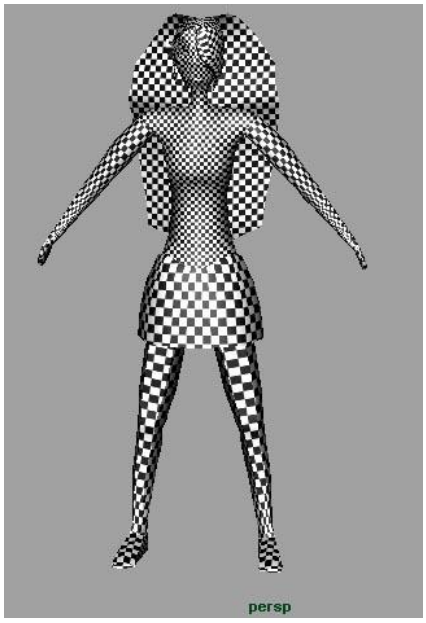
Character Unwrapping

by Amy Gallan



To texture a character you need to go through the process of unwrapping. Unwrapping is essentially unfolding your 3D geometry to flatten into a 2D view. The purpose of unwrapping is so that Maya can project a 2D texture around a 3D 'curved' surface without distortion.

The goal for a successful unwrap is to have minimal texture seams, which are the splits at the edges where your faces unfold. And to have minimal stretching and deformation of the actual shape itself.

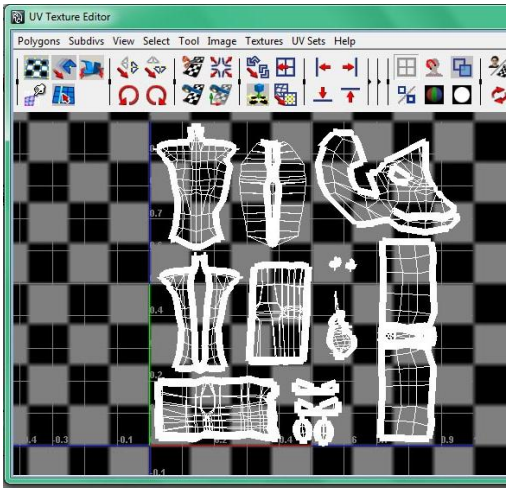
This is no easy feat! But have patience and practice this skill, and you will find yourself unwrapping like a pro in no time!

Use these notes as a basic guide to some of the procedures and workflow to unwrap your own characters!

First let's cover some basic tools you'll need to know.

The UV Texture Editor

The UV Texture Editor is where you can view and edit your UV's. UV's are displayed here in '2D' format.

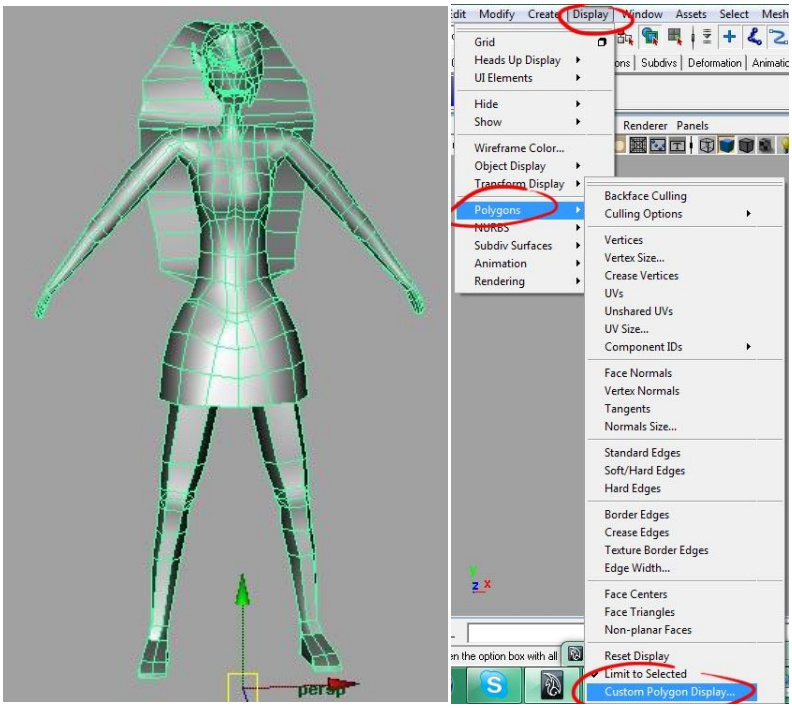


Display Texture Borders

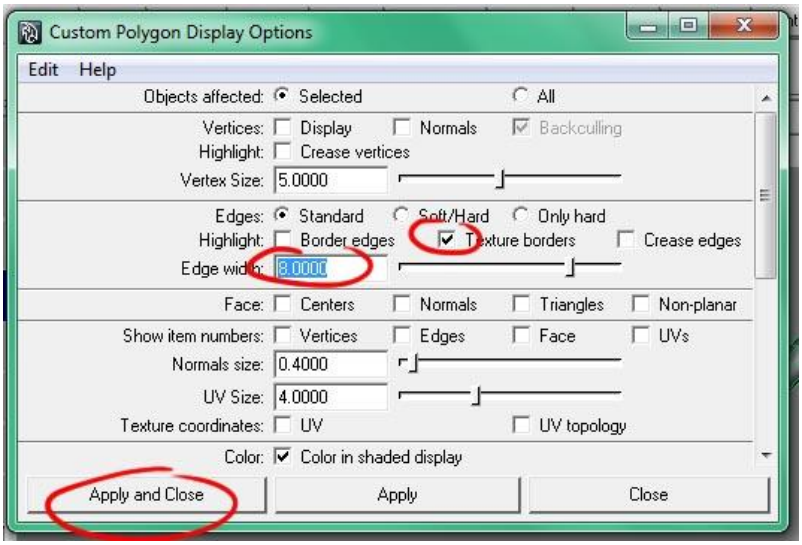
The placement of seams is vital to your unwrap. Seams are areas where the 3D shape has to be split from to flatten out in 2D for the UV Shells. Seams are inevitable, however you can be strategic about hiding them in areas of your model that aren't as visible. Also seams are perfect in area; such as the edge where a t-shirt texture changes to a pants texture.

To be able to control where you place your seams, we can display border edges...aka texture seams.

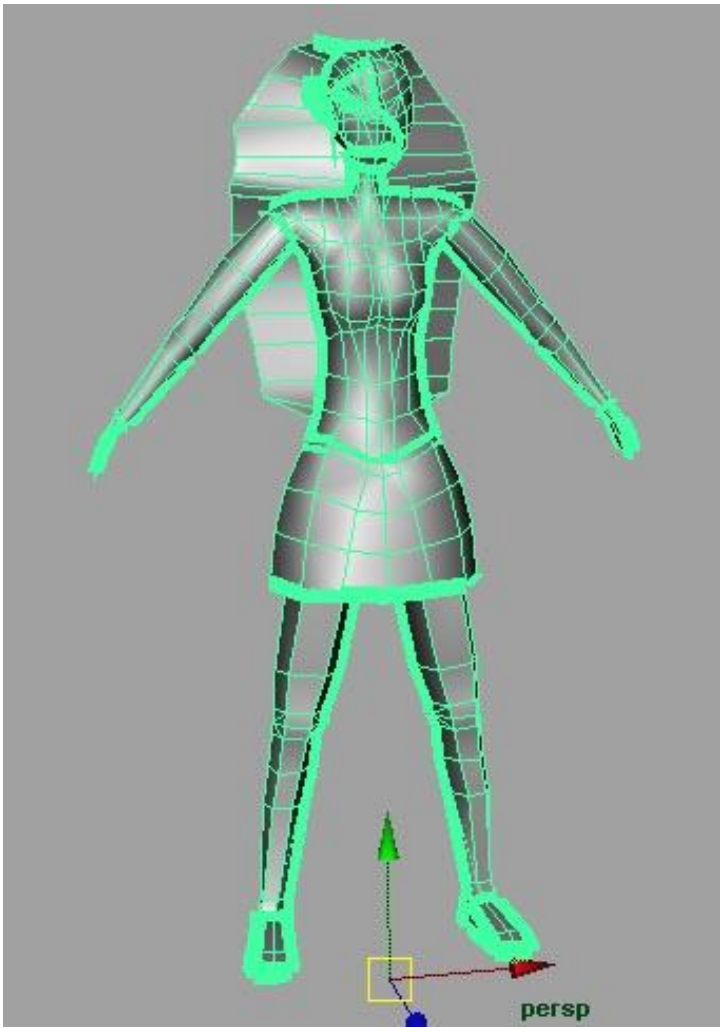
Display > Polygons > Custom Polygon Display



In the options make sure Texture Borders is ticked, and turn the edge width up to around 8.

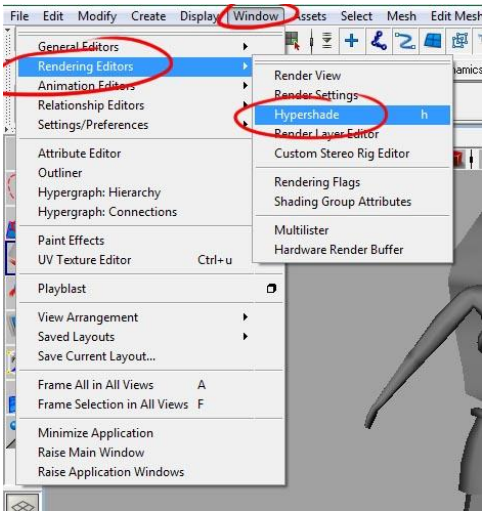


As you can see below the seams are now visible. Make note of the seam placement in this diagram, as this may give you ideas where to hide your seams for your character. For example, hide the seam for the leg running down the inside of the leg, so that it is the least visible.

