

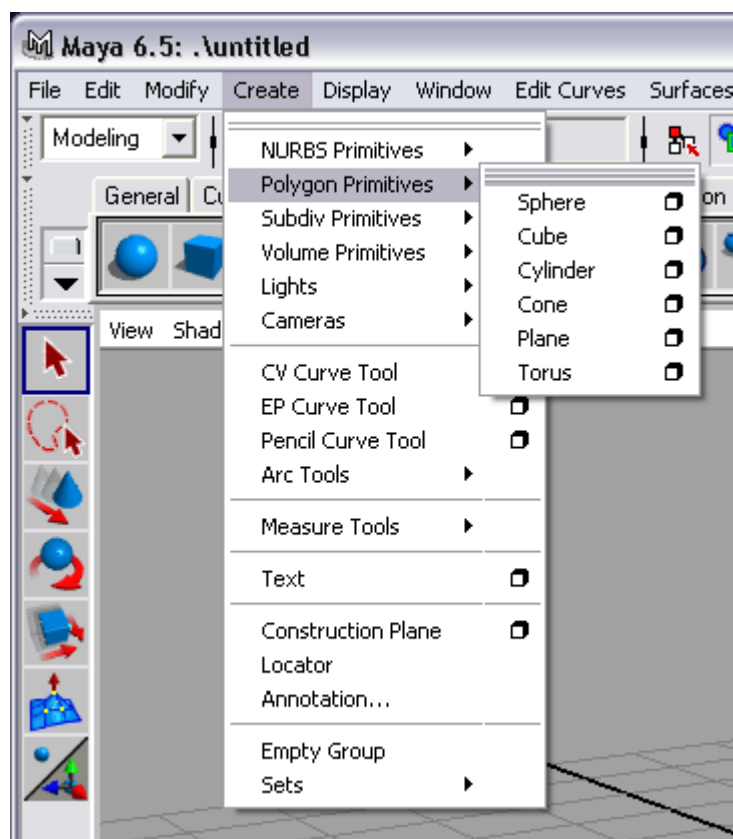
# UCBUGG Modeling master class, fall 2006

Written by ~~Mike Ross~~ a three-year-old, Edited by Mike Ross

This tutorial is meant to introduce students of all levels to the absolute basics of modeling in Maya. Maya gives you access to a variety of options for geometry, including polygons, NURBS, curves, and subdivision surfaces. Though the latter are certainly important, this tutorial focuses mostly on basic polygon modeling.

## Creation

First thing's first. In order to model anything, we need to get some polygons into your scene. You can use the **Create** menu to make all your polygon primitives. We'll be dealing mostly with polygons, though the create menu houses options for other types of geometry.

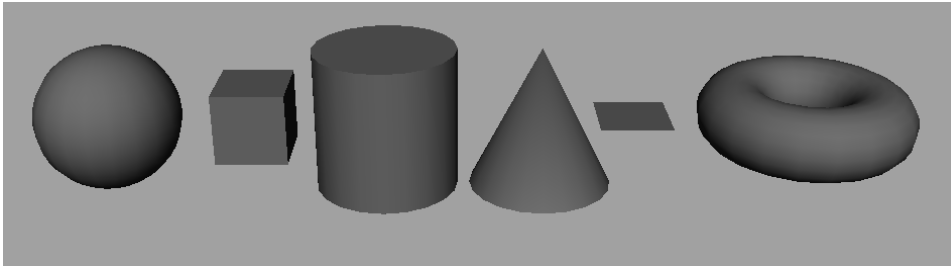


Alternately, you can just click on the polygons in the shelf, which is faster.

