# The Maya Interface

Three-dimensional modeling and animation are challenging tasks. Trying to get your vision of a universe transferred into pixels is part science and part art and takes a great deal of perseverance. Fortunately, the engineers at Alias have spent a large amount of time and energy making Maya as helpful and transparent to use as a complex program can be. Still, when you are confronted with a program as deep as Maya, a good introduction to its components can be helpful in getting the most from your work as quickly as possible. This chapter explores Maya's user interface, examining each element of the work environment in turn. After reading through the chapter, you should have a good understanding of the major components of Maya's GUI (graphical user interface) and know how to use these elements in your modeling and animation work.

- What's behind the Maya interface?
- Scene windows and scene objects
- Window layouts
- The Hotbox
- Menus and shelves
- The Outliner and the Hypergraph
- The Channel Box and the Attribute Editor
- The Timeline
- The Command line, the Feedback line, and the Script Editor

# What's Behind the Maya Interface?

What makes Maya work well as an animation package? First, interacting with it is a straightforward process, for several reasons. You can easily navigate all scene windows, plus the Hypershade, Hypergraph, and other windows, via the same keyboard and mouse combinations for zooming, tracking, and rotating. (Rotating works only in perspective camera views.) Because navigating works the same way in all windows, you have to learn only one set of commands to get around in Maya's world. Moving objects around a Maya scene window is similarly intuitive: select the Move, Scale, or Rotate (or any other) tool, grab a manipulator handle (or the center box, to move on all axes simultaneously), and alter the object. To try an example, create a new scene in Maya, and add a ball (by choosing Create  $\rightarrow$  NURBS Primitives  $\rightarrow$  Sphere). Now rotate around the ball by holding down the Alt key and clicking the left mouse button. This type of rotation is known as *camera* or *scene* rotation. To rotate the ball itself, choose the Rotate tool from the Tool Box, located on the left of the scene window (or simply press the E key on the keyboard), select any of the manipulator rings around the ball, and then rotate the ball by dragging with the left mouse button, as in Figure 1.1. To move an object, select the Move tool (or press the W key). To scale, select the Scale tool (or press the R key).

#### THREE-BUTTON MOUSE CONVENTIONS IN MAYA

Maya makes extensive use of all three mouse buttons. This book—as well as the Maya documentation—uses a shorthand notation to describe the basic mouse operations:

Click or LM click means to click (press and release) the left mouse button.

Drag or LM drag means to click the left mouse button, hold it down, and drag.

**Shift+click** means to LM click, hold down the Shift key, and click another item.

**Choose** means to either click or hold down the left mouse button and select an item from a menu.

**MM drag** means to click and drag with the middle mouse button.

**RM choose** means to hold down the right mouse button (in a specified area) and choose an item from the popup contextual menu.

**Rotate (Tumble) view** means to rotate the (perspective) camera; that is, hold down the Alt key and the left mouse button, and then drag in the perspective window to rotate the view.

**Move view** means to move any camera; that is, hold down the Alt key and the middle mouse button, and then drag in any scene window.

**Scale view** means to scale—or zoom—any camera; that is, hold down the Alt key and the right (or left and middle) mouse button, and then drag in any scene window to zoom (or scale) the view in or out. This setup allows a straightforward mouse button mapping of left=rotate, middle=pan, and right=zoom.

Figure 1.1

Rotating a

sphere in Maya

Another powerful advantage of Maya lies in how you interact with the user interface. You can almost always accomplish a task in two or more ways—called *workflows*—in Maya. For example, if you prefer not to use menus on top of the screen, you can use Maya's Hotbox (which you can customize) to access all menus or any grouping therein by merely pressing and holding the spacebar, as in Figure 1.2.

You can also create items using the current buttons on the shelf or, equivalently, using menu commands. Most impressive, however, is that Maya will let you decide how you interact with it. If you are not satisfied with Maya's interface, you can alter it in many ways, including creating marking menus, shelf buttons, and hot keys. Although all these usercustomizable features can contain extremely complex instructions, you can create them rather quickly (especially the shelf buttons).