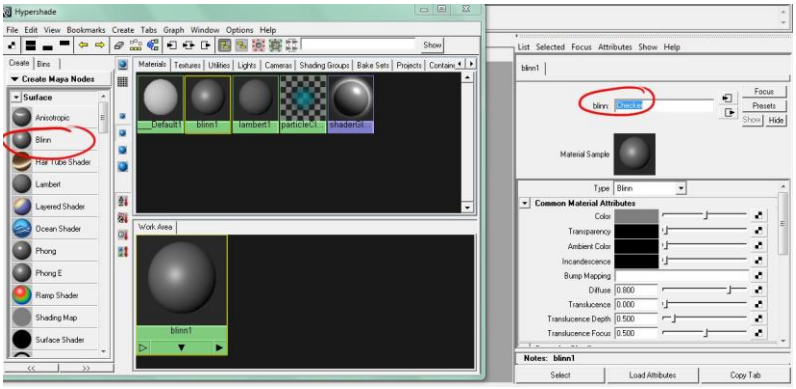


Unwrapping with a Checker Texture

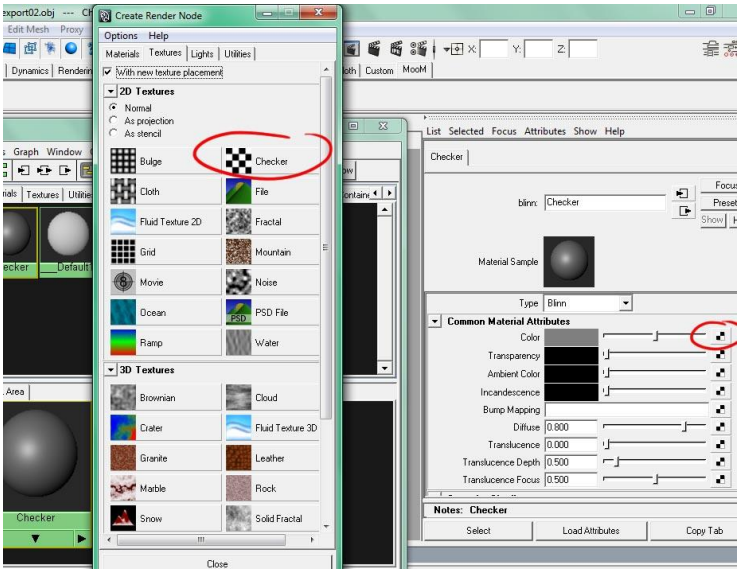
Applying a checker texture, or a similar texture to your model can assist in visually seeing how your 2D UV's will project texture co-ordinates onto your 3D model. Your aim with the checker texture is to get all of your checkers remaining as 'square' as possible without stretching or distortion.



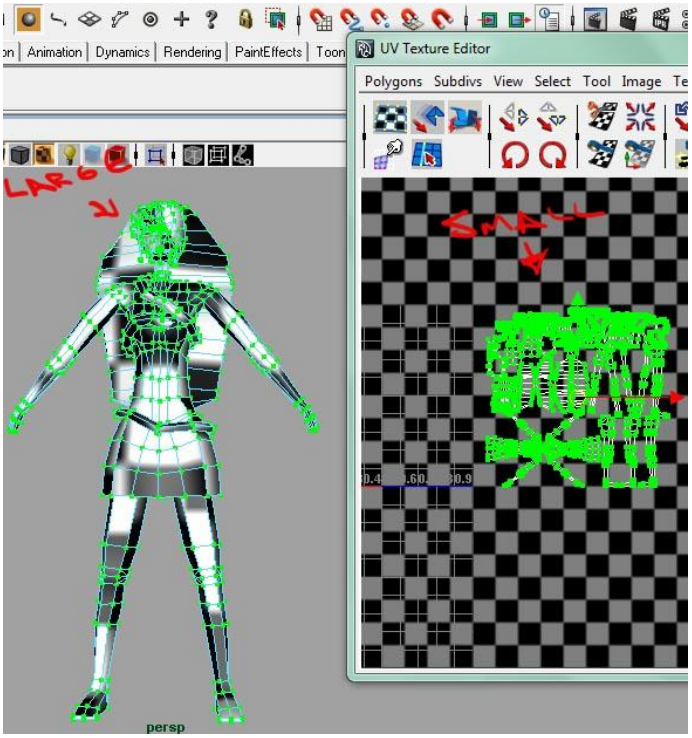
In your Hypershade create a 'Blinn Texture Node'



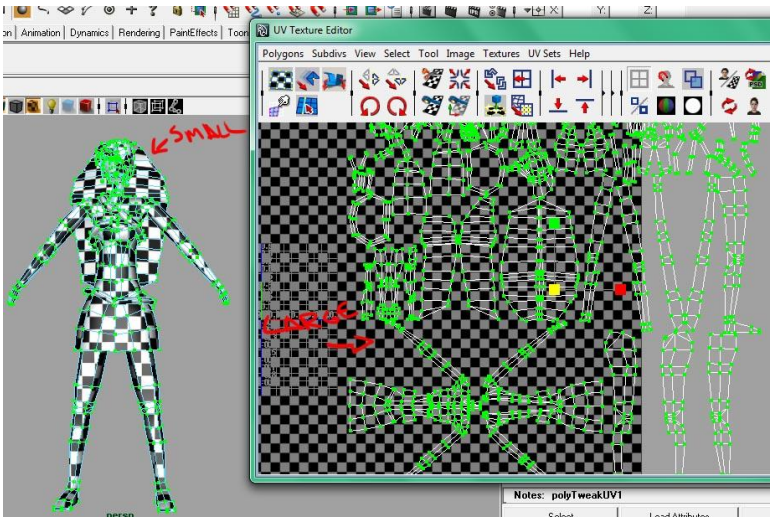
Then in the 'Colour' input (checker box next to colour in the attribute editor) Select checker.



The general rule with texture space is the smaller the UV's are in the UV texture editor, the more magnified/low res the texture is on your model.



So therefore if you want your checkers to appear smaller and more detailed, simply scale up all of your UV's in size.

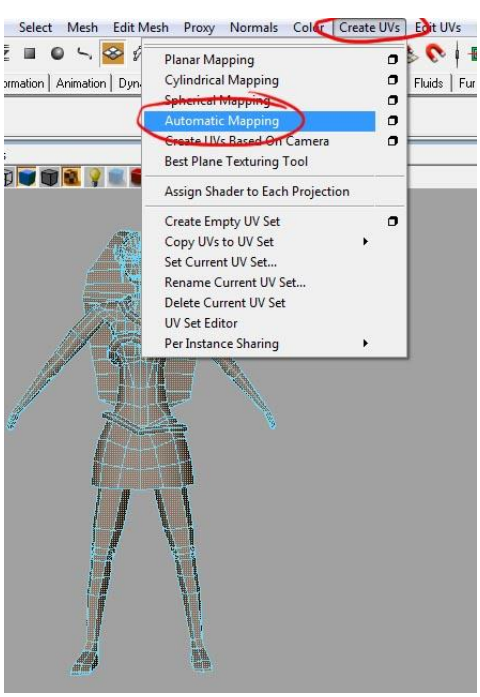


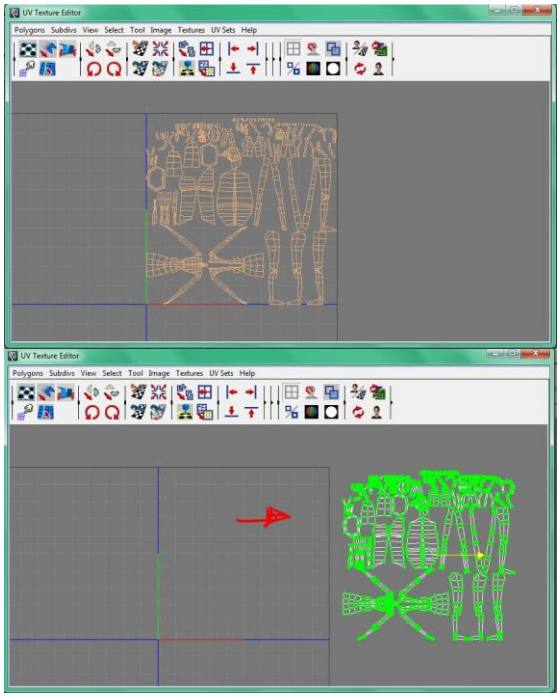
Automatic Mapping

When starting out with the unwrapping process, your UV's can look like a huge mess in the texture editor. It can help to lay everything out in little pieces and move them off to the side to clear up your UV texture editor viewport.

To do this select your entire mesh and go to

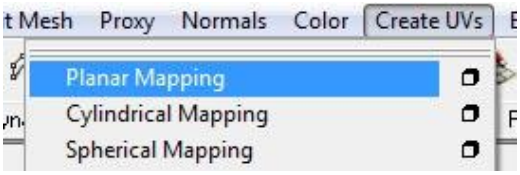
Create UV's > Automatic Mapping





Planar Mapping

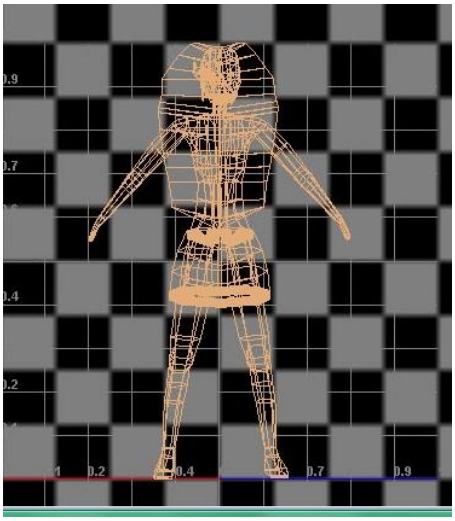
Planar mapping is basically going to project UV's flat from a single view.



For example if you select all of your faces and projected from the front view it would look like your model does from the front view.

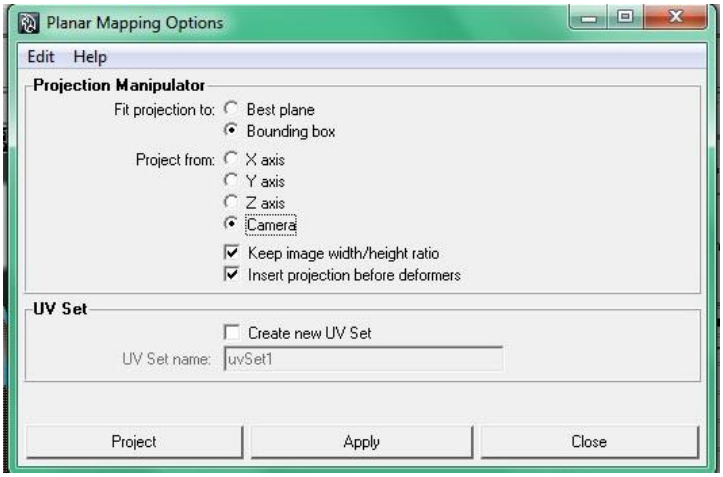
However using this alone as your unwrap would result in stretching and overlapping textures etc.