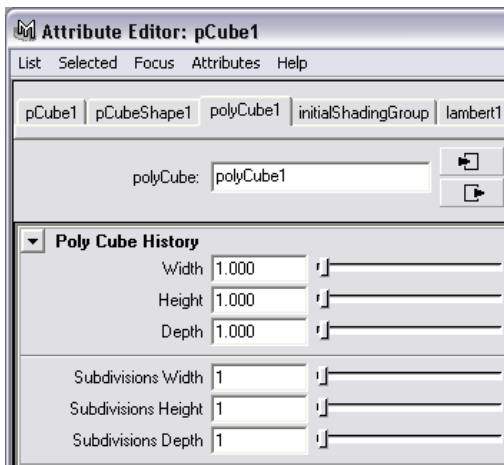


## Polygons

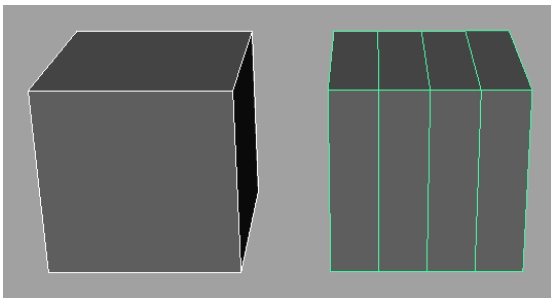
These are polygon primitives: sphere, cube, cylinder, cone, plane, and torus. They will be your building blocks for poly modeling, though there are more interesting and mind bending ways of getting geometry to look right.



Whenever you make an object, it starts off with some default attributes. For now, some important ones include the default dimensions and levels of subdivision. You can tweak these as needed. If you want to tweak the defaults themselves, use the menu box in the **Create** menu.

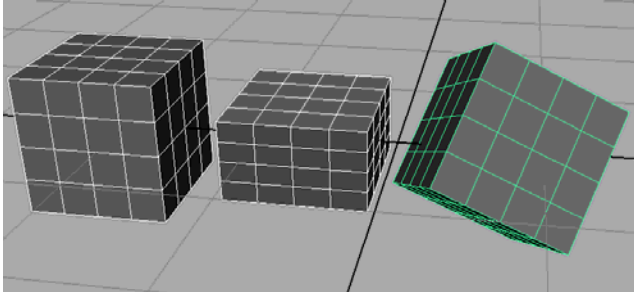


The dimensions simply define how long, tall, or deep the object is, while the subdivisions determine how the model is divided in each direction. For example, the cube on the left has subdivision levels of 1 in each dimension, but the cube on the right has 4 subdivisions along its width.4 direction.

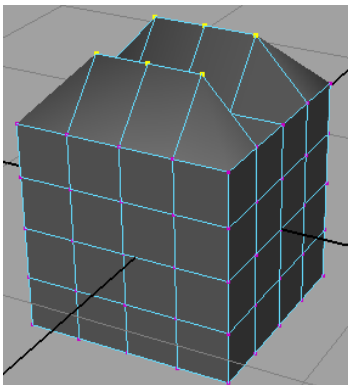


So, how do you mold a cube to look like something that's not a cube? There are a thousand ways to manipulate polygons. First off, get to know your friends, the translate/rotate/scale tools (**w**, **e**, and **r**). These tools can modify the whole object at once or its individual components.

To operate on the whole object, hit **F8** to switch to object mode (note: hit **F8** twice and you'll revert back to the mode you were in before object mode). In this mode, you scale, transform, and rotate the entire object as a whole.



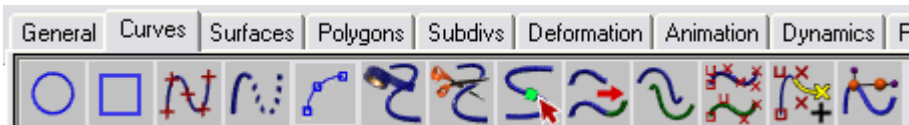
Hit **F9** to manipulate the individual vertices. These are the points that define the actual shape of the polygon. Manipulating the individual vertices allows a fine level of control over your object, but it's rather tedious.



**F10** lets you manipulate the edges between vertices directly, and **F11** lets you manipulate faces directly. These are really just different interfaces for controlling the vertices, but they can be useful.

**Tip:** with some set of vertices, faces, or edges selected, **<** and **>** let you grow and shrink your selection! It comes in handy at times.