Finally, Maya's plug-in architecture (its API, or application programming interface) and its built-in scripting language, MEL (Maya Embedded Language), are open and comprehensive. Because of Maya's API, plug-ins (such as the built-in mental ray and Maya Fur) fit seamlessly into the program, so much so that it is often difficult to determine where the main program

stops and the plug-in begins. Although the API is fairly complex and is best left to knowledgeable programmers, MEL is a reasonably simple scripting language that gives just about anyone with a bit of programming experience access to nearly all of Maya's powerful features in the graphical user environment. Not only can you create specialized, time-saving scripts with MEL, you can also create entire windows or even a whole new GUI for the program (because Maya's entire GUI is built on MEL scripts in the first place). For example, a technical director can create a custom character animation interface for their artists, allowing them to animate this character without knowing anything about the low-level details of the construction and "rigging" (or animation setup) of the character.

As should be obvious from these features, Maya provides an up-to-date, intuitive environment that you can customize. Whether you have a shop of one person or one hundred, Maya's adjustable interface will get you building complex animations extremely quickly and efficiently. Let us now take a more thorough tour of the Maya interface, looking at several important elements of the GUI.





The Maya Hotbox



### WHAT'S NEW IN MAYA 5

Alias continues to improve Maya in version 5 with a number of new features and upgrades that make Maya easier to learn and use than ever before. Here are a few highlights:

- Maya's rendering architecture has been completely reworked and now allows simple
  access to all of Maya's render options, including software and hardware rendering, the now
  completely integrated MentalRay rendering engine (which includes global illumination and
  caustics abilities), and the all new Vector renderer, which supports such vector formats as
  Flash, SVG (Scalable Vector Graphics), and Illustrator, and can also render "toon shader"
  bitmap images. The Vector rendering engine is only available for OS X and Windows versions of Maya, due to a lack of support for the vector output formats in Irix and Linux.
- Maya's help pages have been completely revamped to provide a uniform look from one platform to the next. The web pages are now properly searchable, due to Alias's use of a mini web server embedded into the Maya startup actions, that provides server-side functionality, including searchability. Now all platforms (including OS X) use a web browser interface for help functions. Due to the way help files are now served, Maya must be running in order for you to access help functions.
- Learning Movies and Tutorials, found in the Help menu, are a series of MPEG (Moving Picture Experts Group) movies and web pages, respectively, that demonstrate essential Maya skills.
- The Move tool now has a Move Along Rotation Axis option, which allows objects to be moved along each axis of an object that is no longer oriented with world space. To access this tool, double-click the Move tool icon on the left side of the main window, or with the Move tool selected, choose Window → Settings/Preferences → Tool Settings.
- Inverse and Forward Kinematic skeletons are now easier than ever to set up and use (see the Skeleton menu in the Animation menu set), and FK/IK skeleton motion can now be blended via the ikBlend attribute, which appears in the Channel Box when FK/IK skeletons are created.
- Animation muting, which turns off animation for selected channels of a node, can be useful for a number of purposes, including model tweaking after animation work has begun. To access this tool, right-click a channel, and choose Mute Selected to mute a selected channel or choose Mute All to mute the entire node.
- Fluid Effects now allows creation of a pond (small body of water) as well as an ocean, and you can now give both a pond and an ocean a wake function, which simulates interaction of an object (such as a boat) with the surface of the body of water.
- Fur now has a clumping attribute, available upon creating a fur description, which allows
  for "dirty" fur that is not evenly distributed across the body of an object. This feature,
  which can be painted onto the fur map, allows for much more natural-looking long-haired
  creatures, whose hair often clumps together in areas such as the chest or leg joints.

# **Interface Elements**

Although Maya is composed of many elements, they can be grouped into about eight categories. We will quickly examine each category in turn.

# **Scene Windows**

The scene windows are your primary interface with the objects (and lights and cameras) you create. Opening a new Maya scene opens the default configuration, which is one large scene window (from the point of view of the default perspective camera), with the Channel Box forming a column at right, similar to what is shown in Figure 1.3.

By default, the Channel Box toggles with the Attribute Editor. To force the Attribute Editor to open in a separate window, choose Window → Settings/Preferences → Preferences, and click the Open Attribute Editor In Separate Window radio button.

Once the default window is open, you can activate the perspective view panel by clicking anywhere inside it. When you select this (or any) panel, its borders turn blue. At this point, you can rotate, scale, or translate the view to adjust what you see in this window. (For specifics on how to do this, see the earlier sidebar on mouse conventions.) The default scene window is called the *persp* (for perspective) view and is simply the view from the default perspective camera that Maya builds upon opening a new scene.



