and then sculpted corrections. Even with a pretty badly skinned character, you can compensate nicely.

PSD’s are a pretty common technique at large studios like ILM, Weta, Dreamworks, that do a lot of creatures. One clever technique that Weta did in Avatar was to create a muscle system, then put the character through a bunch of poses (building up a library), then they turned off the muscle system and turned the PSD on. PSDs evaluate thousands of time faster than a complex muscle system, and they are also far less prone to geometry sizzling around and other artifacts, not to mention you can edit your psd library with sculpting tools and specifically correct problems artistically. You can think of it sort of like this - photon maps are to GI as PSD is to rigging.



As the animated character moves around when PSD is on, the engine looks for familiar poses that are in similar positions and mixes those shapes in. So if you don't like what your shoulder is doing when it's pushed forward, sculpt on top of that position and save the corrected shape into the library.

You don't want to have to sculpt a pose for every permutation and combination of arm movements + body positions + finger shapes etc. The number of combinations would be immense. Instead, you want to segment the body up into sections, we do this with the 'parts' editor, so that the engine can pull those components separately out of whichever pose they find correlation in. You're not actually chopping geometry or anything like that, just grouping joints together into a piece that you would like the engine to try and recognize different positions for.

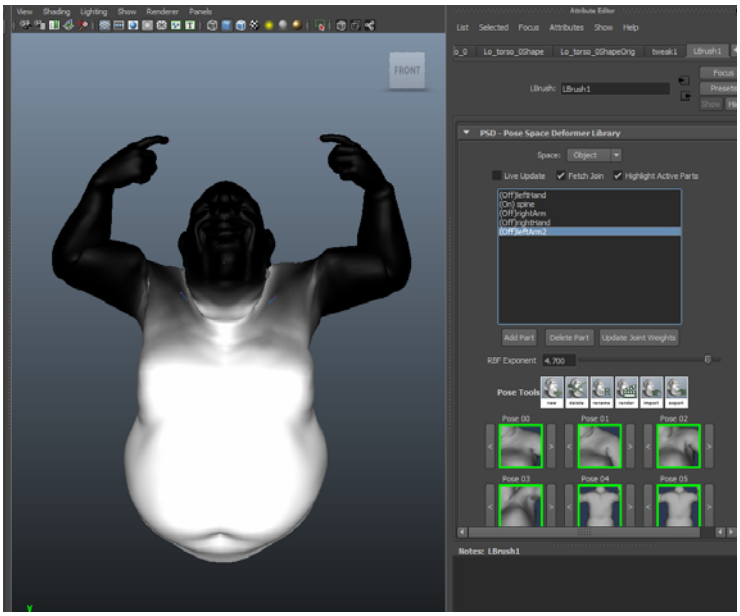
Often, a rig contains lots of dead bones - that is - bones that don't animate, but they're there in the hierarchy and have influence on the skin. This is the main reason we created 'parts'. For example, you want the upper arm and shoulder to be getting its cues from only the shoulder joint, and not the one you may have put in there to animate muscle jiggle. This is why just using the skin strengths you painted in maya is not a correct envelope for the PSD.

For this, you'd create an upper arm part, that only includes the shoulder joint, and paint it to include the whole area.

Infact, if you wanted to control it with a joint that's not even skinned to anything (like if you made a joint off to the side that you want to use as a lever)

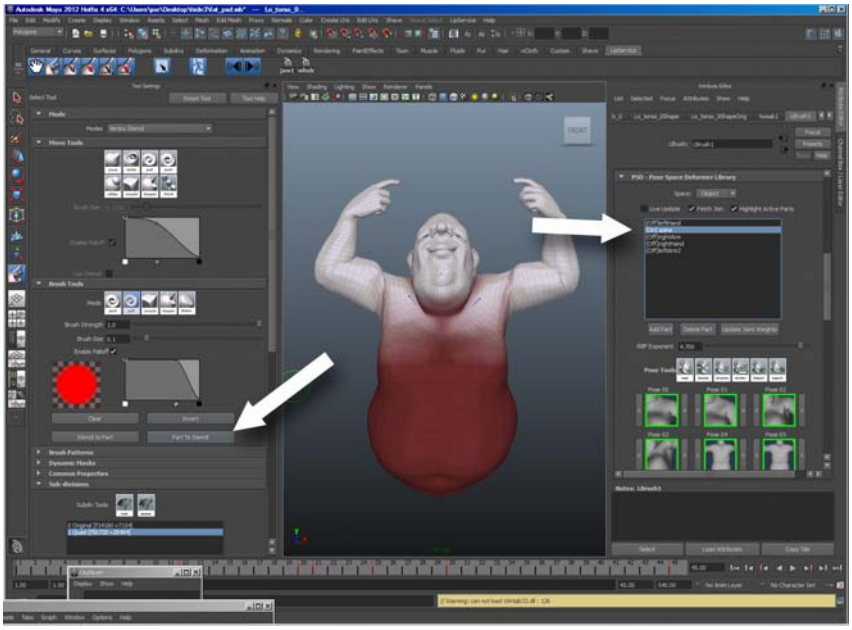
Parts can also include multiple joints (like a few joints from a spine), the solver will do its best to prioritize them, but nothing will ever be cleaner than a single joint part, the joints don't have to be contiguous - you might want to abbreviate a spine, for example, with 3 representative joints. However, there may be other situations when you want to use multiple joints - for example if you didn't feel like making targets for every finger joint.

Hitting ‘Add Parts’ will bring up a list of joints - you can select 1 or more of the joints, they will highlight as you select them, then hit OK.



Afterwards, if you can’t remember which joints were in a part, if you select the part in the parts listbox, it will highlight that part (assuming the checkbox saying ‘highlight selected part’ is on.

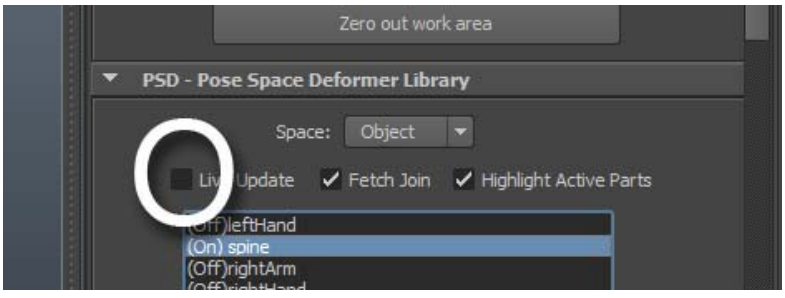
You’ll probably want to edit the weights in some areas, so the way to do that is to select a part on the parts list, then open the Brush tool (from the shelf). Put it from ‘geom’ mode into ‘stencil’ mode and hit ‘part->stencil’.



This will put the current part's weight into the vertex stencil buffer. Go ahead and paint on it, 'push' is basically an eraser where 'pull' is a marker. 'smooth is really useful for blurring edges. To put the stencil back onto the part, hit 'stencil->part'. Then you'll want to definitely hit 'normalize other parts against current', this will carve your current part's shape out of other parts that you've already made so that they don't sum up to more than 1.

Couple things to know, if parts are highlighted, only those parts will get evaluated, this is so you can diagnose problems in parts individually. If you don't have any parts created, the entire object will be considered one part. Also, you can redefine parts at any time, it will not destroy anything and will just be evaluated fresh once the part is created.

As your animation moves around, you may encounter areas that still look wrong, just stop and that frame, go into the sculpt mode, sculpt corrections and create a new pose in the PSD library and save it.



By default we have 'Live Update' turned OFF. Live update applies PSD corrections as you transform joints around interactively, it can cause you some confusion while you're sculpting - but it has uses.

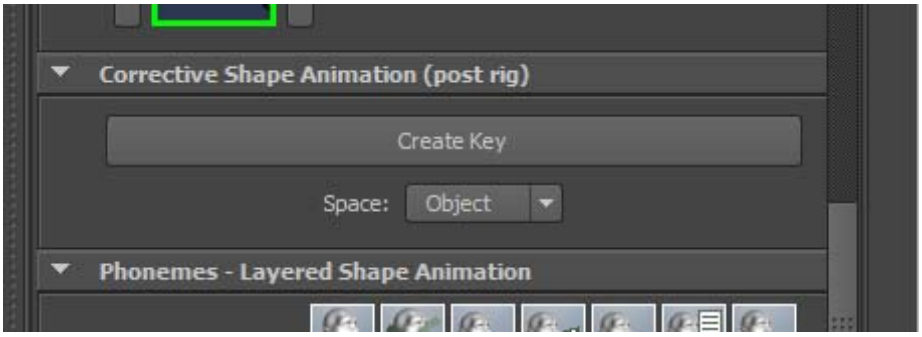
You'll also notice the 'fetch joint' checkbox. This is for when you're fetching a target from your library, if fetch joint is on (it's on by default) all the joints will be moved into position along with the geometry.