## Curves

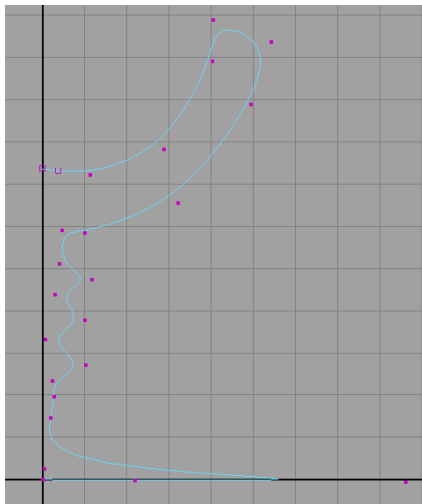


Curves are fun. The curves shelf and menu give you a few options for making curves. Outside of geometry, you can use them to define motion paths (e.g. characters, camera, etc.) rigging, and other things, but we'll cover those in later classes.

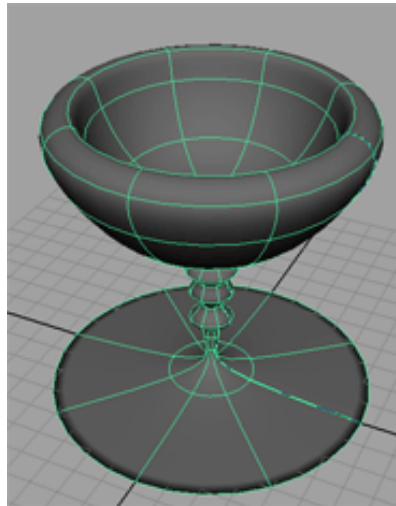
You can edit curves via control vertices. Hit **F9** to be able to select these guys. **Control Vertices (CVs)** are the points which actually define the curve. Since the curve doesn't run exactly through these points, you can use **edit points** on the actual curve itself. Edit points show up as 'x's on the actual curve. Moving these manipulates the CVs into position accordingly.

## Revolving

The most immediate use for curves is for making nice circular shapes. For instance, let's make a funny looking curve in the side view panel. Then, we'll select **Surfaces**→**Revolve** and revolve around the y-axis (click the box icon in the menu for additional options). Now, from our funny looking curve, we get a funny looking chalice. Neat, eh?



Revolve!  
→



Note that this didn't delete the curve, it just made a new shape defined by it. This means that if we don't like the chalice, we can keep editing the curve and the chalice will reflect the changes as you work. If you later want to break the link between your chalice and the curve, select the chalice and go to **Edit**→**Delete by Type**→**History**.

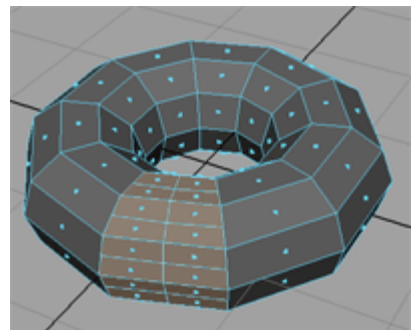
Those are curves, they come in handy. Ideally, another tutorial would explain many of the fun tricks you can do with curves. Bug your local UCBUGG facilitator if you want one, or search online.

## Edit Polygons Tools

The **Edit Polygons** menu has a variety of tools, so here's a rundown of some of the most commonly used. The best way to learn is via experimentation, but hopefully this will expose you to some of the simpler tools available.

### Subdivide

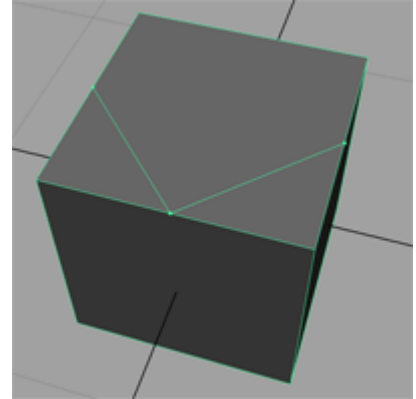
No real surprises here, it uniformly subdivides a selected region. Good when you want more detail to work with. Note, however, that this increases your poly-count exponentially, so try to avoid using this on large regions. Depending on the type of animation, you may also



choose to **smooth** your model once finished, either by converting it to a subdivision surface or by choosing **Polygons->Smooth**. In this case, you'll want to work with as coarse a model as you can get away with. The **Smooth Proxy** tool in the **Polygons** menu can help give you an idea of what your finished result will be as you build your model.