Figure 1.3

The Maya user interface

You can build other perspective cameras by choosing Create → Cameras → Camera. To view the scene through this new camera, choose Panels  $\rightarrow$  Perspective  $\rightarrow$  camera1.

In addition to the default perspective camera, Maya also creates three orthographic views-top, side, and front-that you can also see (in what's called a "four-view" window) by selecting the perspective window and then quickly pressing and releasing the spacebar, as shown in Figure 1.4.

To fill the screen with one of the orthographic views, click in it (to select this window), and press and release the spacebar again. Being able to switch quickly between view layouts and window sizes greatly speeds up your workflow in Maya, because no extensive menu selection process is required.

To switch views in Maya without losing your current selection, MM or RM click in the view you want to activate (for example, the front view), and then press the spacebar.



Figure 1.4

## **ORTHOGRAPHIC AND PERSPECTIVE VIEWS**

An orthographic view is a non-perspective view from a 90-degree (or orthogonal) angle. Because these are not perspective views, they do not reduce the size of objects as they move away from the camera. A perspective view of a row of columns, for example, would show the back column as smaller than the column nearest the camera. An orthographic view, on the other hand, will show all columns as the same size, since scale is not reduced as a function of distance from the camera in this view. You can think of an orthographic view as similar to a blueprint drawing; a perspective view is similar to a picture from a camera.



## **Quick Layout Buttons**

Another quick way to switch between view layouts is to use the Quick Layout buttons. The Quick Layout buttons (see Figure 1.5) are in the Tool Box (more on the Tool Box later), which is to the left of the Maya workspace. Simply click any of the first six buttons for a different view layout. To change a button, RM click it to display the Saved Layouts pop-up menu and choose from a variety of view layouts.

Figure 1.5 The Quick Layout buttons

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The appearance of the seventh button, the Panel/Layout button, depends on the view layout you chose from the first six buttons. For example, if you click the first Quick Layout button (which, by default, is the Single Perspective View) the Panel/Layout button has one arrow. If you chose the Four View button, four arrows appear on the Panel/Layout button. You can change a specific panel by LM clicking any of the arrows and choosing from the pop-up menu. RM clicking will give you options to change the layout configuration such as Single Pane or Two Panes Side By Side.

After you configure the Panel/Layout button to your liking, you might want to save the layout. RM click the Panel/Layout button and choose Save Current Layout from the pop-up menu. A small window will open, asking you to name your layout. Type **My Layout** (or any-thing you please) and click OK. To access your saved layout, RM click any of the first six Quick Layout buttons to open the Saved Layouts pop-up menu (as you did before) and choose it from the menu.

## Moving in Scene Windows

Moving around in scene windows is fairly straightforward, once you learn the keyboard and mouse combinations for doing so. Additionally, because you use the same commands to move in all scene windows (plus several other windows), once you learn how to move in one window, you can move in all. Because the perspective window has the most options (you can rotate, or tumble, the view as well as zoom and translate), let's quickly look at how to maneuver in the default perspective window.

Open a new scene in Maya; then hold down the Alt key and the left mouse button and drag the mouse around. The scene should spin around as you drag the mouse.

If the scene does not rotate as you drag (you might see the cursor become a circle with a line through it), you could be in an orthographic view, which does not allow rotations. To move to a perspective view, either press the spacebar to display the four-view layout or LM click the four-view Quick Layout button in the Tool Box; then click in the perspective window (top right) and press the spacebar again.

To translate a scene (move up/down or left/right), hold down the Alt key once again, hold down the middle mouse button (MMB), and drag the mouse. You will see the scene move around with the mouse movements. (Notice that the camera is actually moving opposite to your mouse movements: as you drag right, the camera moves left, so the objects appear to move right. You can see this clearly if you make cameras visible and look at the camera in a different view as you drag.)