Once you have a good PSD library, you should be able to apply it on a whole range of animations and it should “just work”.

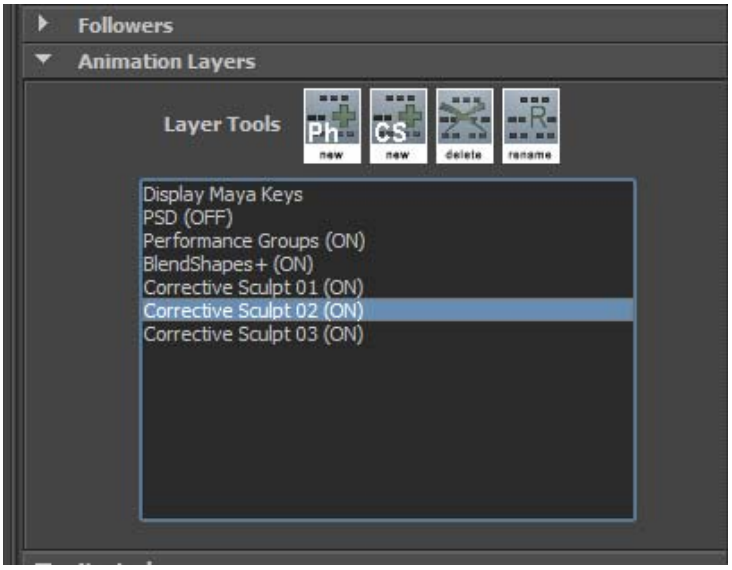
Correctional Sculpting Animation [CS] - post rig

Another way to address corrections is a “Correctional Sculpt Animation”. Basically a CS lets you animate on top of your skin making ***embellishments***. So as the character moves around, you can go in and sculpt and key details - such as muscles flexing, cloth wrinkling, veins popping, drool sagging, etc - or even do things like fix a cloth simulation. This is like ‘phoneme’ animation, except that it it's a 'one off' kind of thing - each key has it's own shape.

To create a pose, you simply just want to stop the animation on a frame, do some sculpting and hit ‘create key’.



You can create multiple layer tracks of correctional animation in the animation layers rollout



The layers will simply add together. Your keyframes do -not- need to coincide with keyframes on your skeleton, they ride on top of that animation and can be completely asynchronous.

Blendshape+ : post rig

You can use this exactly like you'd use Maya's blendshapes, infact if you go LipService->import blendshapes, the blendshapes you already had on your model will be imported. You'll see them all under the Blendshapes+ rollout and you can animate the sliders like you'd animate any slider.

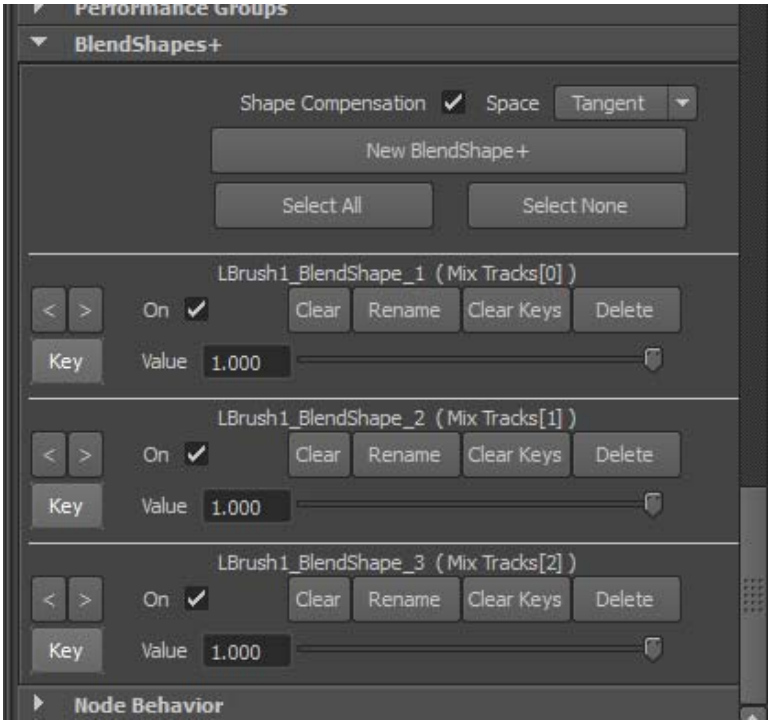
You can change the names, but the name that's in parenthesis is what you'll see in maya's curve editor.

Here's where we blow their doors off... :-)

You'll notice that the default settings have 'tangent space' ON and 'shape compensation' ON.

Normally when you sculpt a blendshape, you have to do it pre-rig in the neutral pose. You do not have to do that with BS+. You can sculpt them right on top of the rig. If you have 'tangent space' on, they will be basically converted internally to pre-rig shapes and animated in that space, they will follow along with the rig just like normal blendshapes.

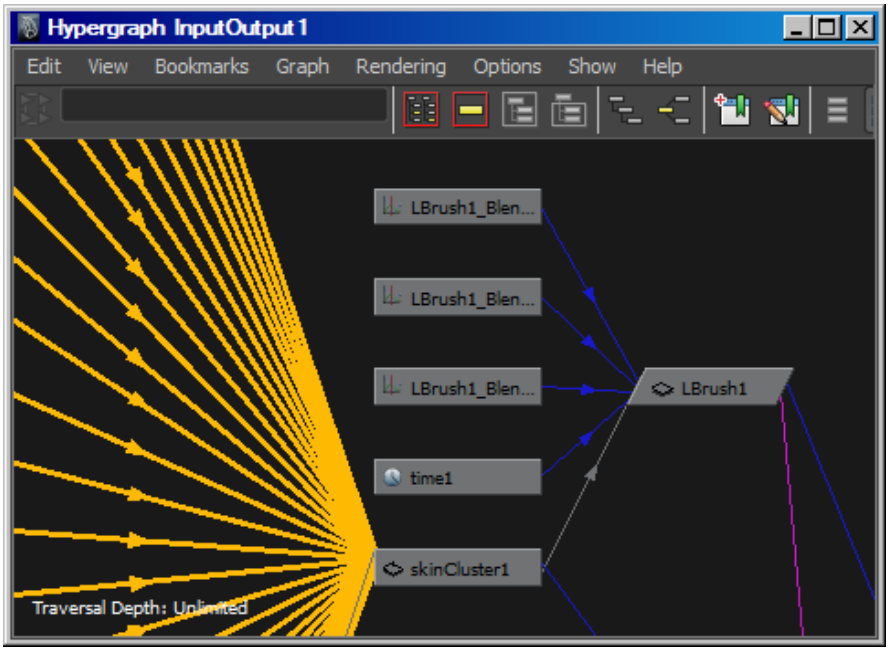
'shape compensation' is the really cool part.



What shape compensation allows you to do is not only edit on top of the pose, but on top of all your other blendshapes. For example you've already made a blendshape for an upper arm flex, and that slider is currently dialed in, and it is posed. And lets say you want to add another slider for the veins on that muscle to stick out, you'd just start sculpting them, and 'add shape' - only what you've just sculpted (the veins) will be reflected in that slider and you will be able to animate them now irrespective of what shape or pose is under them.

LBrush Nodes, How They Work

You can think of LBrush nodes like animated ‘tweak’ nodes. They need to be applied POST skin, muscle, etc. if you want them to follow that motion. This is what your hypergraph will look like



If you just applied LipService to do some quick sculpting on your model, you can just do a “LipService->purge” to clear it out and leave a tweak node behind with our deltas in it. To get rid of that, you can delete history, and you’ll be back to the original object in your hypergraph, but it will have your corrected shape.

If you want to render with our subdivs and animation evaluation, you must have a batch license for each render node. If you wish to avoid this you could always bake the animation out to shapes, but I wouldn’t advise that particularly at high res.

You can also bake out displacement, color, and direction maps.

Relative to a specific level of detail. This is useful for exporting the high res data out if you want to purge as well.