## Split Polygon Tool

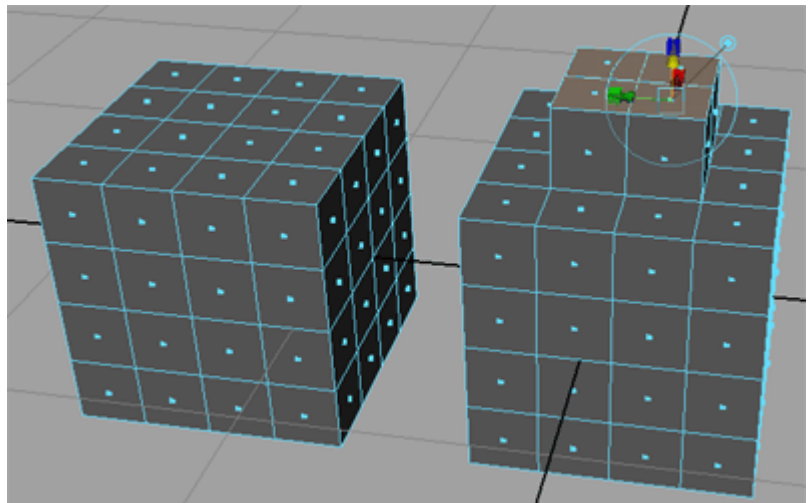
This one's extremely useful, letting you place vertices directly on your polygon's surface. To use it, select the tool and click on an edge of your polygon. You can then just start drawing out a face you want to make. By default, the tool "snaps to edges." If you want to get funky, you can turn that off and start drawing vertices freeform on your object. Just double click on the tool icon and the options will pop up on the right hand side, then uncheck "Snap to Edge." It also has a "snap to magnet" option. I'm a big fan of this. Just like it sounds, it the tool will snap to the midpoint of an edge. If you want something like the 2/3 point, fiddle with "Number of magnets" option.



## Extrude Face

Another extremely useful one, extrude faces can extend and grow shapes. As an example, if you're doing fingers on a hand, you can just extrude different faces of the hand.

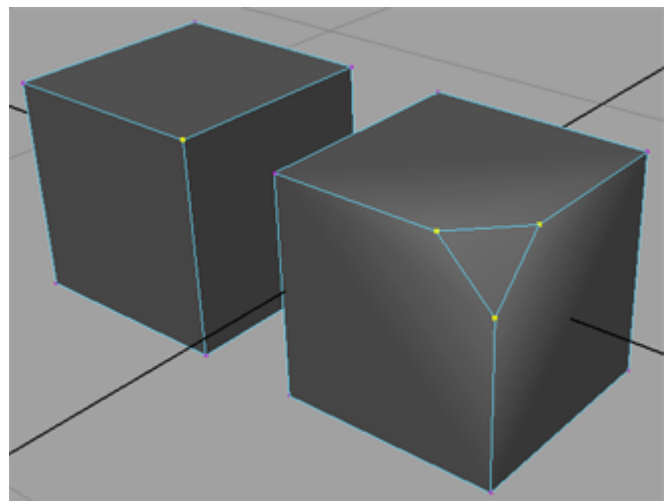
**Extrude Edge** and **Extrude Vertex** are the same idea, only they'll push out a new edge or vertex from some existing edge or vertex. Extrude vertex will actually create a few vertices along the way to help you avoid mangling your object.



