Learning to Use blender: An introduction

Introduction

Blender is a free 3D modeling and animation program. It has many remarkable tools to help you develop amazing models and create animations. However, it does have its quirks. The foremost quirk is a non-standard interface that requires some getting used to.

First, the program utilizes all three buttons of a mouse (the middle button is generally under the scroll wheel. Continuing with this use of the mouse, is that the selection button is the RIGHT mouse button, not the commonly used left button of windows. Furthermore, the left button is often used as the "accept" button for movements of objects. This takes some getting used to.

Second, it is often difficult to find the correct tools via buttons – though they often exist. This requires that you learn to use the shortcut menus. These will be highlighted as we go on.

This introduction is my own reductionist approach to learning blender. I approach the program because I want to understand the basics before I try and learn all the cool features. As such, there will probably be many cool features that I completely ignore and leave it to you to discover.

When you first start blender you see a screen something like this:
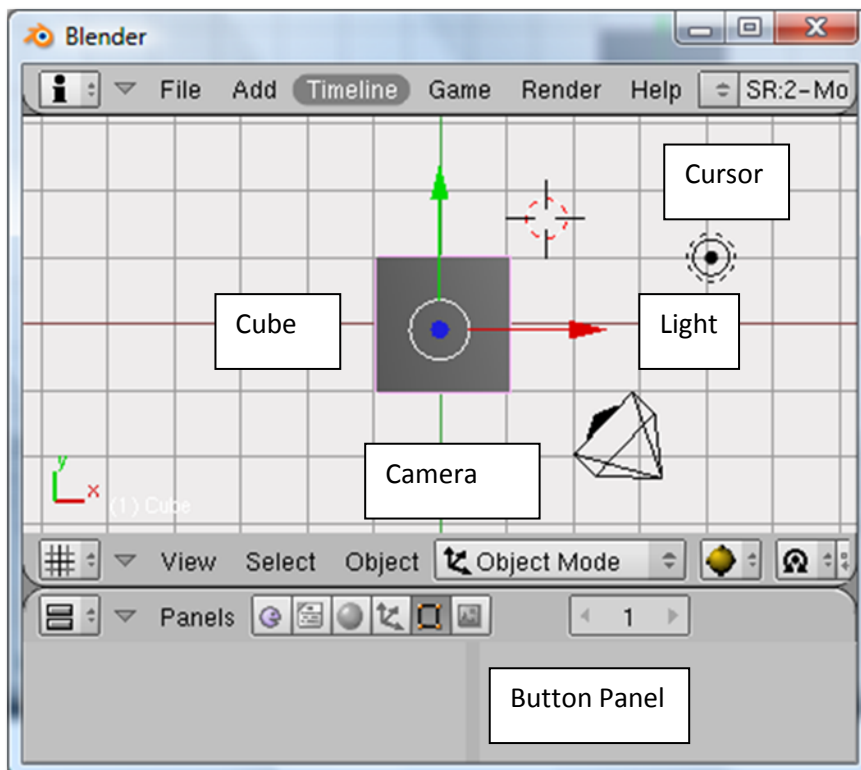
We will be trying to become familiar with the interface and to construct something simple – like a cross.

Navigating in 3D

3D computer animation such as that used to create the films by PIXAR represent a virtual 3 dimensional world which we view through the two dimensional screen. When we "build" or model in that world, we have to be able to move around and look from different perspectives. These few tools enable us to view whatever we are working on from different points of view.
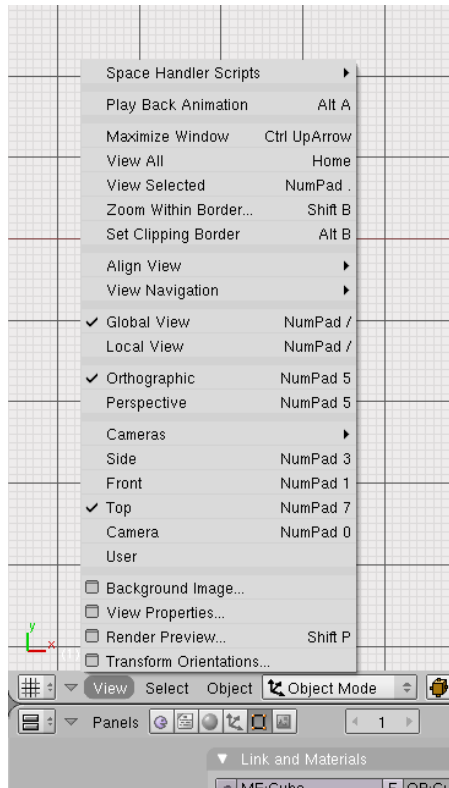
Orthographic/perspective view

The perspective view is how we see things. Objects that are further away look smaller. However, this view is not necessarily the best view for modeling. Therefore, a second viewing mode known as Orthographic that does not show the foreshortening of object from perspective is included. To switch between orthographic and perspective modes you can either press the **Numeric keyboard key 5**. Or you can choose the view menu in the lower left hand corner.