IMPORT/EXPORT

Importing from ZBrush or Mudbox

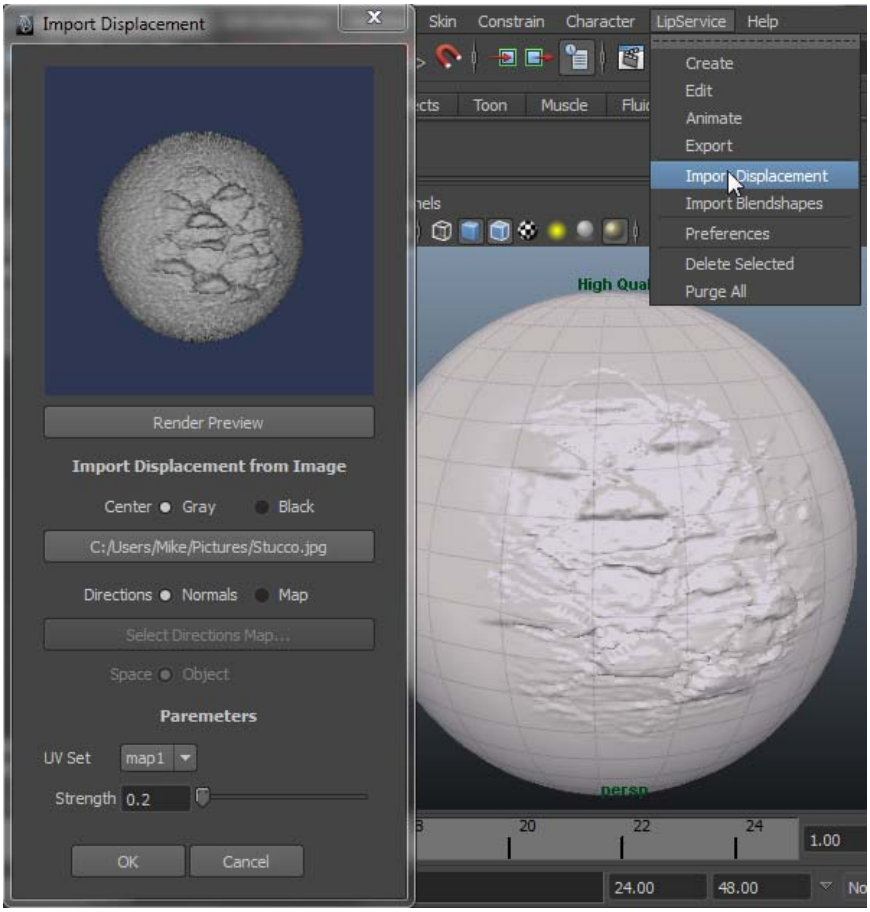
Ok, so let’s say you’ve done some highres sculpting inside ZBrush, and then you export low res geometry, and displacement maps.

To import, you would apply LipService to the low res geom. Subdivide it to high res level (from the subdivs rollout in the tools AE), then go LipService->import displacement and you can select your displacement and directions textures. The displacement map sets the amount that the points are to be displaced, and Directions is the direction vectors. This can either be standard Normals or a map file.

You can actually apply the displacements at any time - for example if you want to work up all your targets on a nice light level 0, you can then later add subdiv levels and apply the displacement to the neutral object, and select 'offset all targets'

There are memory consequences to subdividing, all targets get the subdivision. We do however compress them based on their difference from the neutral object - if you're working in tangent space, this means that the details track with the motion, so memory consequences probably won't be so bad, a bit hard to explain - but keep an eye on your memory use.

ZBrush uses middle grey as a 0 magnitude, so that the range is -.5 to .5, we provide a toggle for this under the displacement import.



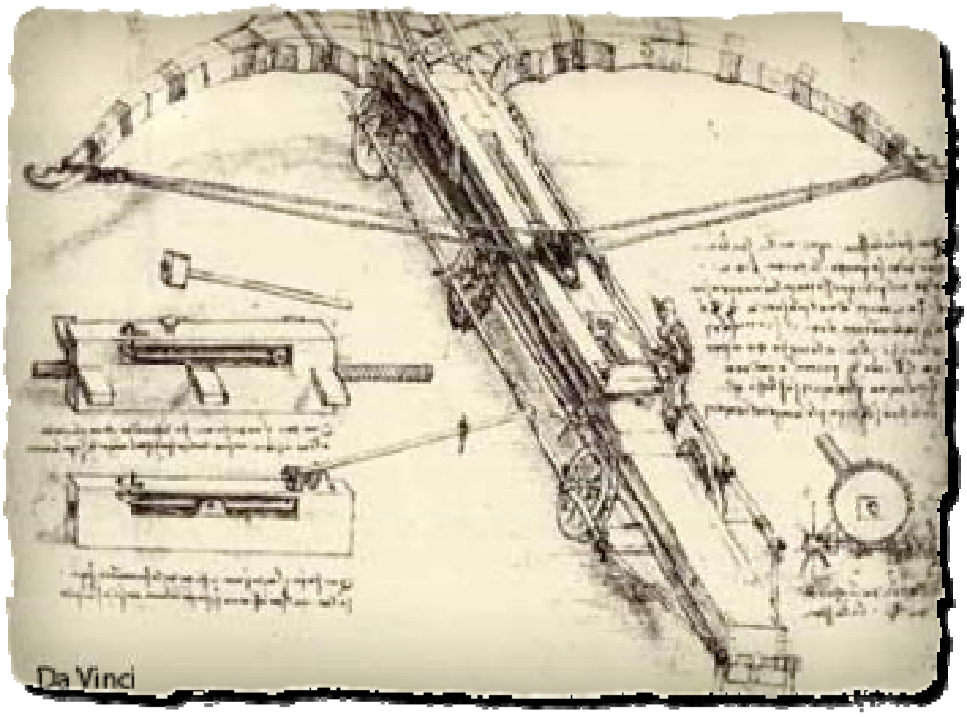
model by Scott Wells 2009

Baking Texture and Displacements Out

You can also export displacements and texture using the baking rollouts in the tools UI.

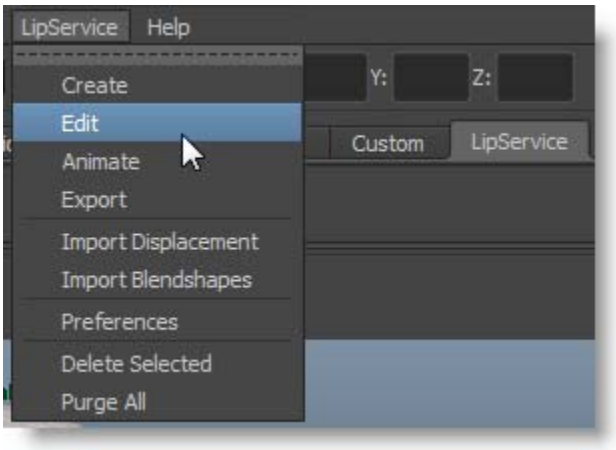
[IMAGE]

3 User Reference



The following pages are a feature by feature, menu by menu guide to LipService

PULL DOWN MENU LipService->



CREATE
Create an LBrush node on the current geometry.

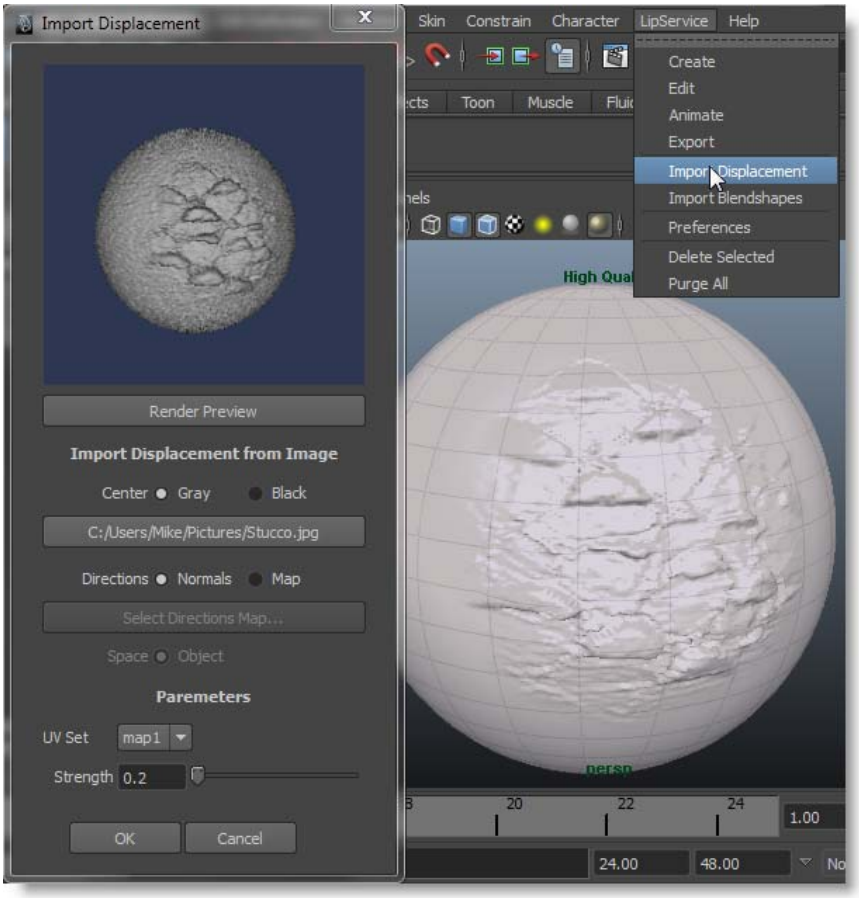
DELETE
Remove the currently selected LBrush Node