## Chamfer Vertex

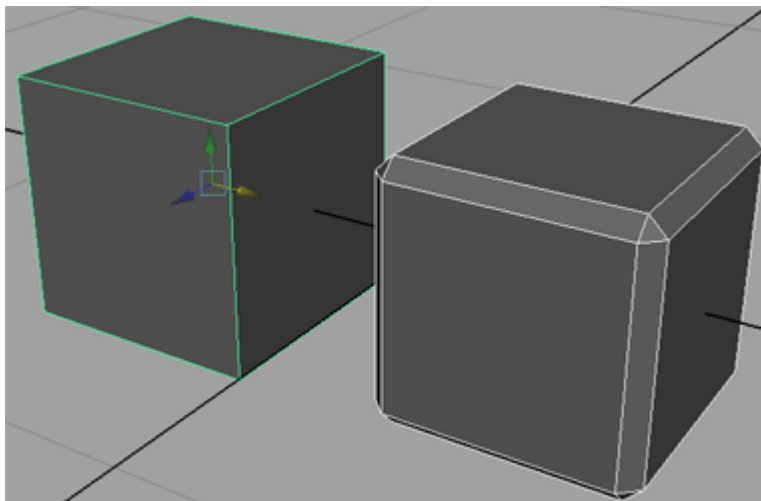
This comes in a handy now and then. You can imagine this as slicing off a corner, just see the example to get an idea.

It's not limited to corners, all it does is morph the selected vertex into a vertex along each incoming edge. So for instance, a regular vertex among quadrilaterals has four edges, so it will make four vertices slightly off center.



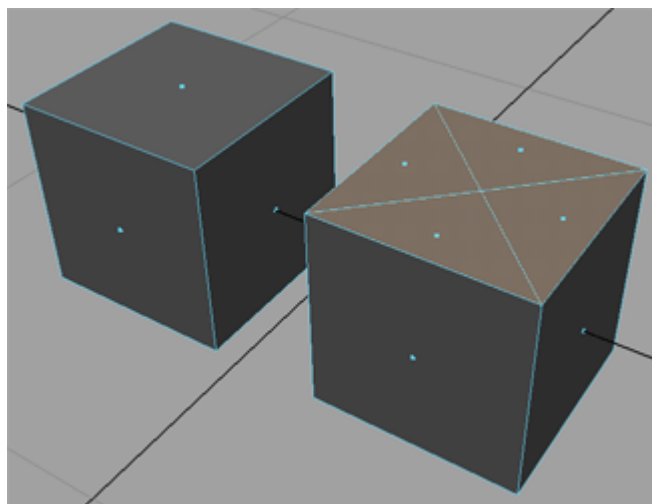
## Bevel

This sees a fair amount of use. If you have a box, but you want the edges rounded (GOOD IDEA), you use this to do it automatically. You can set options like the offset of the new edges from the original and how many edges it creates.



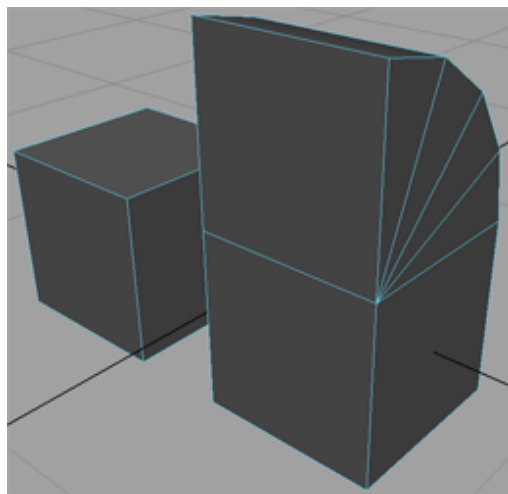
## Poke Faces

Select a face and it will put a vertex in the midpoint, with edges coming out of the surrounding vertices. It comes in handy sometimes.