So for best results we need to use a combination of mapping techniques to separate all of the different sections of geometry into separate UV shells with minimal distortion.



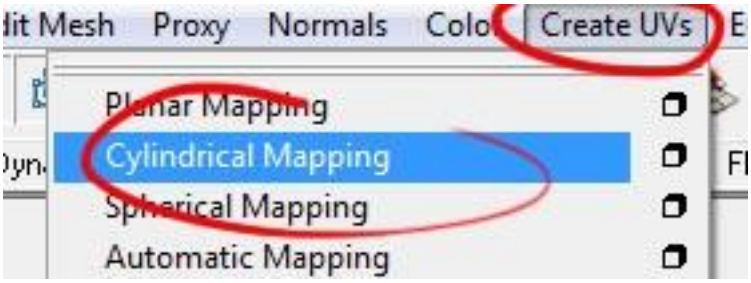
In the planar mapping options your can choose the view that best suits the angle that your selected faces are facing. For angles that don't fit to XY or Z you can line up the perspective camera and project from 'Camera'.

Ensure you have 'Keep image with/height ratio' ticked to ensure your UV projection doesn't stretch out of shape.



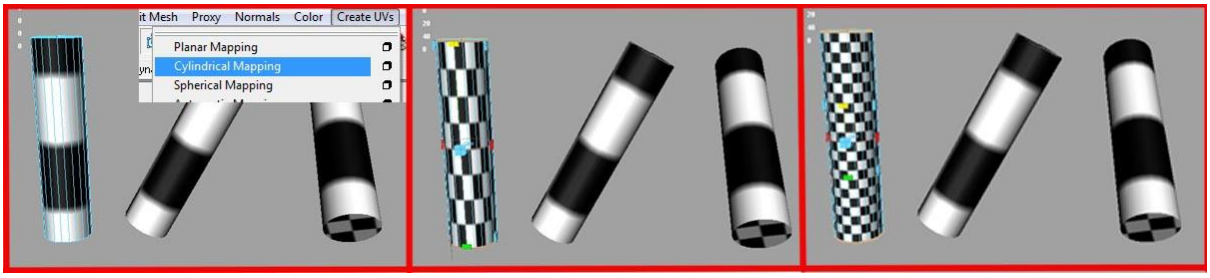
Cylindrical Unwrap

The cylindrical unwrap basically project a texture surrounding your selected geometry from a 360 degree view. However a cylindrical map splits the round model along a particular edge to separate those texture edges apart and flatten the whole shell out into 2D texture co-ordinates displayed in the UV texture editor.



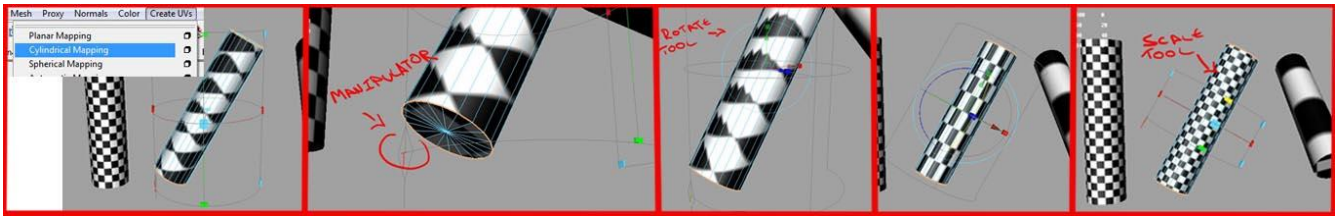
However placing the cylindrical map so that it wraps neatly around your model can take a bit or fiddling around with the rotate and scale of the actual 'cylindrical map manipulator'

Below we can see a cylindrical map applied to a cylinder. As this is at a straight angle the cylindrical map is going to sit neatly in this position by default. All you need to do is use the projection map scale manipulator to scale the UV's down to become 'square' in the viewport and not stretched.

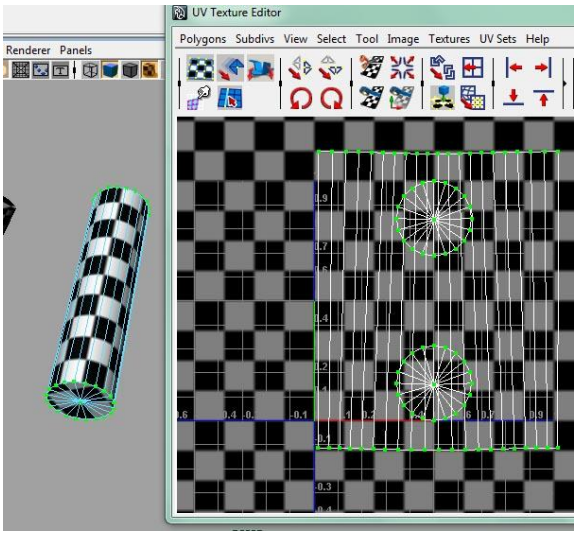


However if we apply a cylindrical map to some geometry that is off to an angle, we will have to also rotate and scale the ‘cylindrical map gizmo’ to fit around the geometry’s position.

As you can see in the pictures below, you can select the manipulator mode (red ‘T’ cross at the bottom or the cylindrical gizmo) and then select the rotate circle, now you can begin to match up the position. Once rotated into position fix and stretching UV’s by using the scale tool.



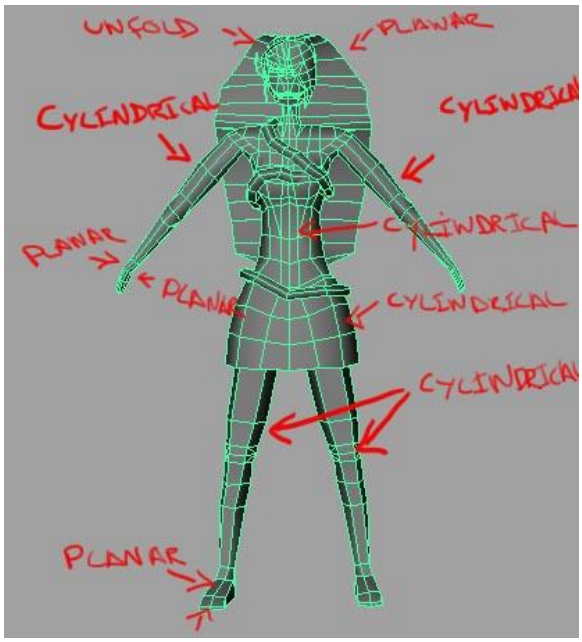
Below is an example of how the above geometry will look in the UV texture editor once unwrapped.



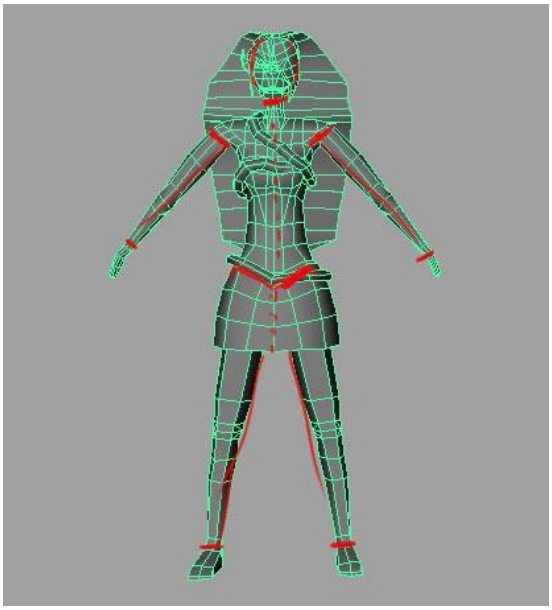
Unwrapping the character!

So now that we have covered some of the basics, let's get stuck into unwrapping a character.

When starting out it is best to break your model down into its basic shapes, to determine the best method of mapping. For example I would make the most of the natural shape and cylindrically map each of the limbs. But would planar map the tops and bottoms of the hands and feet, as they are relatively flat surfaces.



It is also very important to anylise your model and plan out where you want your seams to be placed.

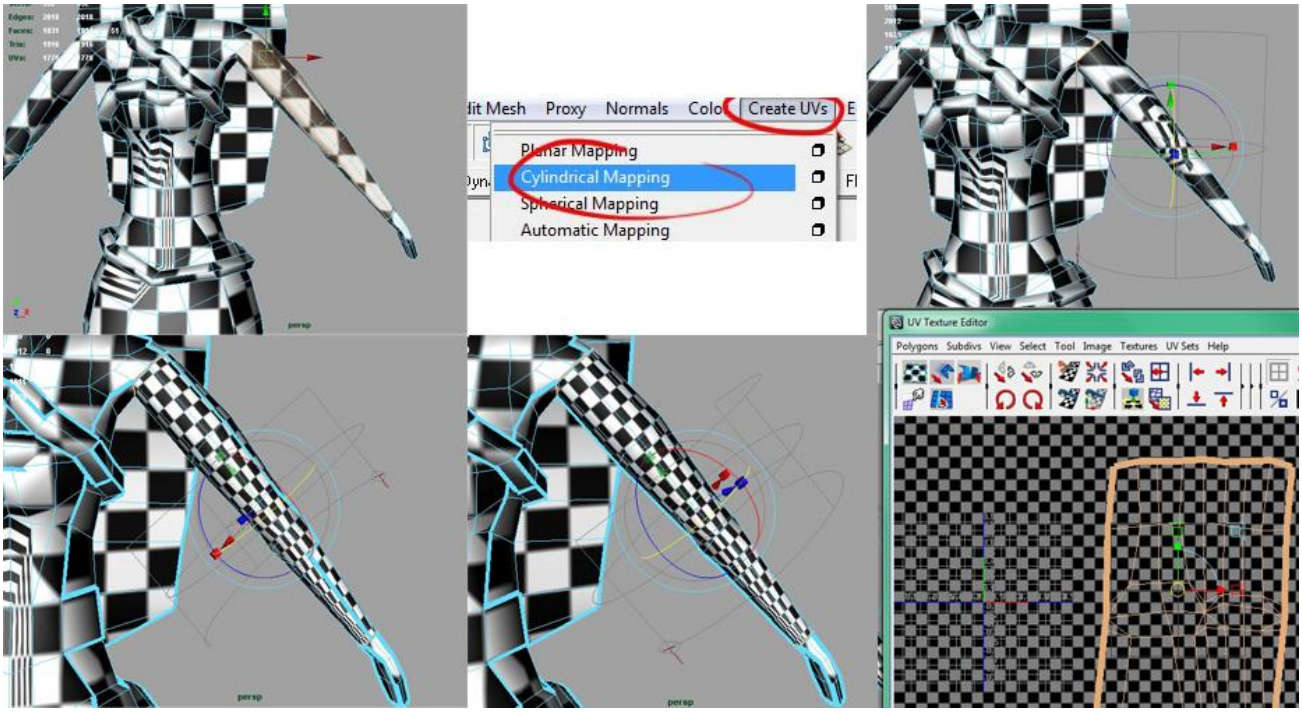


Once you have figured this out, you will know what faces you need to select, what UV mapping technique to apply and exactly where you want the texture border seams to be placed. It is now just a matter of spending the time to carry out the unwrapping process section by section