EDIT
Edit the currently selected LBrush Node in the sculpt editor and bring up the sculpt attribute editor

ANIMATE
Bring the current animation attribute editor into the attribute editor

EXPORT
Export the geometry at the current display subdiv level to another piece of geometry

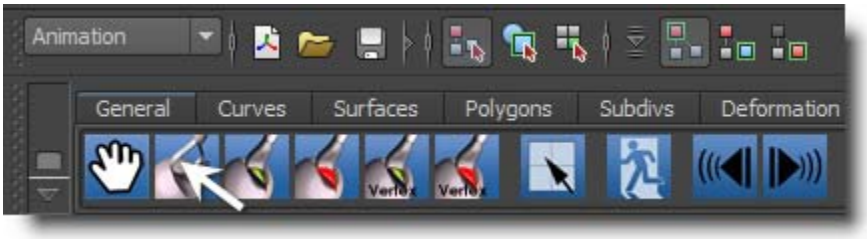
IMPORT DISPLACEMENT
Apply a displacement/direction/normal map into LBrush's geometry



-> center [grey] [black]
center sets the middle of the range. ie - grey means the grey scale goes from -.5 to .5
black means the grey scale goes 0 to 1
ZBrush uses grey as the center
-> Direction [normal] [map]
displacement will just occur along the smoothed normal if normal is set, it will travel along a map of vectors if a map is applied

PREFERENCES - todo

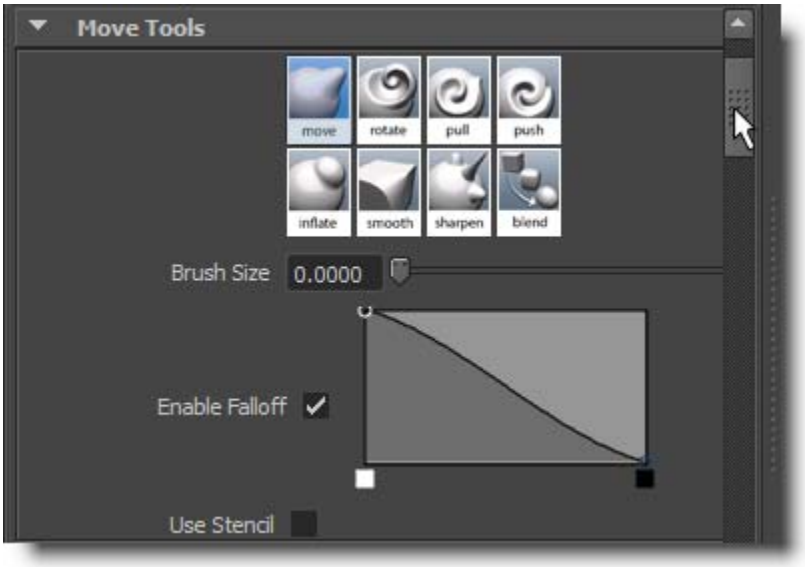
PURGE ALL
Purges all traces of LBrush/LipService from a scene and collapses the current shape into a tweak node.



TOOL SHELF (left to right)
-> SCULPT single clicking on this will create an LBrush node (the first time) and put you into sculpt mode. It will also bring up the sculpt and paint tools in the AE with ‘move‘ selected in the sculpt tools
-> PAINT single clicking on this will create an LBrush (the first time) and put you into paint mode. It will also bring up the sculpt and paint tools int eh AE with ‘push‘ selected.
-> SELECT this kicks you out of the shave interface and puts you in component selection with the currently activated selection of faces

-> AUDIO REVERSE maya’s frame reverse doesn’t play audio - this one does
-> AUDIO FORWARD maya’s frame forward doesn’t play audio - this one does

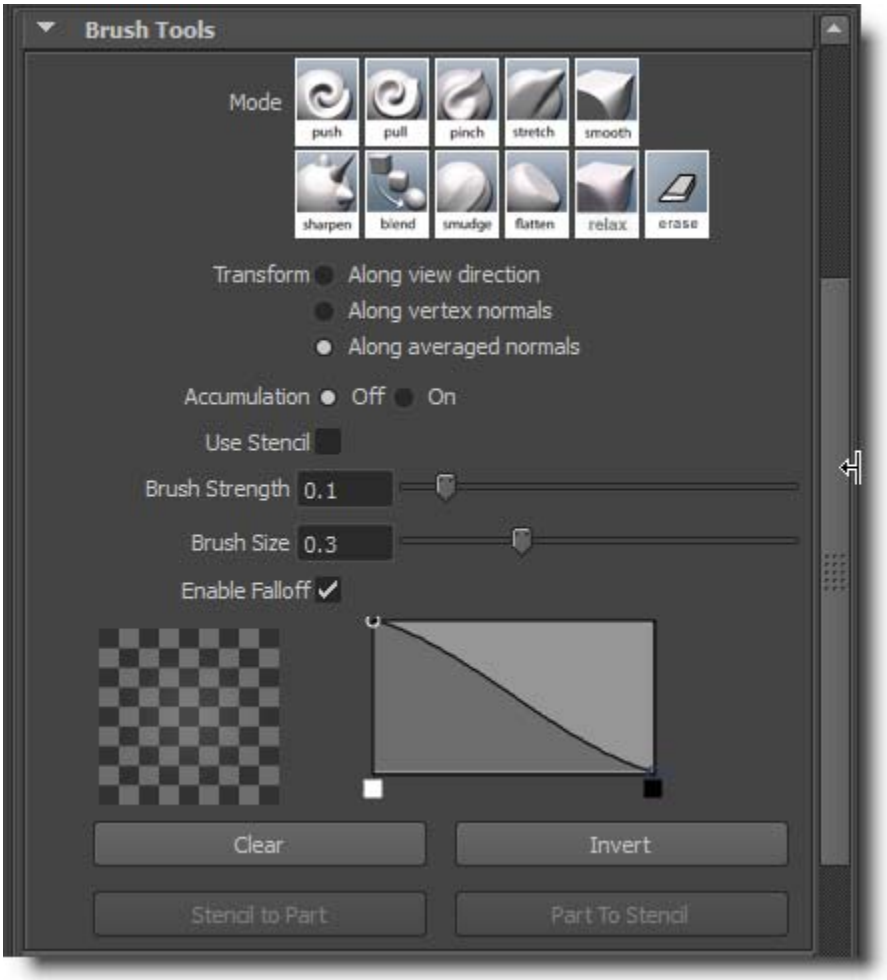
BRUSH INTERFACE AE ->



LBRUSH SCULPT TOOLS
The sculpt interface is for pulling geometry around in screen space. It is a one-click per transform operation, you click, drag, and release to perform a modeling change.
 ->MODE
  ->MOVE this moves geometry in screen space when you drag it
  -> ROTATE this spins geometry in screen space when you drag it
  -> INFLATE this translates geometry out along the normal when you drag to the right

-> SMOOTH this smooths a piece of geometry when you drag to the right
-> SHARPEN this does the opposite as smooth
-> BLEND this one blends a shape in from another target (see common properties) when you drag right

-> BRUSH SIZE - this sets the size of the brush radius
-> ENABLE FALLOFF + Graph if on, the brush's falloff is attenuated by the curve that's in the graph
-> USE STENCIL when on applies whatever stencil's been painted as an attenuation to whatever transform you pick with MODE