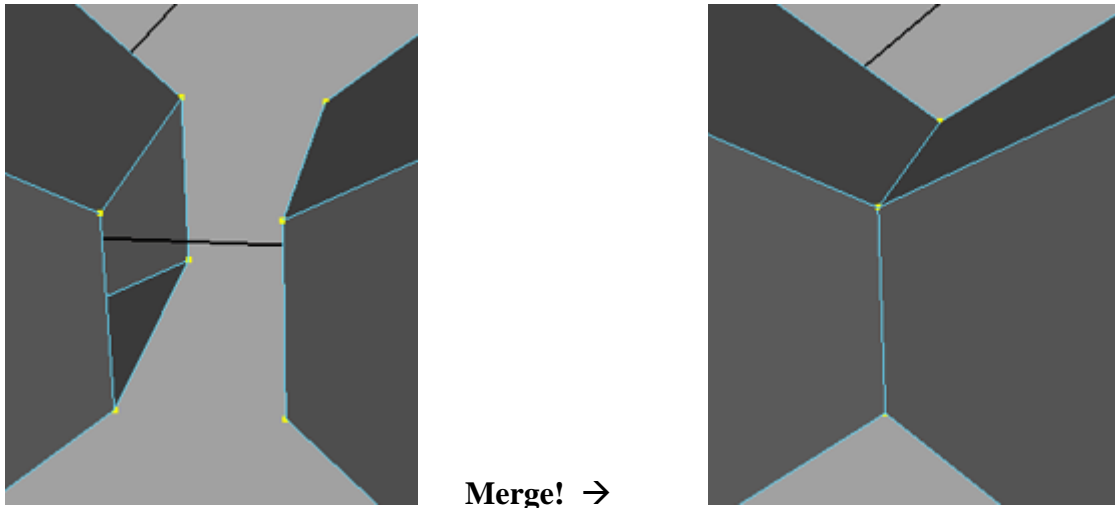
## Wedge Faces

This one's a little weird. Select a face and an edge, then this will rotate out that face with a variable number of divisions and degrees. This picture shows the wedge tool used on the top face and front edge. **Note:** In Maya 6.5, and possibly later, changing your selection mode clears your selection set (slightly annoying). So, in order to select a face and an edge, select a face first, then switch to edge mode (**F10**). You'll see that your face got deselected, but just hit undo (**ctrl-z**) and it will reselect it. You can then select your edge and watch the face wedging madness ensue. If that didn't make any sense, don't worry, it'll be clear when you're working with it.



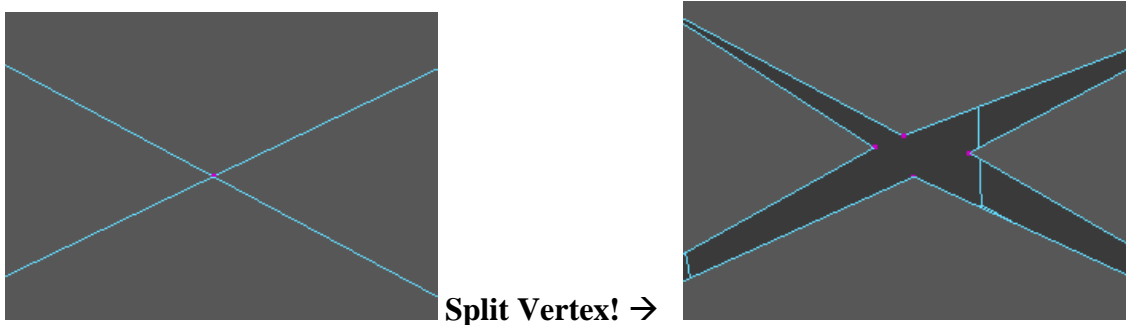
## Merge Vertices

Another important one. Select two or more vertices, and all the vertices within a certain distance of any other vertices get merged together into a single vertex. Note that if you're trying to merge two separate objects, you need to combine them first under **Polgons**→**Combine**.