Zooming

The easiest way to zoom the view in and out is to use the **scroll** wheel on the mouse. This lets you look more closely at an object or view it from farther away.

Rotating view

To see different orientations of an object you can simply hold the middle mouse button down (**MMB**) and move the mouse. This is a free rotation and you can get quite dizzy moving the view in this way.

Panning view

If you wish to simply move the view from side to side or up and down (panning) you simply hold the **shift** key down AND the **MMB** and drag the mouse. These motions have no impact on the object itself.

Selecting views

Another way to select views is through the numeric keyboard. The 3D world has a coordinate system. In the default view, the z-axis is up, the y-axis is back into the screen and the x-axis is side to side. However, we can view along the z-axis by pushing the Numeric keypad **7**, along the y-axis with the Numeric keypad **1**, and along the x-axis with the numeric keypad **3**. The other numeric keys also have functions corresponding to views. **0** is a view through the camera. **4** and **6** allow you to rotate the view in increments around the vertical axis defined on the screen. **2** and **8** allow you to rotate the view about the horizontal axis defined on the screen. Holding the **ctrl** key down with **2**, **4**, **6**, and **8** allow you to pan up and down and back and forth.

Modeling

Selecting, moving, rolling and scaling the model

By default, blender starts with a cube in the center. We can change the orientation of that object in several ways. First, we can select the object by RIGHT CLICKING on it. When you select an object, notice that it gains a purple outline. You can toggle select/unselect all objects by pressing the **A** key. If you press the **B** key, you can left drag a bounding box around the object you want to select it.
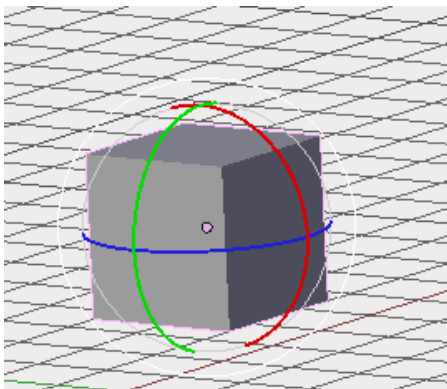
Now the object will move with the mouse. If you wish to reject the move, right click again. If you wish to accept the move, then left click. You can also move an object by left clicking and holding on the arrows that you see. Those arrows are the translation manipulator. This method limits motion in one direction. Another great way to move the selected object is to use the **G** key. **G** is for grab. If you press this key, then the object will move with the mouse as if you had right clicked on it. This has some advantages though – if you press the **G** key and then press **x**, the object is constrained in the x direction. If you follow the x by a number, the object will move that distance. You still have to left click to accept the motion.

To rotate the object, you can press the **R** key (rotate). The rotation will be with the axis of rotation out pointing out of the screen. Similar to the grab function, if you press x, y or z, you define an axis of rotation. You can also choose the angle through which to rotate numerically.

An alternative way to add a rotation is to use the manipulator. By default the translate manipulator is initially selected. This is the arrows that you see when you select an object. If you wish to use a rotation manipulator, then select the circle. This will bring up three orthogonal rings surrounding the object that you can use to rotate it about the x, y and z axes. These are shown below. To rotate about the y-axis (green), the x-axis (red) or the z-axis (blue) simply left click on one of the rings and drag.
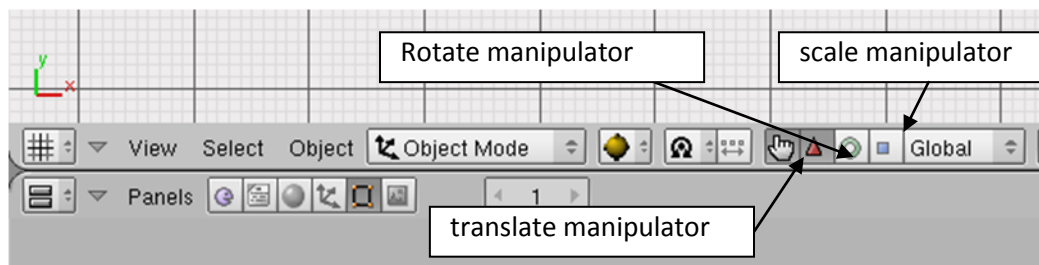
Scaling, or changing the object's size, can be done by pressing the **S** key, then dragging the mouse. One can also press **S** and then x, y or z to constrain the scaling to one of the axes. One can also include a numeric value after the S or the axis so that the scale is a specified amount. For example, pressing S followed by 2 will scale the entire object by a factor of 2 on each dimension. Pressing S followed by x and followed by a 2 will scale the object in the x-direction by a factor of two, but no scaling will occur for the y and z directions. Finally, if you choose the scale manipulator, you can control the scaling in the x, y and z