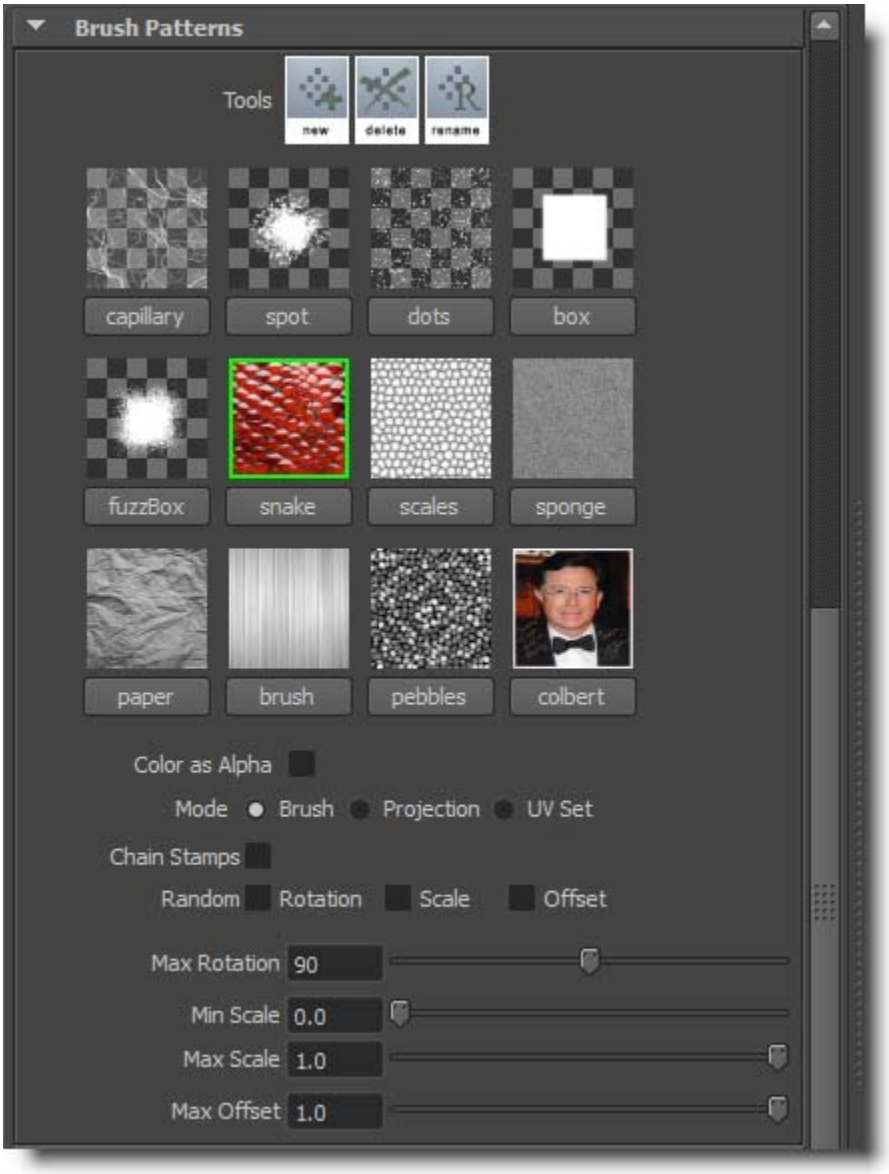
LBRUSH PAINT TOOLS
->MODE
->PUSH pushes geometry in
->PULL pulls geometry out
->PINCH pinches geometry in towards the cursor
->STRETCH pushes geometry away from the cursor
->SMOOTH smooths the geometry that's under the brush

->SHARPEN does the opposite as smooth
->BLEND this mode blends a shape from another target (see common properties)
->SMUDGE this mode pulls geometry partially along with the brush
->FLATTEN pushes geometry towards a tangent plane that's facing the camera

->AFFECT this radio dictates what aspect of the geometry the brush is changing when you paint
-> Geom when this is on, the brush is pushing around geometry
-> Stencil when this is on, the brush is painting stencil. (note PUSH paints additively, PULL subtracts)
-> Color when this is on, the brush is painting color vetexes
->TRANSFORM
-> Along view direction - for example PULL would pull directly towards the camera plane
-> Along vertex normals - for example PULL would pull out along the vertex normals that were there when the brush was stroked
-> Along averaged normals - this is the same as above, but with some smoothing applied

->ACCUMULATION
-> OFF when accumulation is OFF the stroke will add to the underlying geometry but not to itself
-> ON when accumulation is ON the stroke will continually build on itself - this feels more organic but is harder to control
-> USE STENCIL
-> ON applies the painted stencil to the attenuation of the brush
-> OFF does not apply attenuation

-> BRUSH STRENGTH this multiplies the tool's strength by whatever attenuations are being applied
-> BRUSH SIZE this sizes the brushes radius
-> PAINT COLOR - this applies only to 'color' mode
-> ENABLE FALLOFF + GRAPH - when ON applies an attenuation graph to the profile of the brush



PATTERNS

->TOOLS

-> NEW create a new brush texture cell

-> DELETE delete a brush texture cell, pick the icon, then the pattern cell

-> RENAME rename a brush texture cell, pick the icon, then the pattern cell

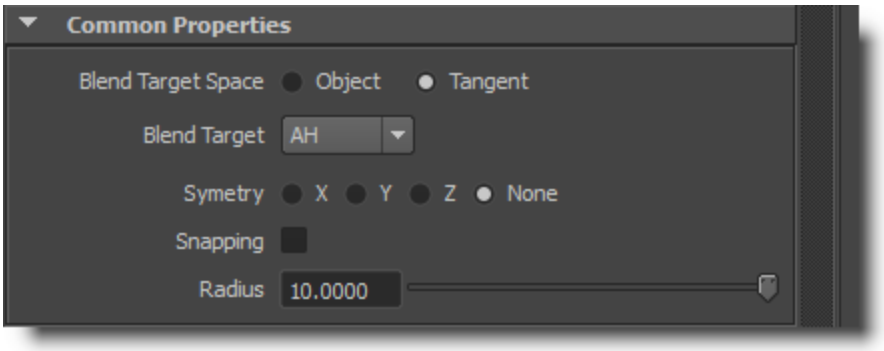
->PATTERN CELLS -> click on the picture to activate one, a green outline will appear. click again to de-activate

->MODE

-> BRUSH in this mode the texture is stamped at each mouse location during a stroke

-> PROJECTION in this mode the texture is overlaid over the object as an attenuating stencil, after you click on the pattern the stencil will appear - move the mouse out to the work area to place the

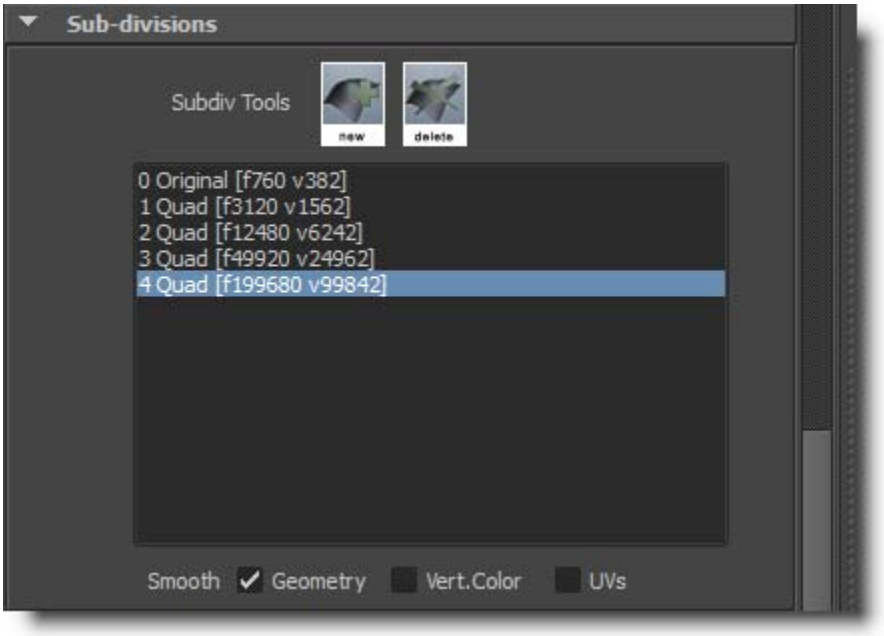
texture, and click once
  -> UV Set in this mode the texture is applied as a stencil the way it would be applied if you texture mapped the object (according to UV)
-> MAX ROTATION - this slider sets the upper range of random rotations to be added to the brush
-> MAX SCALE - this slider sets the upper range of random scale to be added to the brush
-> MAX OFFSET - this slider sets the upper range of random translation to be added to the brush



COMMON PROPERTIES
-> BLEND TARGET SPACE
  -> Object - use this space is you want the blend brush to be pulling in the pose with the shape
  -> Tangent - use this space if you want the blend brush to be pulling in only the displacements