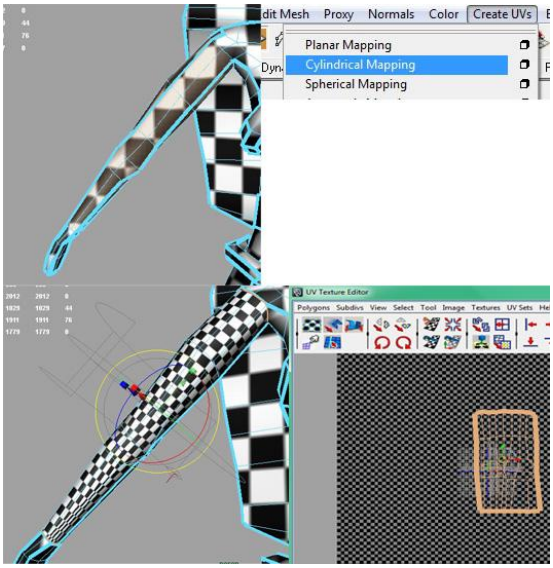
Below is a step by step guide on how I have unwrapped my character. For each section of the body the images show what faces to select, what map I have used, how to position the projection map gizmo (if required), how the checker texture appears in my viewport, and how the UV shell appears in the UV texture editor.

Arms

Select the faces along the arms, finishing at a nice edge loop around the wrist and the shoulder. Apply a cylindrical map and then rotate and scale the cylindrical map gizmo to fit your geometry. The UV shell for your arm should resemble a rectangle type shape. Move this shell off to the side so that is out of your UV workspace.

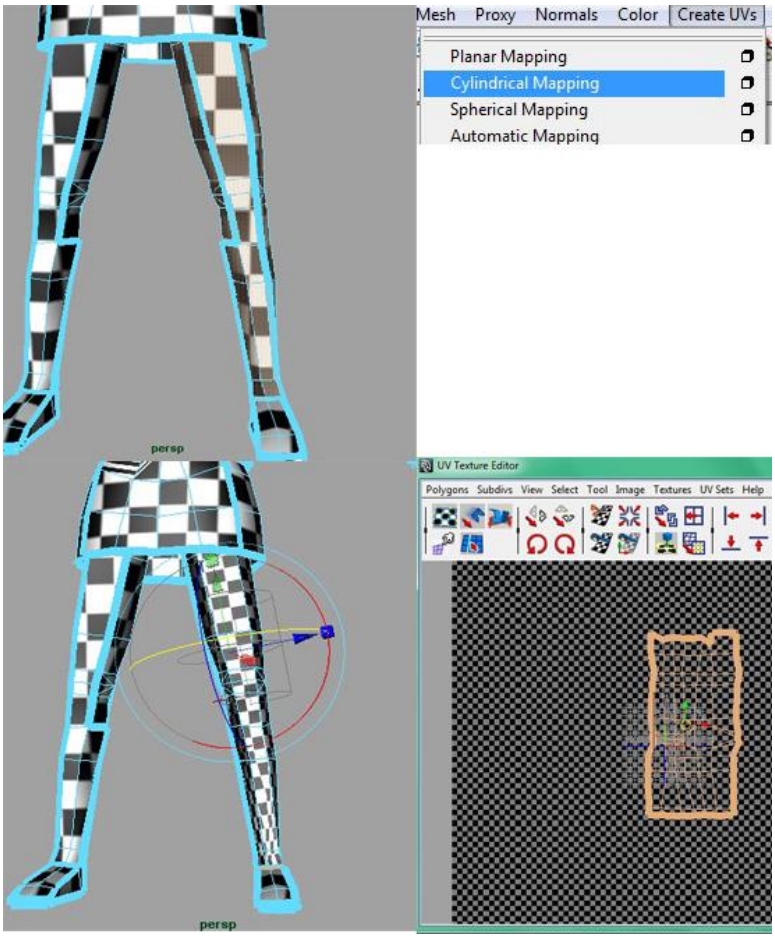


Repeat the above process for the other arm.

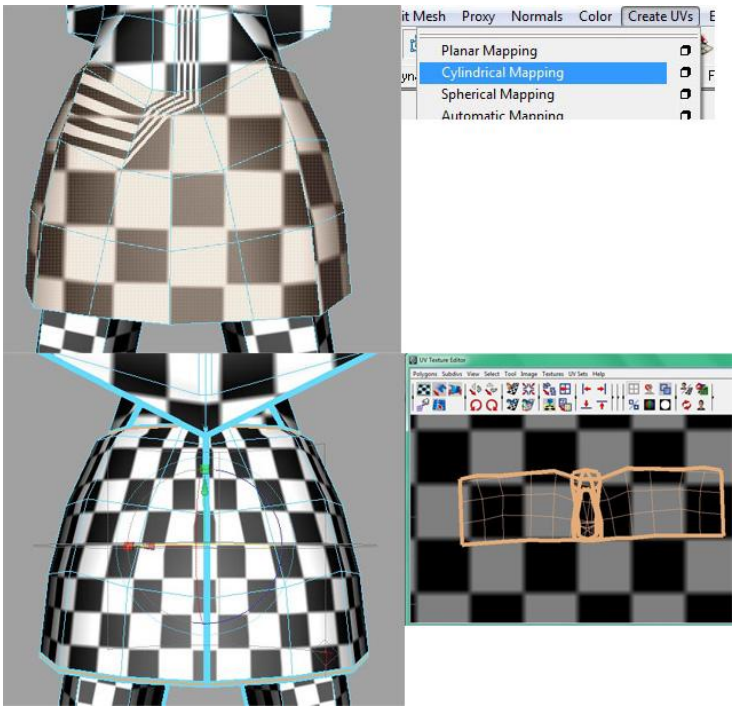


Legs

Follow a similar process to the arms but this time selecting the leg geometry.

