**Modeling: Hand**

To model the hand we will also start with a cube and add detail by extruding faces and adding edge loops. This assignment is more difficult because organic shapes are more difficult to realistically model than manufactured shapes. Make sure to look at reference as you work. The reference will not match perfectly on both sides, so you will need to bridge the gap between the 2 orthographic views of your reference. When you're modeling a part of the hand that you don't have good reference for, look at your own hand. Continue to round out and detail the shape of the fingers and palms – continuously check the model from different angles.

**Terms**

Image Plane - A place in Maya to drop your reference images and view them in 3D and orthographic views.

**Tips**

* Use the **Merge Vertices** Options to merge all of the finger vertices back to the hand vertices with 1 click rather than doing each set individually.
* Model a left hand so you can look at your left hand while using the mouse with your right.
* Use Photoshop to match your reference angles as closely as possible before importing them into image planes in Maya.
* Modeling with the axes is much easier than modeling something that doesn't go along any of them. Work on the fingers and thumb along the axes and then rotate them afterwards.
* If you have history turned on when you smooth the hand, you get a SmoothNode which can be used to "unsmooth" the hand. If not, there's no going back.
* Save iterations so if you mess something up, you have an earlier version to retreat to.

**Common Mistakes**

* **Interpenetrating Geometry** - Avoid faces that go through each other in the block view. Usually this is a result of moving vertexes in the smooth preview (hotkey ‘3’) and not checking where they are in block view (hotkey ‘1’)
* **Referencing Files** - Make sure the files you reference for your image planes are on the network, not on your desktop. TAs don't have access to your desktop, so we can't tell how well your model matches the reference.
* **Stray Vertexes** - If you select all the vertexes in an object and hit "Delete", any stray vertexes will be deleted. If there are vertexes that look like they don't add anything, but Maya can't delete them, then you have bigger problems like faces with no surface area.
* **Surfaceless Faces** - Usually these are a result of an accidental face extrude. Select the object, go to Mesh > Cleanup... Select "Select matching polygons", "Apply to selected objects", "Keep construction history", "Faces with zero geometry area", and set "Area tolerance" very low. Then click "Cleanup", and hit "4" to look at your object in wireframe mode. Any selected faces have 0 surface area.
* **Non-Quad Faces** - Usually these are a result of the Interactive Split Polygon Tool, or a primitive that makes triangles (like a cylinder). Select the object, go to Mesh > Cleanup... Select "Select matching polygons", "Apply to selected objects", "Keep construction history", and "4-sided faces". Click "Cleanup", and shift select over the whole object. Shift selecting inverts your selection, so now instead of having all of the 4 sided faces selected, you'll have everything else selected. Hitting "4" for wireframe mode can make these faces easier to see.
* **Visible Edge Loops** - If you can see edge loops on an organic object once it's smooth, you probably have some more vertex tweaking to do (on this assignment this comes up on the palm).
* **1 Far Vertex** - If you need a bump in a surface, usually pulling 1 vertex far away from the others is not the right approach. Add more geometry in the affected area and make a smooth transition from the regular surface to the bump (on this assignment this comes up in the knuckles closest to the wrist).
* **Extra Extrude** – If you hit smoothing mode (3) and there appears to be a hard edge where there shouldn’t be it is possible there’s an extra extrusion. If the extruded faces weren’t moved, there should be vertexes on top of each other. You can use “Merge Vertexes” to automatically merge vertexes that are very close to each other. To adjust the threshold, click the square for options.

**Demo Outline**

**Initial Shape**

* (Object Selected) Hold Shift + Right Click -> **Insert Edge Loop**
* (Object Selected) Hold Shift + Right Click -> Split -> **Interactive Split Polygon Tool**

OR **(**Edge Selected) Hold Shift + Right Click -> **Interactive Split Polygon Tool**

**Finger and Thumb**

A rule of thumb is to work generally to create the shape before focusing on details. Look at your model from one side and try to shape the finger out before moving to the other two perspectives; don’t forget to slightly taper the fingers. After then you can start defining the knuckles and adding fingernails.

* Extrude and add edge loops – ‘g’ hotkey to repeat last action
* Scale and Move Edges – round out finger and create joints
* Extrude faces at fingertip for nails – rotate and shape
* (Faces Selected) Hold Shift + Right Click -> **Extract Faces**
* Edit -> **Duplicate** OR **Ctrl + D**
* Display -> Hide -> **Hide Selection** and Display -> Show -> **All**

OR (Object Selected) **Ctrl + H** and (Outliner Selected) **Shift + H**

* (Both Objects Selected) Hold Shift + Right Click -> **Combine**
* (Vertex Selected) Hold Shift + Right Click -> Merge Vertexes -> **Merge Vertex Tool**

**Palm and Defining**

A Useful tool to use is **Sculpt Geometry Tool**, under Polygon Menu. It looks like a blue hill with a red arrow coming out. This tool only works when selecting the model (F8) and having soft modification on (press ‘B’). You can adjust the sculpt geometry tool size by holding ‘B’ and click dragging