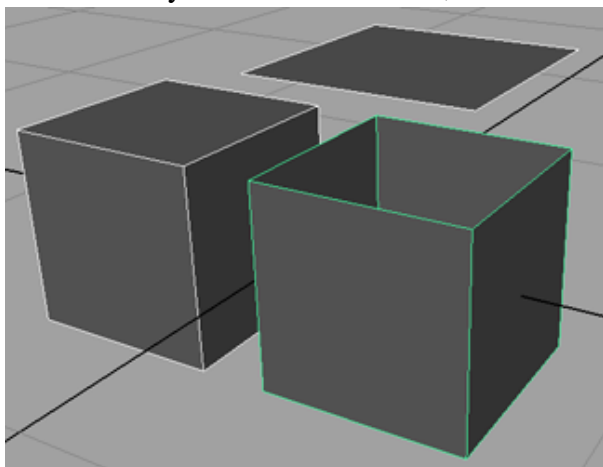
## Split vertex

Disconnects the edges connected to the selected vertices. Literally splits the vertex into however many are needed to create a separate vertex for each polygon previously sharing that vertex. In the example below, I split a vertex connecting four adjacent quadrilaterals and moved them away from each other to show the effect. When you actually use the tool, the vertices all remain overlapping, which can be confusing.



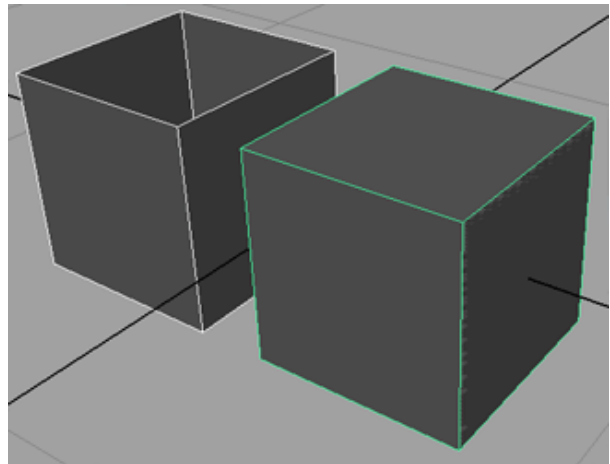
## Extract

For those of you in a cuttin' mood, the extract tool cuts the selected faces out of a polygon.



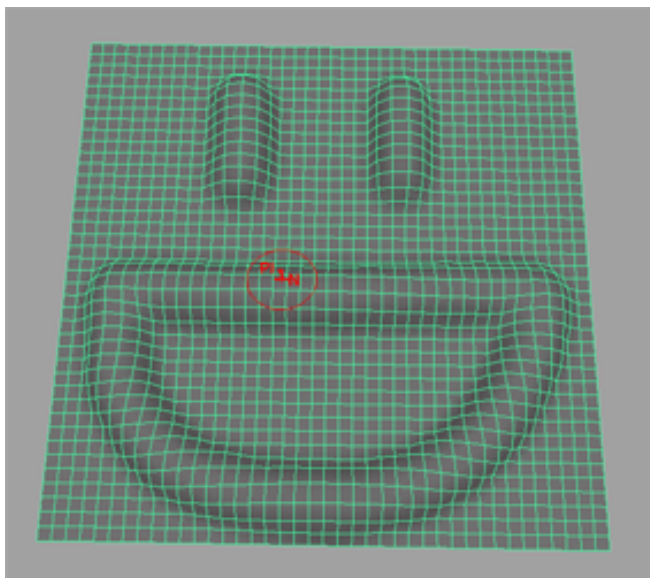
## Fill Hole

No surprises here, this tool fills the area between the selected edges with a new polygon.



## Sculpt Tool

This is pretty cool. Just like it sounds, it lets you push and pull vertices in a vaguely natural way. This doesn't do a whole lot if you don't have many vertices to work with, but it still comes in very handy here and there. The example to the right illustrates the sort of broad shapes you can achieve with some large extrusions and the sculpt tool, while the example below illustrates how easily amused Mike can be.





## **Notes**

You should delete your history once you've finalized your model! Not doing this can cause massive headaches later. If you want to hold onto a version with the history, just save a backup of the scene.

Modeling well takes a lot of skill, an artistic eye, and above all, *practice*. Getting started can be extremely frustrating and mind bending, but the results are worth it once you have a finished character to play with. We're clearly not holding you to a professional level of work, especially since we make a point of making this class open to people without any artistic experience, but giving said that, feel free to blow us away.