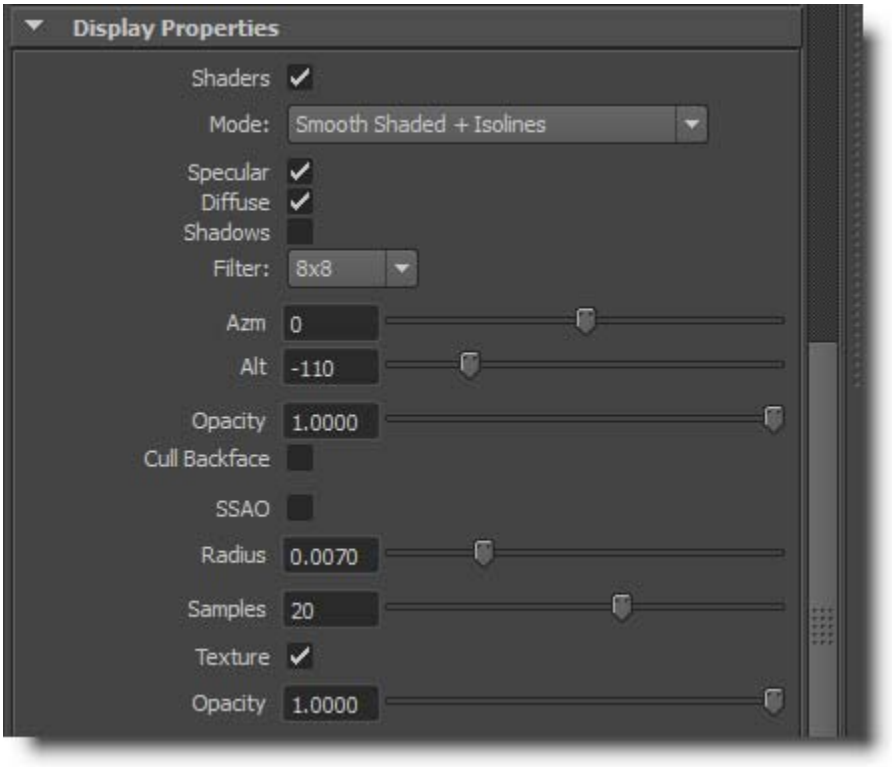
->SYMMETRY
  -> [x][y][z][none] This turns on symetry about an axis when painting

->SNAPPING This will snap the reflected symmetry cursor to the nearest surface on the other side of the reflection axis
->RADIUS This is the search radius for the snap



SUBDIVISIONS
->SUBDIV TOOLS
-> NEW create a new subdiv level
-> DELETE delete a subdiv level
{listbox shows subdiv levels along with face and vert counts for each - current level is highlighted}

SELECTION/VISIBILITY
->SELECT NODE - Select all faces in the node
->EXPAND SELECTION - Add faces which neighbor the selection to the selection
->REDUCE SELECTION - Remove the furthest out ring of faces from the selection
->HIDE SELECTED - Hide the selected faces - brushes don't operate on hidden faces
->SHOW HIDDEN - Show all faces
->INVERT HIDDEN - toggle visibility for all faces



DISPLAY PROPERTIES [need to add in newer stuff]

-> MODE (pulldown)

  -> ISOLINES - iso lines correspond to the outlines of the original polygons on the subdiv surface

  -> ISOLINES + POLYGONS - polygons are the tiny divided polygons between the isolines

  -> SMOOH SHADED - this fills in the object as a solid

  -> SMOOTH SHADED + ISOLINES

  -> SMOOTH SHADED + ISOLINES+POLYGONS

-> SPECULAR - turns on specular highlights

-> DIFFUSE - turns on diffuse shading

-> SHADOWS - turns on shadow casting

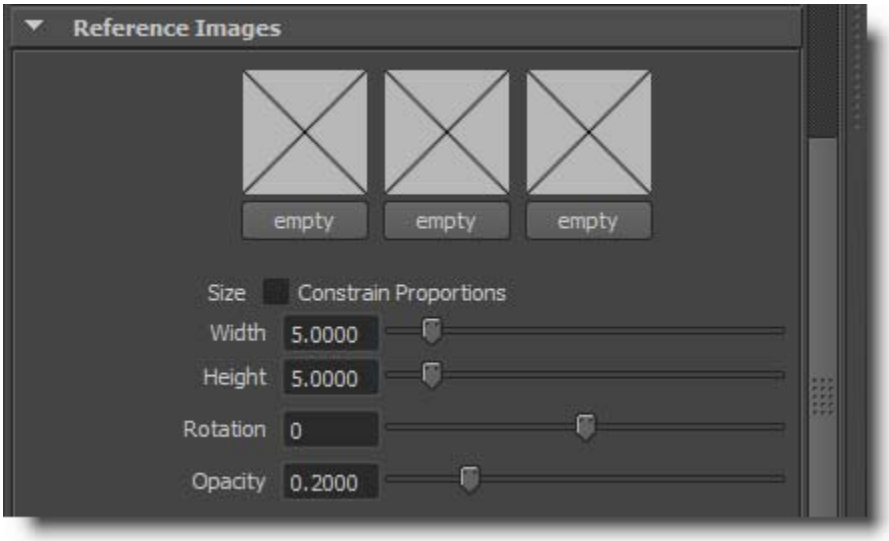
-> FILTER - sets how fuzzy the shadows are

-> AZM - Azmuth angle to the light source

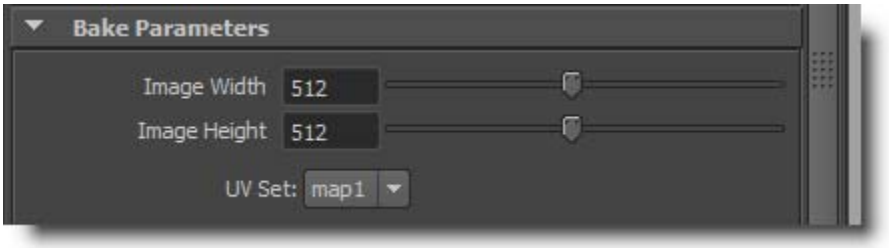
-> ALT - Altitude angle to the light source

-> OPACITY - sets the transparency of the geometry

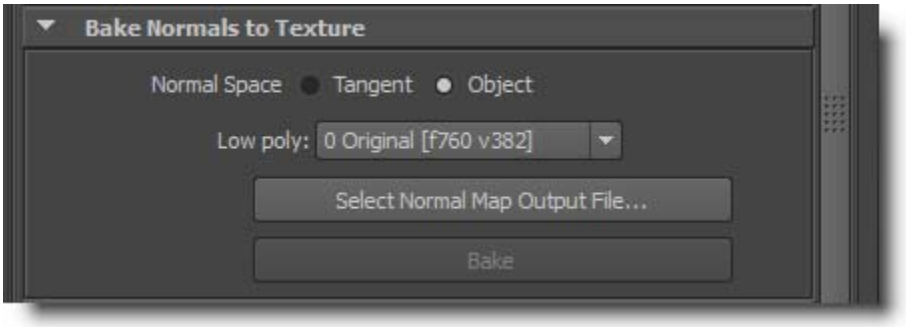
-> CULL BACKFACES - removes faces which are facing away from camera from the draw list



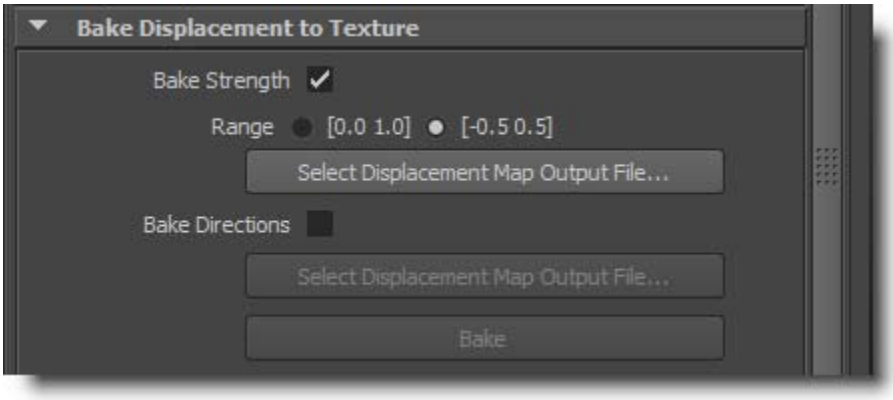
REFERENCE IMAGES
[image picker] - select an image to activate ref image
SIZE
-> CONSTRAIN PROPORTIONS - maintain the same aspect ratio
-> WIDTH horizontal size
-> HEIGHT - vertical size
-> ROTATION - rotate card in screen space
-> OPACITY - fade image



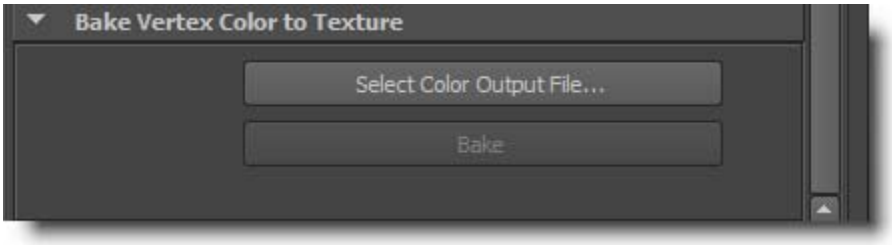
BAKE PARAMETERS **- should be bake COMMON parameters**
-> image width
-> image height
-> UV Set [PULL DOWN] - select the UV basis for the bakes



BAKE NORMALS TO TEXTURE
->NORMALSPACE
-> tangent
-> object
-> LOW POLY [pulldown] select the subdivision level the texture be applied to
-> SELECT NORMAL MAP OUTPUT FILE - name an output file
-> BAKE [button] - do it!