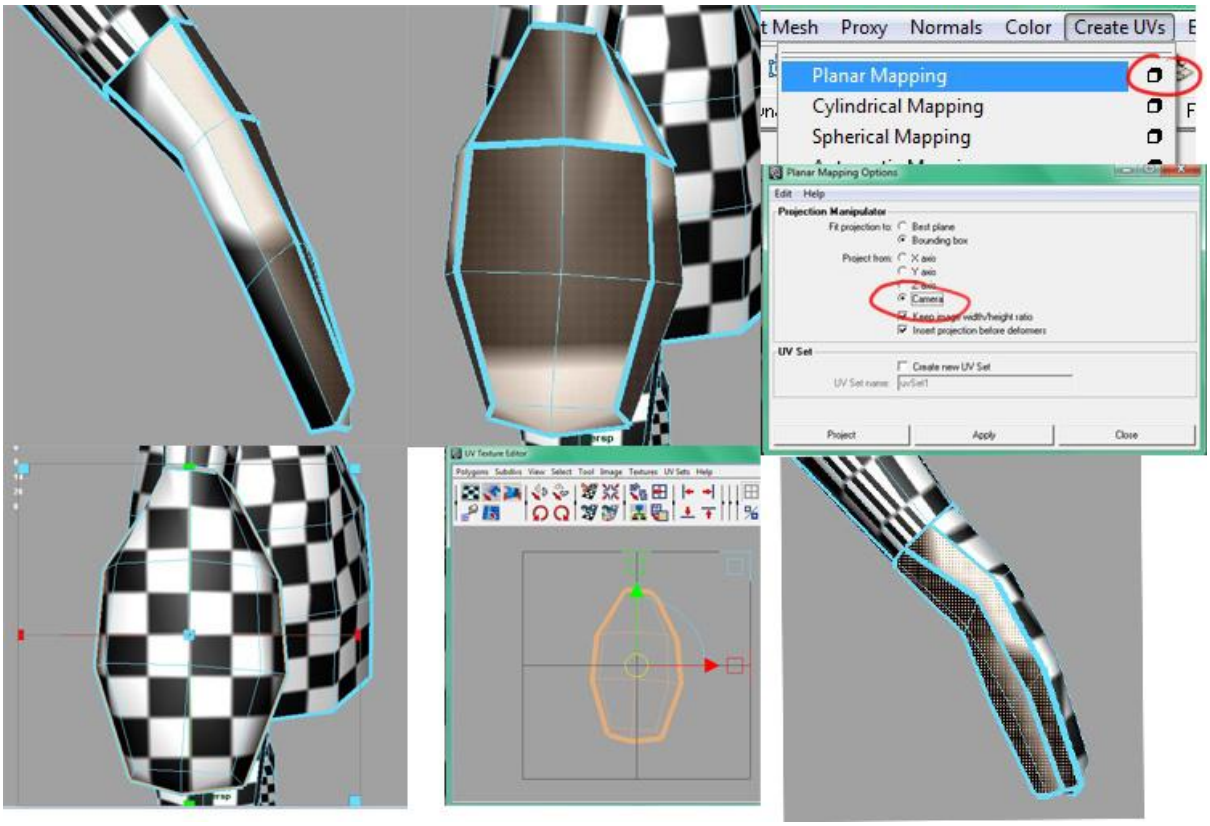


Skirt



Hands

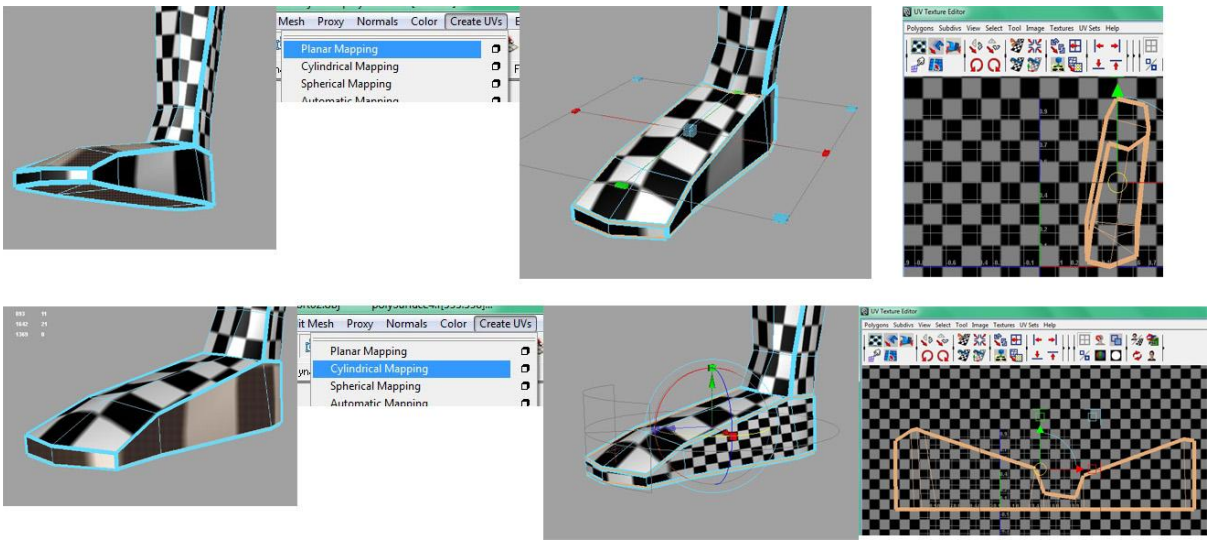
Select the geometry on the top of the hands, position your camera to look straight towards the ‘flat’ of the face selection. Planar project from camera. Now repeat for the underside of your hand.



Feet

Select the tops and bottoms of the feet, similar to the hands, and planar project on the Y axis.

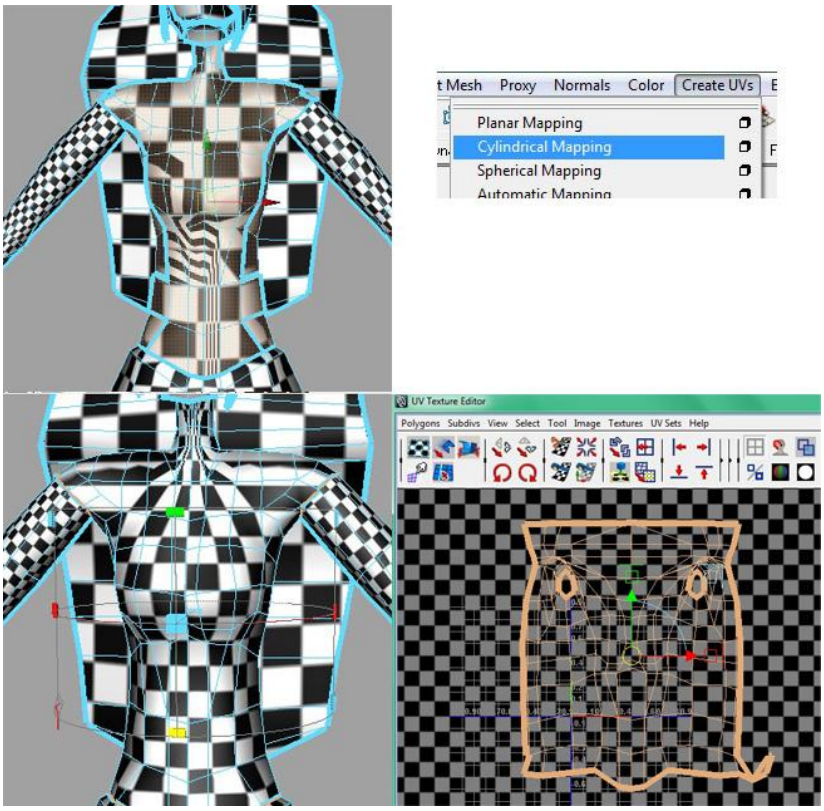
Then go around the foot selecting the sides that are facing vertically (not horizontally like the tops and bottoms of your feet). Apply a cylindrical projection to these faces.



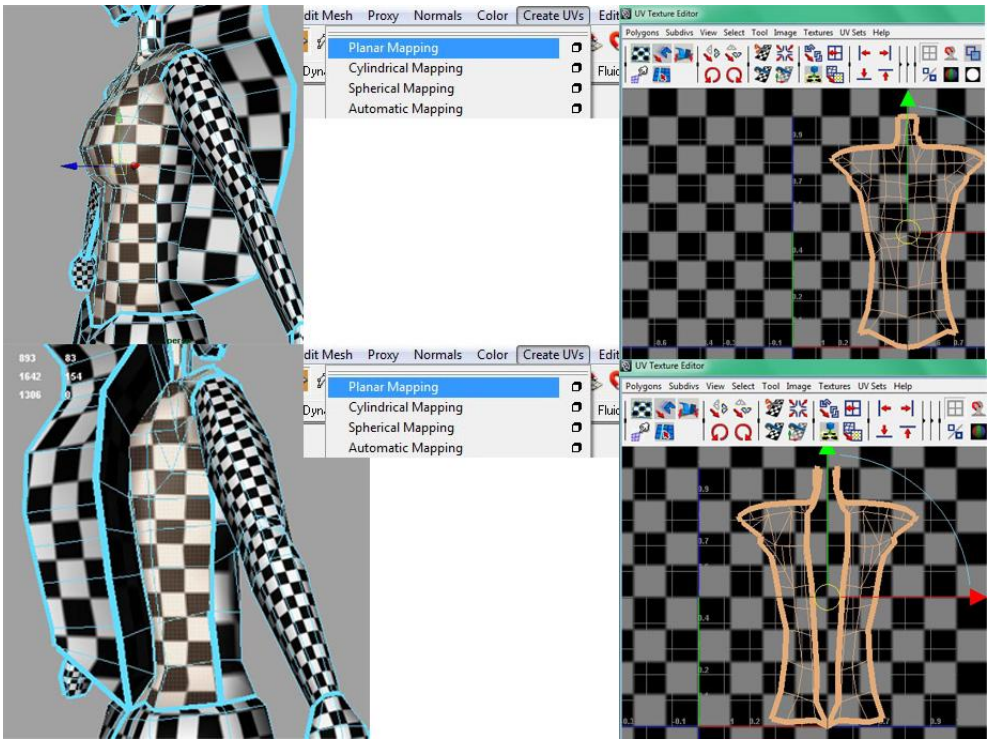
Torso

In this case I could use either of two different approaches.

The first is cylindrically mapping the entire way around the torso, placing the seam along the spine.

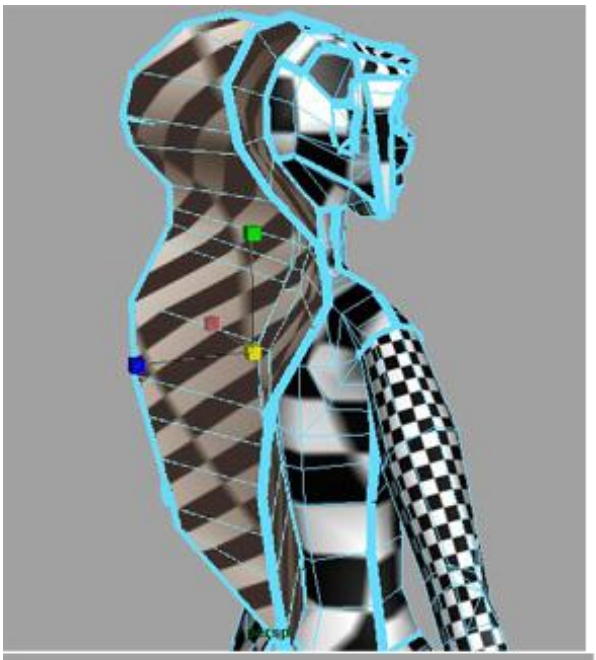


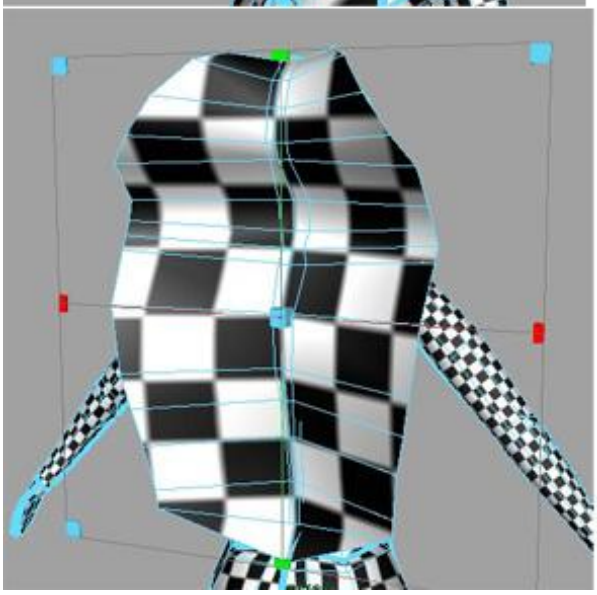
Or I could planar map the front and the back of the torso separately. Leaving the seam to run down the sides of your character's body.