directions with the mouse.

Finally, you can access all of the above commands by pressing **SPACE** and then choosing the transform menu item.

Adding shapes

If we want to add more shapes to the window, we can simply press the **SPACE** bar and this pulls up a context sensitive menu. We can choose **Add** and add various different shapes. Try exploring a few options. Some are rather interesting. Select a shape and press **x**. This will ask if you want to delete an object. You can also press the delete key. You can also choose the **Add** menu from the top of the screen.

Shapes are added at the location of the cursor. The cursor is the cross-hairs looking thing. You can reposition this by just left clicking on the screen.

Basic modeling

3D modeling consists of building something more complex from a variety more primitive shapes. In particular, since we are building something like a cross or a plus sign or something similar, we will simply work from the cube and start with extruding. Position the cube so that it is above the ground. To easily do this, press the **1** key to view from the side and then move the object upwards. Next we want to be able to edit the object. To do this, we have to be in the "edit" mode. To enter the Edit Mode press the **tab** key or click the object mode button and choose edit mode from the menu or press the space bar and choose edit mode.

Now that you are in edit mode you will see a bunch of vertices that are highlighted – okay, you might see six if you swivel the view around. Try grabbing one of the vertices by right clicking on it and dragging it. Notice what happens. If you wish to select multiple vertices, then hold the shift key down while right clicking. A word of warning: control-left clicking produces additional vertices.

Blender objects have vertices, edges and faces. You can easily select each of these by choosing the appropriate mode of selection. However, any face consists of 3 or 4 vertices. An edge is bounded by two vertices. You can select the 3 or 4 vertices surrounding a face and effectively have selected a face. On the other hand, selecting a face or an edge might be easier.
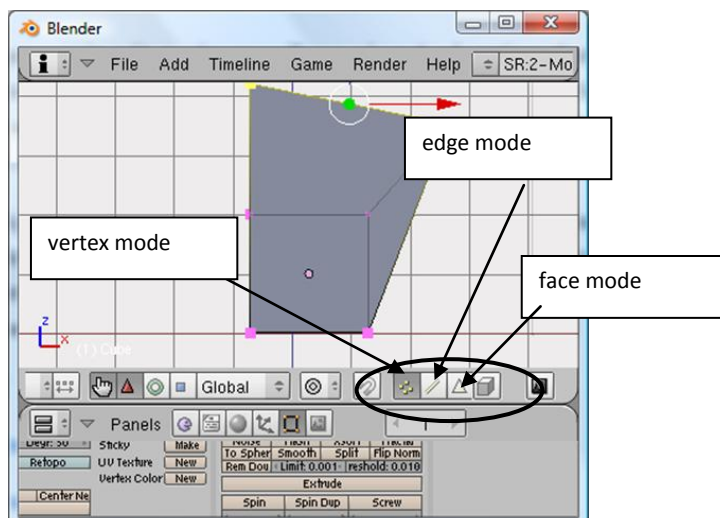
By default, the vertex button is selected in edit mode. Try selecting the edge mode and then click on an edge of the model. Try the face mode. See how these can ease the selection process?

Now you are ready to start building a more complex model. The first tool we will use is the extrude tool.

Extrude

The extrude tool is a tool that does what those old PlayDoh™ machines would do, that is squeeze the PlayDoh™ out through a shape so that you produce an elongated version of the shape. That is an extrusion. You can extrude a vertex, an edge or a face. Let's just switch into face selection mode and choose the top of the cube (you may need to rotate the view a bit). Now press **E** for extrude (or you can press space and then edit or you can choose Mesh from the menu on the button panel). This duplicates the face and if you move the mouse you drag the extrusion with you. Left click to accept the move. Then you can use the scale, rotation, and grab tools to modify this new face.

Try building a complex shape in this way.