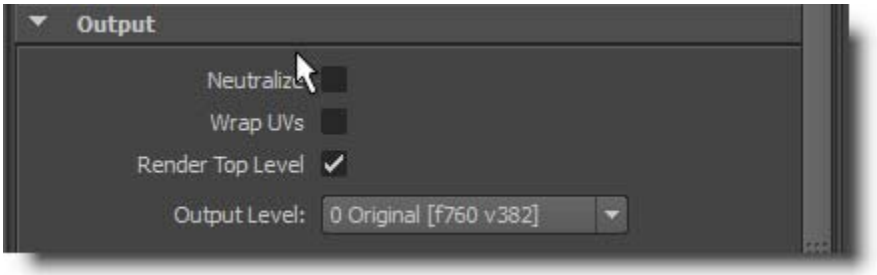
BAKE DISPLACEMENT TO TEXTURE
-> BAKE STRENGTH - scale the values
-> RANGE - is the center grey or black?
-> SELECT DISPLACEMENT MAP OUTPUT FILE - name an output file
-> BAKE DIRECTIONS [on/off]
-> SELECT DISPLACEMENT DIRECTIONS MAP OUTPUT FILE - name an output file
-> BAKE [button] - do it!



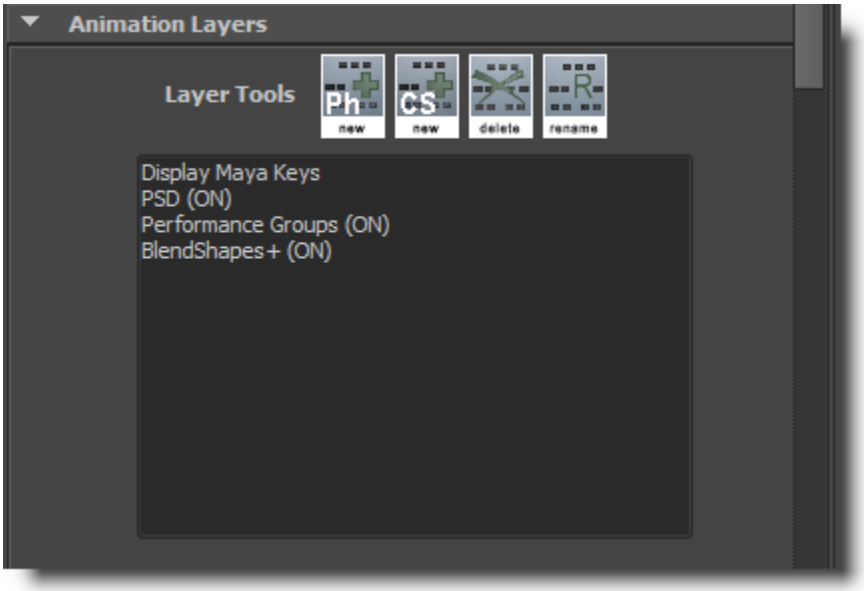
BAKE VERTEX COLOR TO TEXTURE
-> SELECT COLOR OUTPUT FILE - name an output file
-> BAKE [button] - do it!

[image 3-17]

NODE AE->LBrushXX



->OUTPUT
->Render Top Level - when this is on, the object will get fully divided at render time regardless of display setting
->Output Level [PULLDOWN] - this sets the display subdivision level in Maya



->Animation layers

-> LAYER TOOLS -

[icon] NEW - this adds a new layer for animation

[icon] DELETE - this deletes the current layer of animation

[icon] RENAME - this renames the current layer - (a dialogue will pop up)

[image] this listbox displays the current animation track highlighted

SINGLE CLICK ON ANIMATION LAYERS TO TURN THEM ON AND OFF

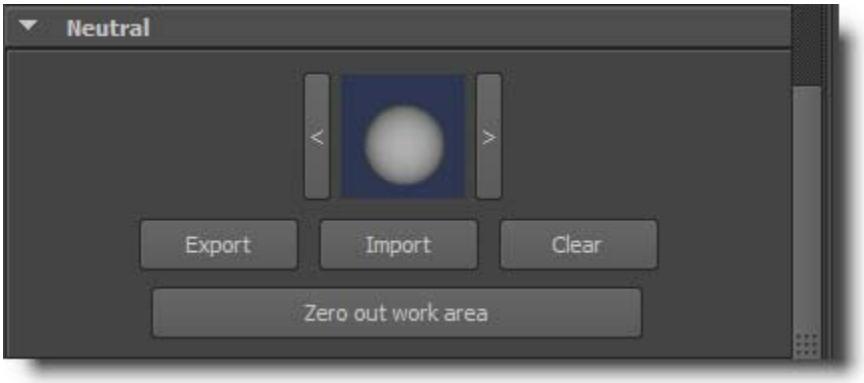
-> Apply PSD corrections - This turns on the PSD engine for animation

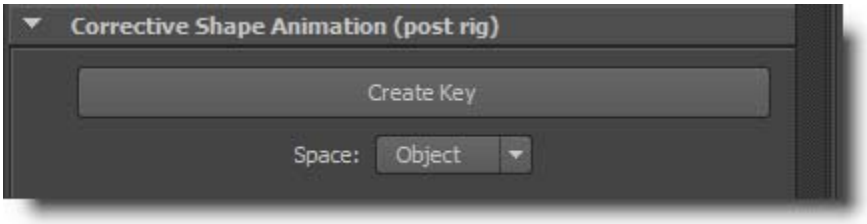
-> Apply CS aniamtion - This turns on a layer of “Corrective Sculpt” animation

-> Apply PHONEME aniamtion - This turns on a layer of “Phoneme” animation

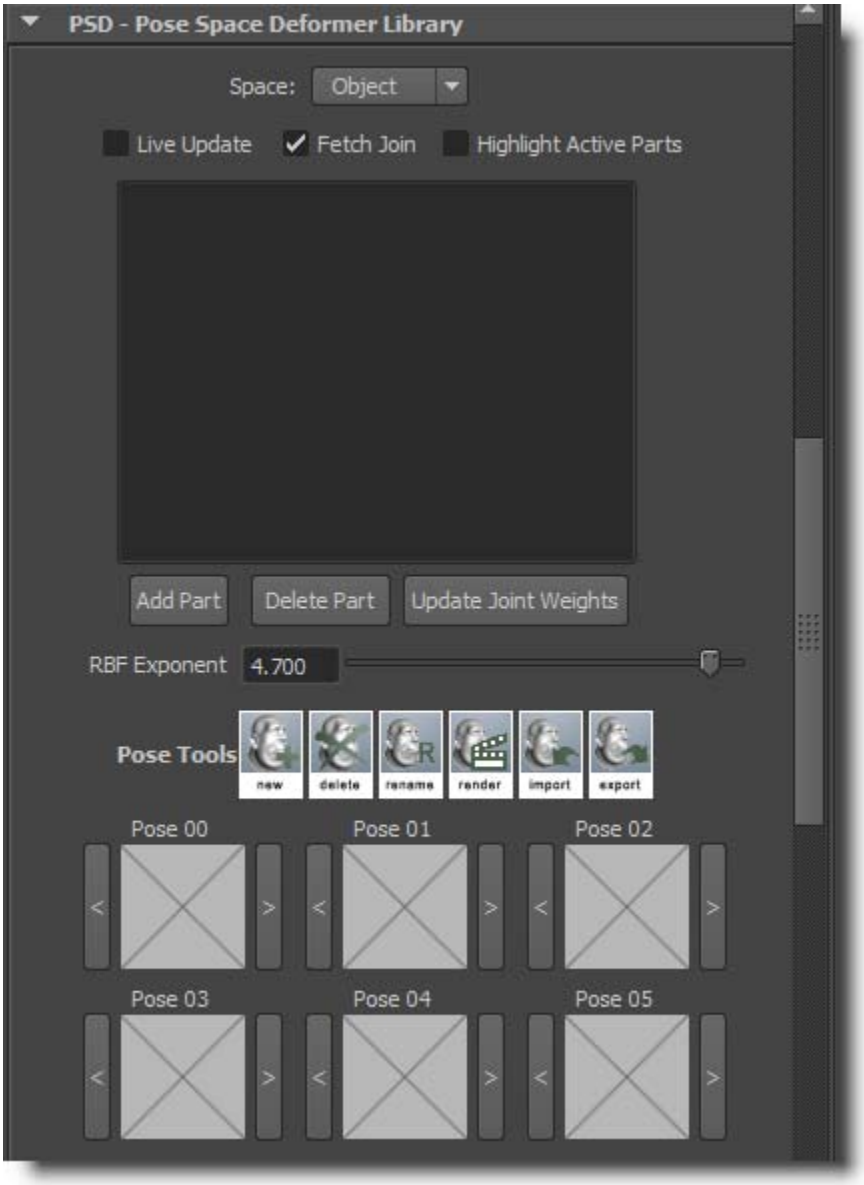
-> Apply PERFORMANCE aniamtion - This turns on a layer of “PERFORMANCE” animation

-> LIVE UPDATE - This turns on the PSD engine for interactive joint transforms [can be distracting, but can have uses]





-> "Correctional Sculpt Animation" - Post Rig Tangent Space Animation
-> create key - creates a keyframe (so does the 's' key)
-> clear work area - clears all deltas from the shape currently in the work area, shape becomes basically a posed neutral for you to build on.