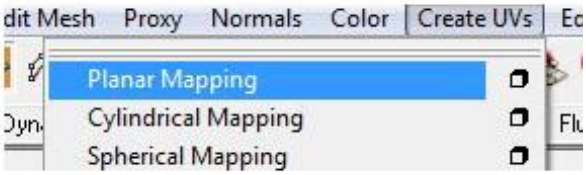


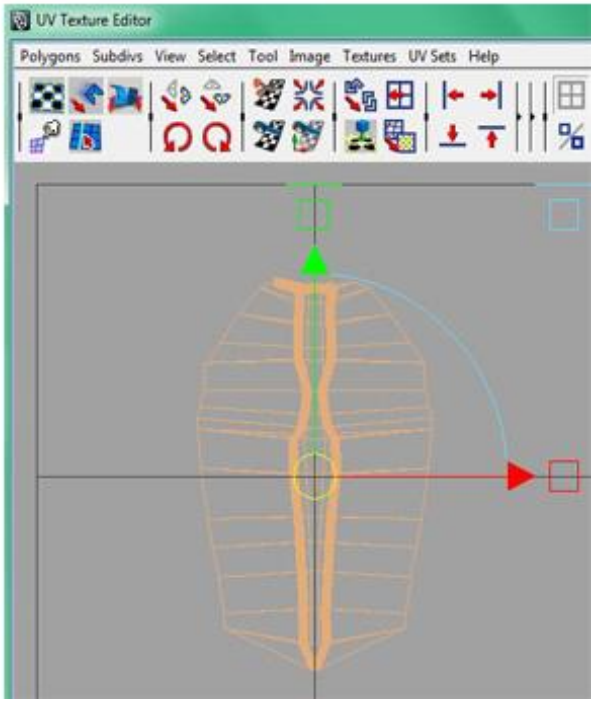
Back Fin

A simple planar projection on the front and back of her fin should do the trick.









Head

There are many different techniques used to unwrap the head. Pay particular attention to getting this area as accurate as possible, as it is an area of high detail, mesh folds, and highly used in animation.

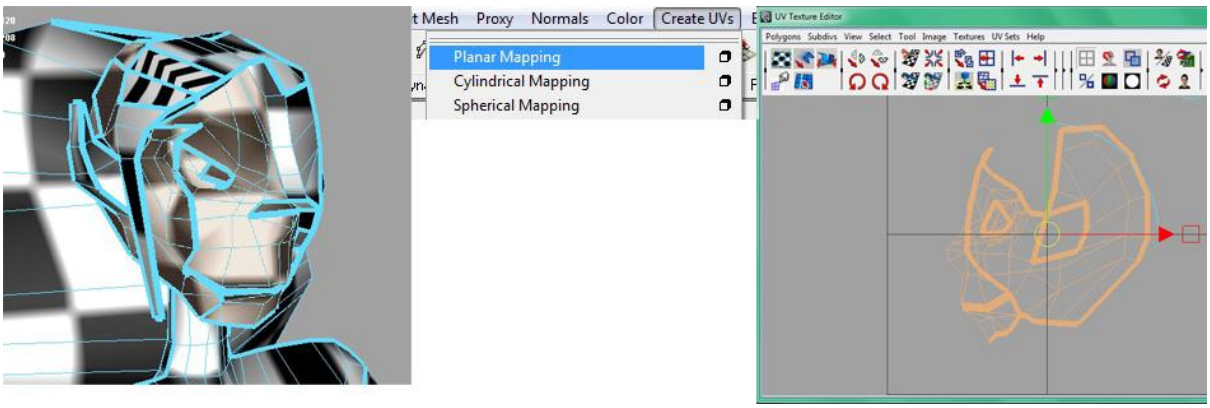
Some common techniques include planar mapping from all sides (front,sides,back,top and bottom) and then stitching these areas together at neighbouring edges to minimise seams. Be wary however re-stitching UV's can often stretch your UV's if you try to do too much.

Another technique is to planar map the top (like a skull cap) and the bottom (the underside of the chin) and then cylindrically map around the rest of the face.

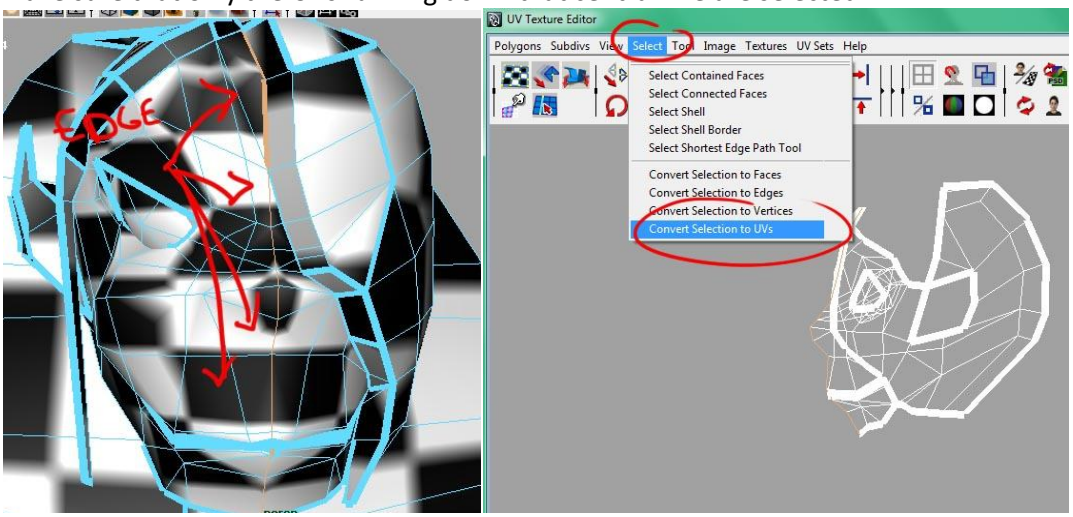
However in this case I am going to demonstrate the 'Unfold' technique. This is basically selecting a central edge to unfold the rest of the surrounding geometry out from (like the spine of a book)

In some circumstances this technique may not work but give it a go!

Firstly select the faces around the front and sides of your head. Then planar project from the side view.

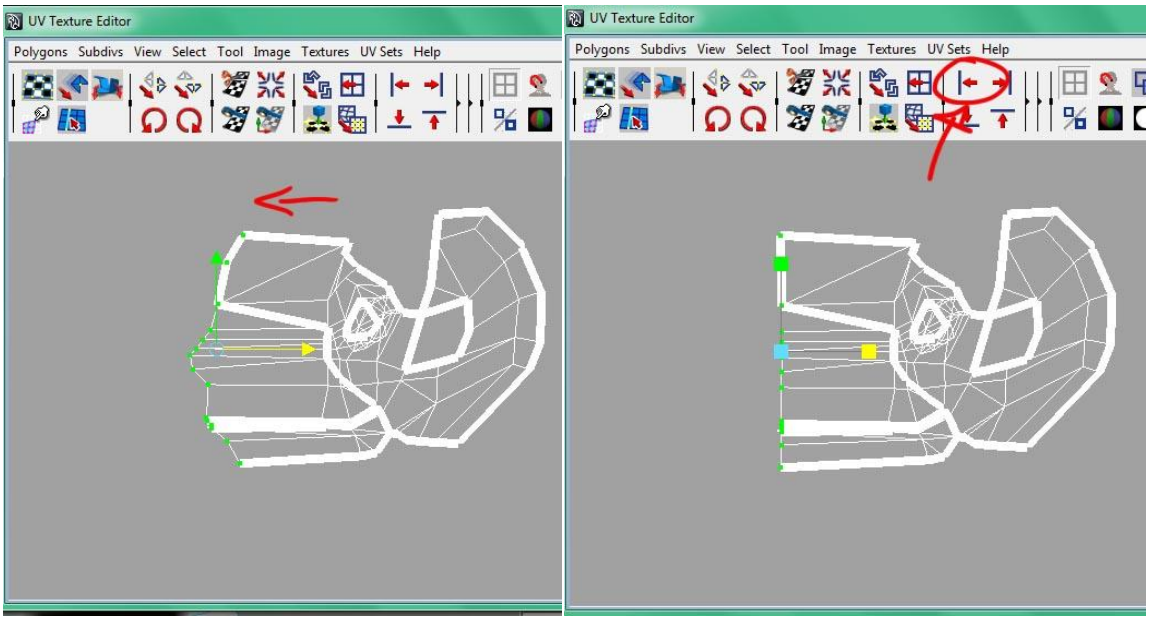


Now select the central edge line to unfold from (preferably from the edge/s running down the nose)
And in your UV texture editor go to Select > Convert Selection To UVs
Make sure that only the UVs running down that central line are selected.



Now using the move tool move these out to the side (away from the other unselected UVs)

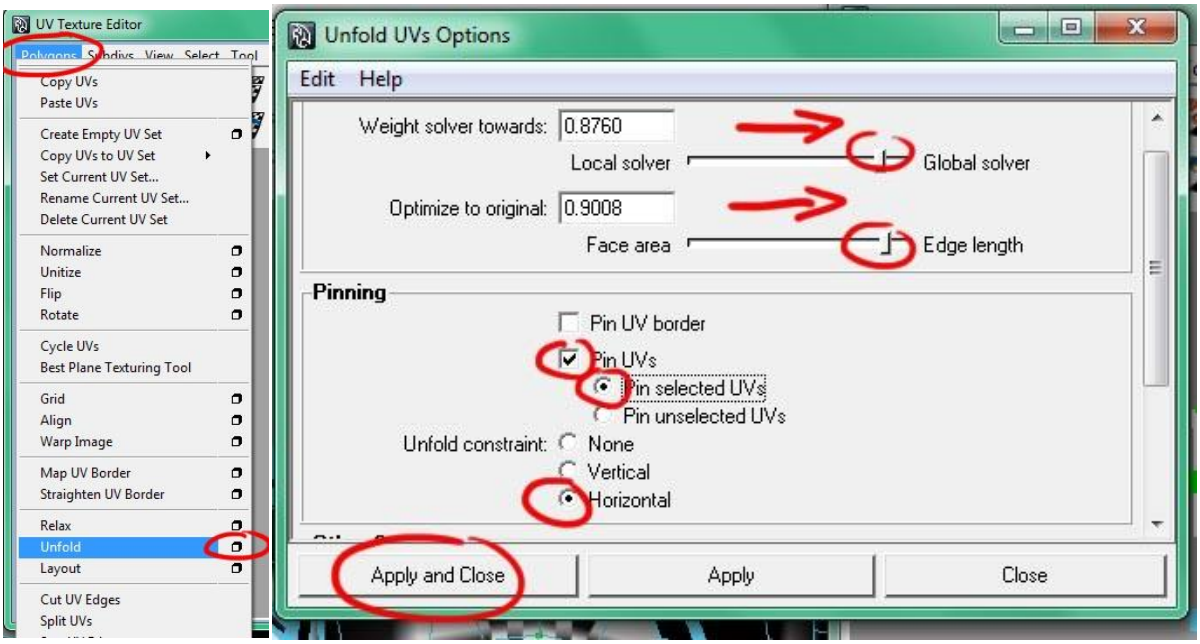
And click the ‘Straighten Edges Vertically Button (As Pictured)