Surface modification

By now you have built a somewhat complicated object. It still looks artificial. Let's play with the surface some more. We can add modifiers to this surface. To add modifiers you will have to either drag some of the button window to the left since what you want is way on the right side. You do this by clicking with the middle mouse button in the button panel and dragging. Alternatively, you can close unwanted panels by clicking their triangle in the left hand corner. Eventually you should have the modifiers panel. Click add modifier and choose bevel. Play with the settings. See what it does.

Delete the bevel modifier (click the x in the upper right hand corner) and add a subsurface modifier (choose subsurf). Notice what this did to your entire shape. Change the type of subsurf from Catmull-Clark to simple subdivision.

For greater control you might want only to alter a portion of your model. Select a portion using the **B** key, then press **W** which pulls up the specials menu. If you try subdivide, it divides your rectangles into a greater number – subdividing each edge in half (a single rectangle becomes four). If you choose subdivide – multi then you can control how many new edges you add. This is a very important tool.

Try choosing bevel and slightly move your mouse. Notice how it gives you control over the beveling?

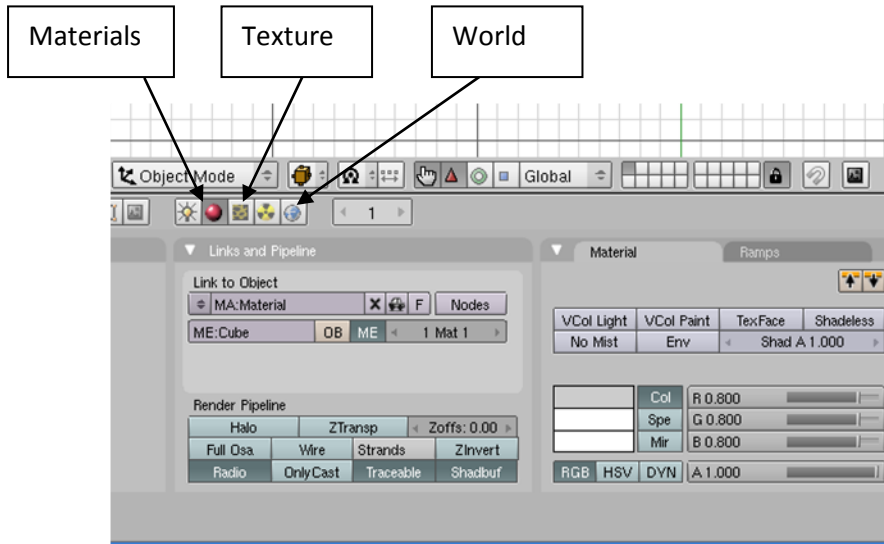Try subdivide smooth and observe how that gives you a new smoother shape with a greater number of faces.

Now that you have really modified your object, let's see about making it look a little less like a piece of plastic.

Adding a material and textures

Textures and materials change the surface of the **selected** object. Let's just change the color of the object first.

Click on the materials button. You will see a number of panels appear. Of interest to us is the one labeled material. You see selected **Col** or short for color. This is the base color of the object. The **SPE** button is the color specular highlight of the object (a shiny spot when light hits an object). The last is **MIR** which is if the object acts as a mirror. Clicking on **Col** you can change the base color of your object.

The size of a specular reflection is important in giving the appearance of the type of a material. The more reflective or shiny an object is, the smaller the region of the specular reflection. This is controlled on the <u>shaders panel</u>. At the bottom of the shaders panel you see a number of settings: in particular if you look at one labeled **Spec** and the other labeled **Hard**. By adjusting hard, you change the size of the specular reflection. If you change Spec, then you change the brightness of the specular reflection.

The panel labeled **Mirror Transp** can control the reflectivity and transparency of the object for "Ray tracing." In this you can control how reflective or transparent an object is.

If you click on the texture button, this is a location where you can define textures. These textures can be variations of color, but they can also be – as the name implies – textures giving an indication of roughness or structure. Designing a texture does not attach it to your object. Try creating a texture with add new. Explore. To save your texture you have to click the F button by the texture. You might also click the thing that looks like a car to automatically name the texture.

To add a texture to the object, go back to the materials mode. On the right side there is a panel labeled texture. You can add your texture to the object. If you choose the **Map to** panel, this allows you to choose how your texture affects the surface. It can be color, but it can also affect it by causing it to displace, or reflectivity, etc. etc.

The world button allows you to make settings for the background of a rendering.

Rendering

To render an image of what you have done through the camera press **F12** or go to the render menu at the top of the screen and choose render current frame.