-> PSD - Pose Space Deformation Library

-> POSE TOOLS

[icon] NEW - creates a new pose cell

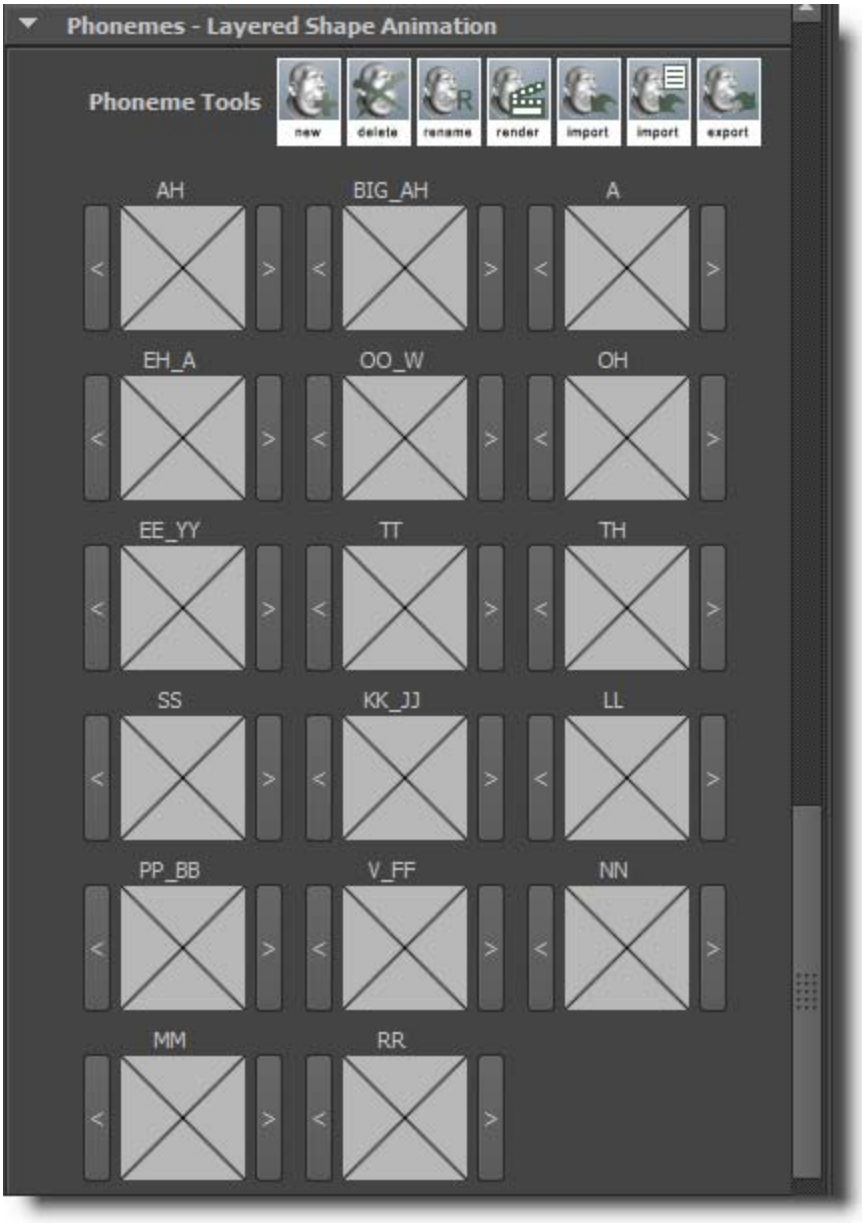
[icon] DELETE - Deletes a pose cell. Press the icon, then the cell you wish to delete.

[icon] RENAME - Renames a cell. Press the icon, then the cell you wish to rename.

[icon] RENDER - This will re-render a cell using the current view. Press the icon, then the cell you wish to re-render

-> Fetch Joints -> When this is on, if you fetch a pose with the '<' button, it will also fetch the joint information, when it's off - you will only receive the displacements
around in the viewport [can be distracting, but has it's uses, default is OFF]

-> POSE CELLS - each pose cell has a button on the left '<' a picture area and a button on the right '>'. The picture area is NOT used to ***create a key*** in this mode, since it's not key based . The '<' button is used to ***bring the shape into the work area.*** And the '>' is used to capture the work area into a cell. The cells actually store the shape information (in tangent space), as well as the object space shape for level 0, and all your joint information.



PHONEME ANIMATION

-> PHONEME TOOLS

[icon] NEW - creates a new phoneme cell

[icon] DELETE - deletes a phoneme cell. press the icon, then press a cell to delete.

[icon] RENAME - renames a phoneme cell. press the icon, then the cell.

[icon] RENDER - re-renders a phoneme cell. press the icon, then the cell.

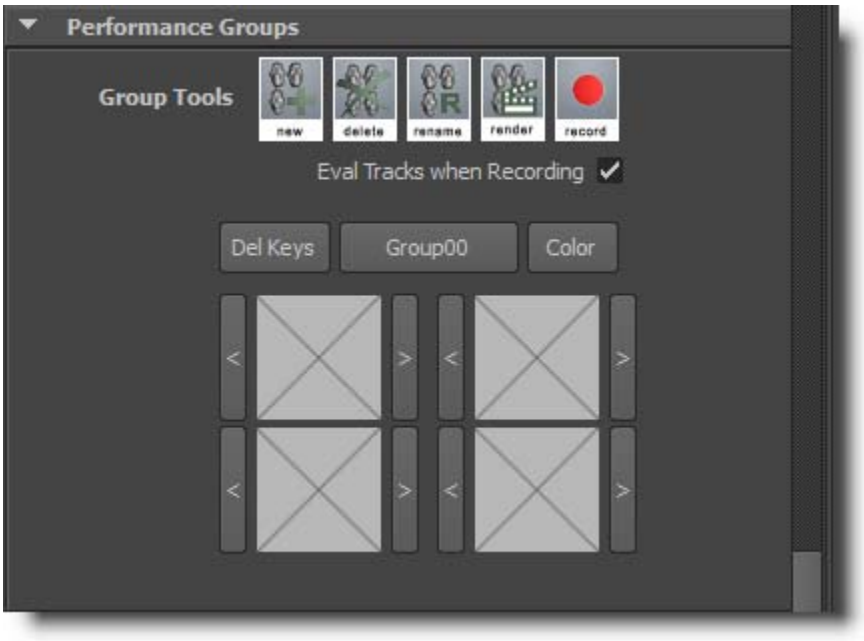
[icon] IMPORT TARGET - imports a model (must be the same number of verts and faces!) into cell. Press the button, then pick the model in the viewport

[icon] IMPORT TARGET FROM OUTLINER - imports a model (must have the same number of verts and faces!) into the cell. Pick the icon, then pick a model from outliner

[icon] EXPORT - exports a cell to the to a maya model model.

-> POSE CELLS - each pose cell has a button on the left '<' a picture area and a button on the right '>'. The picture area is used to ***create a key***. The '<' button is used to ***bring the shape into the work area.*** And the '>' is used to capture the work area into a cell. The cells actually store the shape information (in tangent space), as well as the object space shape for level 0, and all your joint information.

PHONEMES
-> PHONEME TOOLS
[icon] NEW
[icon] DELETE
[icon] RENAME
[icon] RENDER
[icon] IMPORT
[icon] IMPORT FROM OUTLINER
[icon] EXPORT



PERFORMANCE GROUPS
-> GROUP TOOLS
  [icon] NEW
  [icon] DELETE
  [icon] RENAME
  [icon] RENDER
  [icon] RECORD
-> Eval Tracks when Recording
-> DEL KEYS
-> GROUP 00
-> COLOR
-> ‘<‘
-> ‘>’