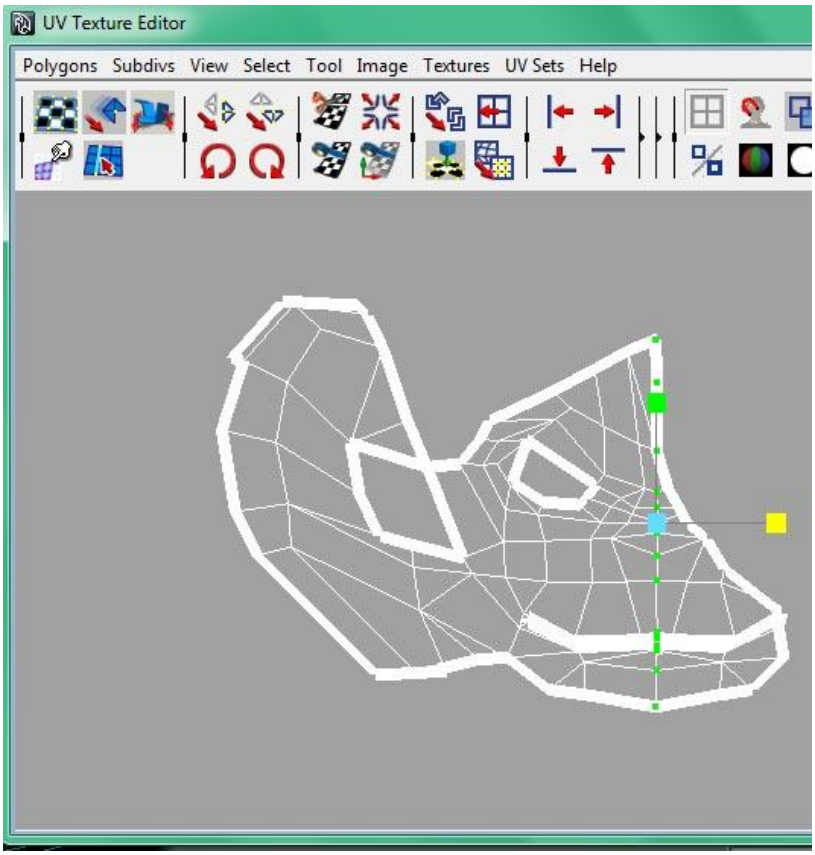
In the UV Texture Editor go to Polygons > Unfold > Options

Crank up the Global Solver and Edge length up on the sliders, and ensure Pin Selected UVs, and horizontal (in this case) are selected.

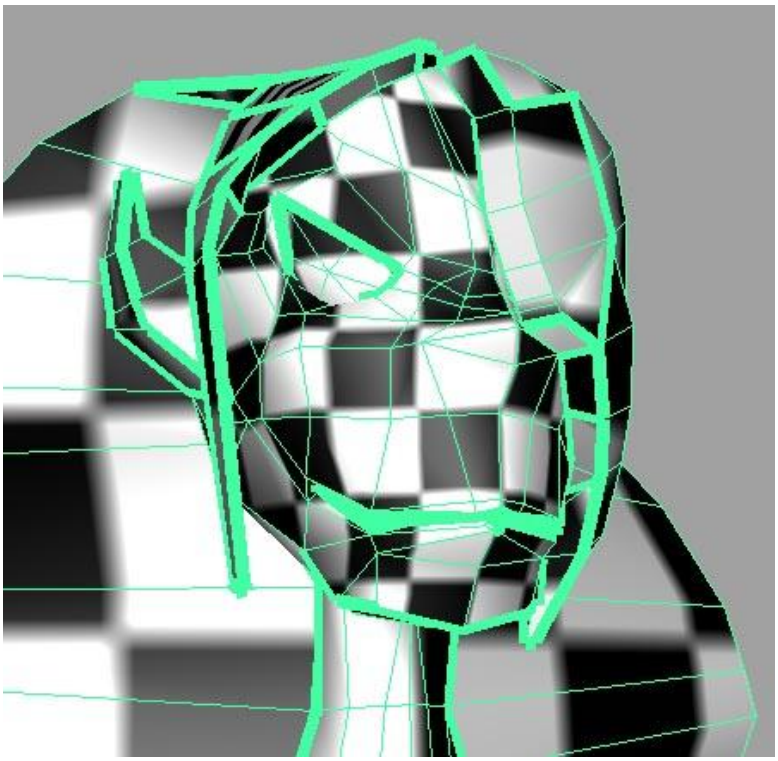
This will pin the central edge down and unfold the other geometry out horizontally.



Your face ‘mask’ UV’s should now look similar to this.

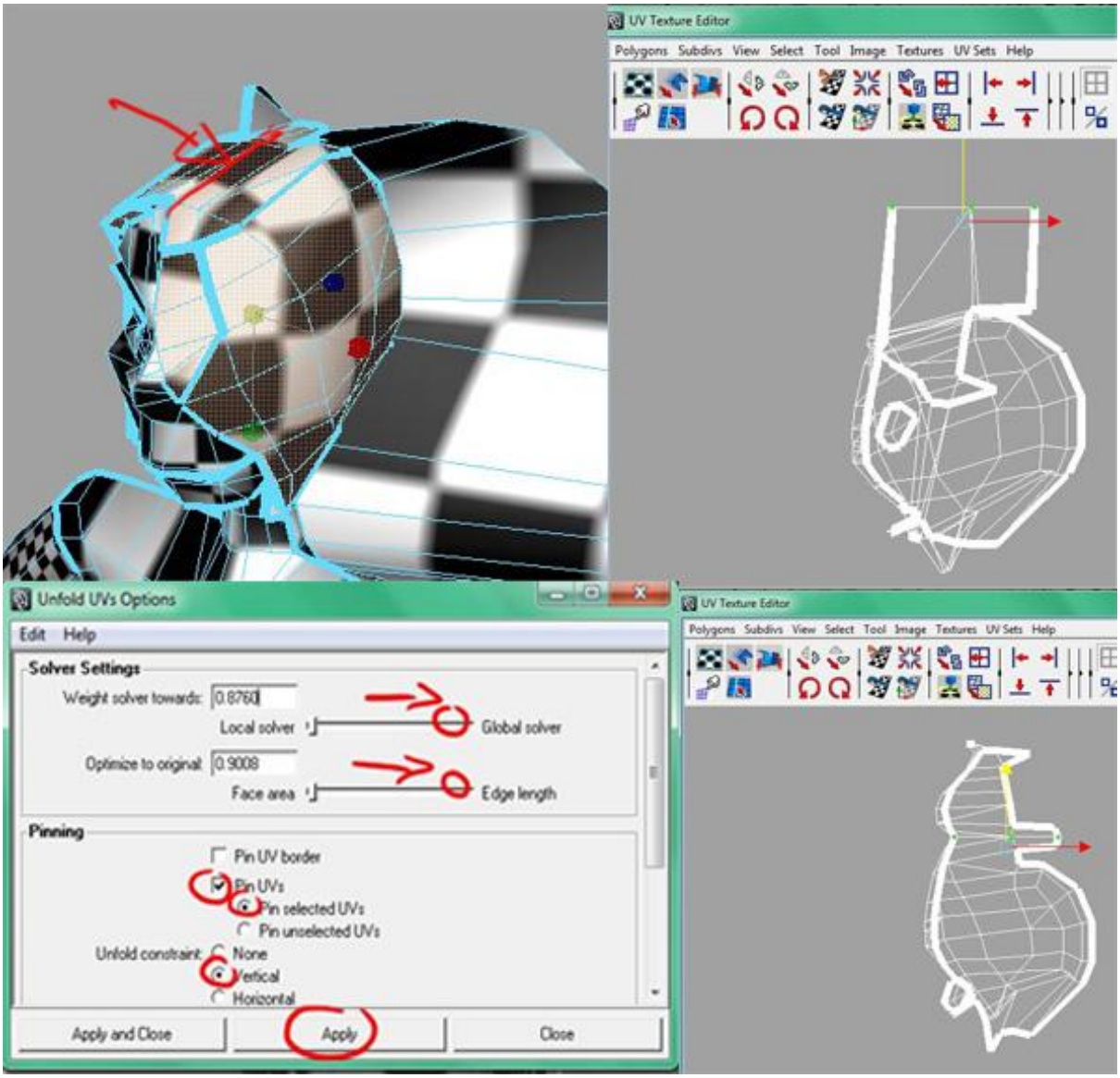


Which in turn creates a nice clean unwrap over your 3D model.



Hair

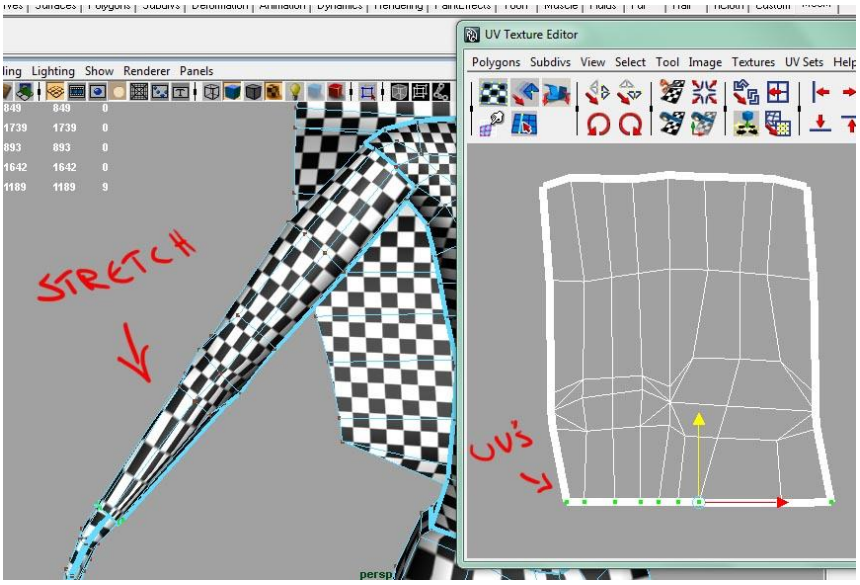
I'll use a similar unfold process to the face unfold. However this time straightening the UV unfold line horizontally...and unfolding Vertically in the unfold options.



Cleaning Up

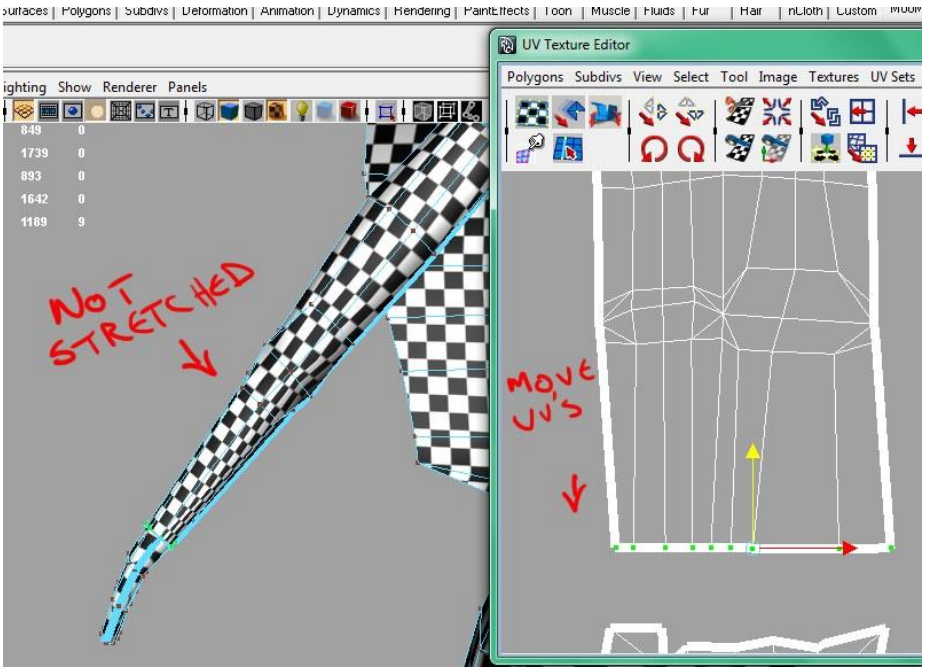
Now that you have unwrapped all of the main sections of your character, inspect your model for any stretching or deformation that you may need to fix up.

For example below we can see on the arm checker texture, the top sections are nice and square. However as you travel down towards the wrist some stretching occurs.

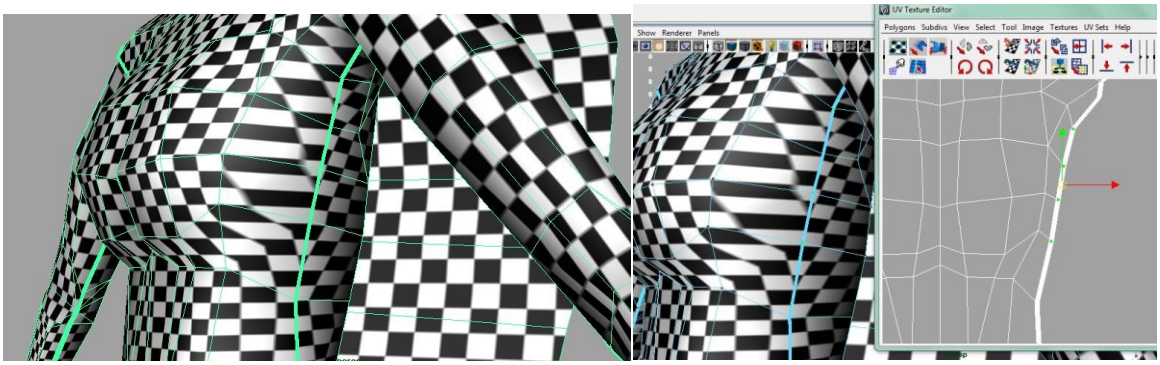


To fix this select the row of UVs and move them around in the UV texture Editor. Your skills in tweaking UVs to correct stretching will come with plenty of practice.

For this particular case the UVs are stretching lengthways, which indicates the UV's are too close to the neighbouring row, so if we move this selected row of UVs downwards a little bit the shape of your faces will begin to match the proportions of the faces on your model, and in turn correct the ratio of your checker squares

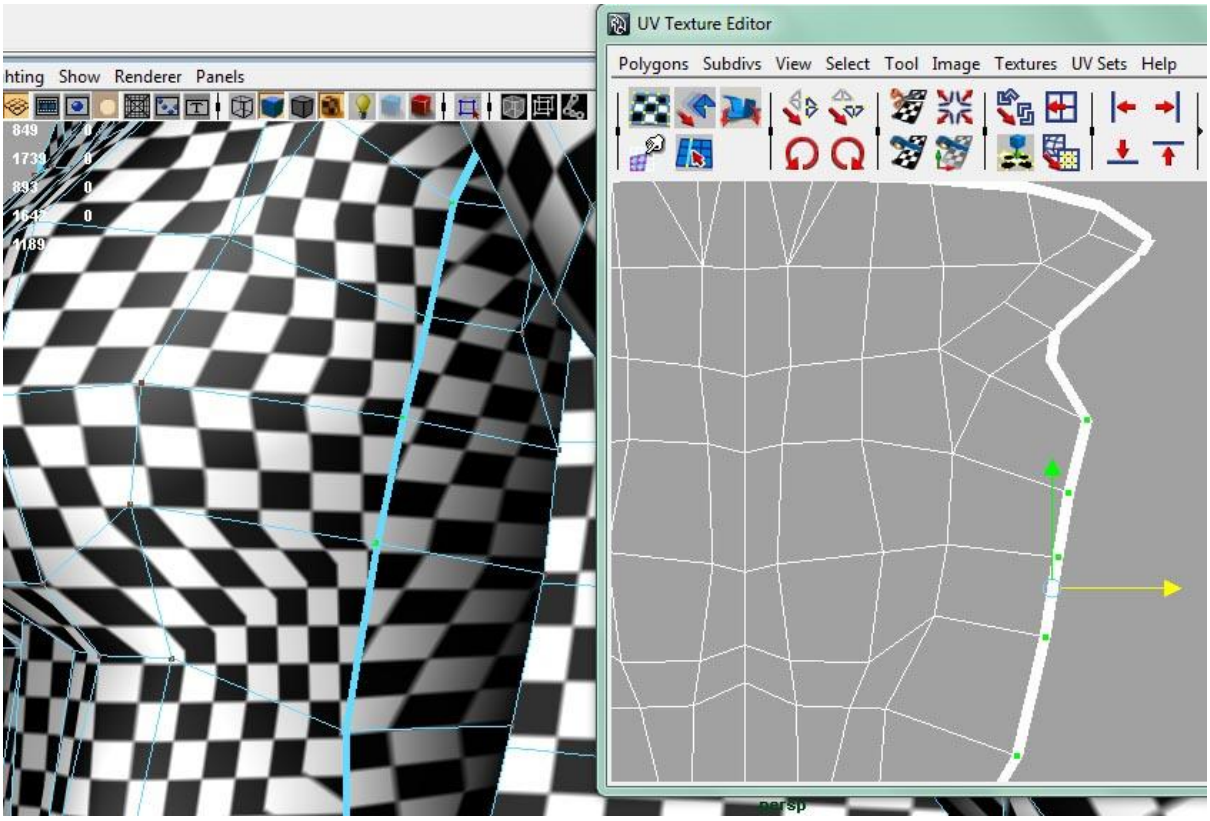


Below we can see the texture deforming in the faces running along the texture border of the torso.

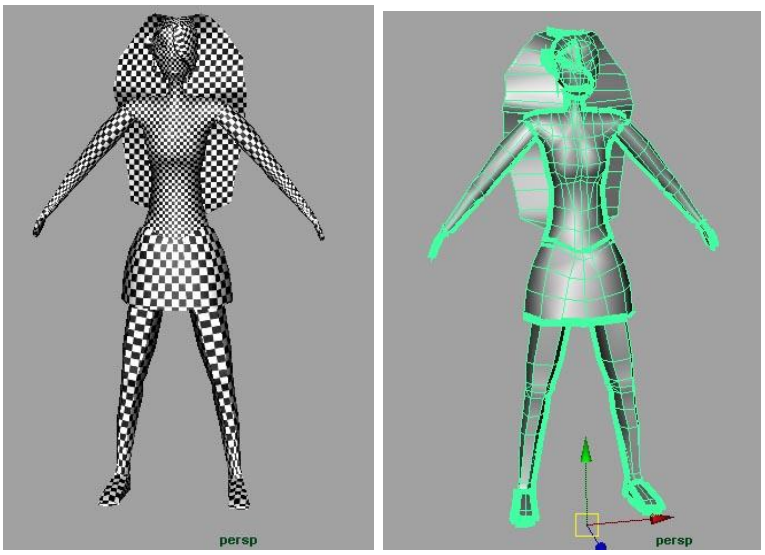


To correct this select the UVs around the border and just move and/or scale these out to try and widen the faces in the UV shell, to mimic the proportions of the faces on your 3D model.

When tweaking UVs make sure to be looking in both the viewport and the UV texture editor for that you can eyeball the changes as you make them. Make sure you aren't in fact making the stretching worse!



Continue to tweak the UVs until you are happy with a clean result.



Now all that is left to do is arrange all of your UV Shells, into the 1-1 space grid in your UV texture editor, to prepare for texturing your character!

Note that you need to make the shells/areas that you require a higher level texture detail (like the face and body) much larger than areas of low detail (like the hands).

The more space a shell takes up the more texture resolution it will have.

Another important point to consider is that you can have overlapping UVs to save space; however that will mean that whatever is in that particular section of the texture will appear on both parts of the model that have their UV's overlapping.

For example, if you place both of your leg UV shells on top of one another you can save space in your Texture Layout; however you will forfeit the option of texturing each leg with unique patterns. Identical texture will appear on both legs.

Most important thing to remember is to use up as much of this 1-1 texture space as you possibly can. Dead space will waste precious texture area that you could use for your character!

When you have finished, export your UV Snapshot to use as a template when creating your texture map. **Polygons > UV Snapshot**