To scale your view (zoom the camera in and out), hold down the Alt key once again, hold down the right (or left and middle) mouse button, and drag. As you drag right, the scene grows larger (you're zooming in); as you drag left, the scene grows smaller (you're zooming out). To quickly zoom in to a specific area of your scene, hold down the Alt and Ctrl keys, and then drag (with the left mouse button) a box around the area of the scene, starting on the left side. When you release the mouse, the scene zooms in, covering the area you outlined. If you drag the mouse from right to left, the scene zooms out so that the entire scene window you start with fits into the box you drag. (The smaller your box, the farther out you zoom.) If you now open the Hypergraph or the Hypershade (choose Window  $\rightarrow$  Hypergraph or Window  $\rightarrow$  Rendering Editors  $\rightarrow$  Hypershade), you can use the same key/mouse combinations to scale or move around. You will notice, however, that you cannot rotate either of these views, because this would accomplish nothing useful.

You can think of the Alt key as the "scene movement key." Whenever you hold down the Alt key, you are in scene manipulation mode, rather than in object manipulation (or some other) mode. The consistent use of the Alt key for movement is just one example of the thought that has gone into the Maya interface.

# **Scene Objects**

Scene *objects* (primitives, curves, cameras, and lights) are the fundamental building blocks from which you create a Maya scene or animation. The procedure for creating and manipulating any object is generally the same: create the object (most often by using the Create menu), choose a manipulation tool (such as Translate or Rotate), and alter the object. You can also adjust the pivot point (or "center") of an object, and you can manipulate the individual components of geometric objects.

# **Creating Scene Objects**

Because you create most scene objects in much the same fashion, we'll go through a few representative examples here, rather than discuss how to create all possible objects in Maya. If you have specific questions about creating a type of object that is not covered here, you can always check Maya's online documentation (accessed via the Help menu).

Maya's built-in help files are a great (and easy-to-use) resource. To access them, choose Help → Contents And Search (or Index). You can also press F1 to access the main help library. After opening the Maya documentation window (which opens in a web browser because it is an HTML document), you can search for a term, browse through a complete index of all Maya documents (the index alone is about 2MB of data!), or read any of the Maya manuals in electronic form. To create a primitive (a sphere or a cone, for example), you choose the type of primitive you want to create from the Create menu. For a simple three-dimensional object (such as a torus or a cube), you can choose from polygonal, NURBS, or Subdivision Surface primitives. Using the NURBS option, you can also select a two-dimensional (nonsurface) square or circle. When you create an object, you can either use the last saved settings or open the Creation Options window, by clicking the option box  $(\Box)$  next to the name of the object, and adjust the object's settings before creating it.

You create NURBS (Non-Uniform Rational B-Spline) objects via a series of curves (or "isoparms") that are mathematically derived from several points (control vertices, or CVs). NURBS surfaces are more complex to calculate than, say, polygonal faces, but they can be warped and twisted more before they show excessive unnatural creasing. Polygonal surfaces, on the other hand, are created by placing many small triangular or rectangular surfaces together. Polygons are simpler to calculate—at least for simple surfaces—but tend to show their constituent blocks if they are bent or distorted too much—especially if the surfaces are created with a minimal number of polygons, or facets. Subdivision Surfaces offers the best of both geometric object types, providing the smoothness of NURBS with the benefits of more free-form polygonal modeling. NURBS and Subdivision Surfaces tend to be better suited to organic forms (such as bodies), and polygonal surfaces generally work better for more mechanical objects (such as spaceships), but this is by no means a hardand-fast rule.

Figure 1.6

The NURBS Cylinder Options window

MURBS Cylinder Options					- 🗆 🗵
Edit Help Pivot Pivot Point Axis Axis	Object     Doco     C X     Free	0.0000 • Y	C User Defined 0.0000 C Z C Active View	1	
Start Sweep Angle End Sweep Angle	0.0000		1		
Hadus Height Sulface Degree Caps	2 0000 C Linear O None Estra Transfe	C Bottom	Cubic C Top	C Both	
Use Tolerance Number of Sections Number of Spans	None     None     I	C Local	C Global		
Create		Apply		Close	

As an example, let's create a default polygonal sphere and then use the option box to create a NURBS cylinder. To create the poly sphere, simply choose Create  $\rightarrow$  Polygon Primi-

tives  $\rightarrow$  Sphere. On releasing the mouse, you should see a sphere appear at the center of Maya's default grid. If you look closely, you will see that the sphere consists of many rectangular faces (more accurately called quadrilaterals) that butt up against one another, forming the sphere. Now move the sphere aside (press the W key and move the sphere away from the center of the grid) and create a NURBS cylinder with nondefault options. To access the options window of the NURBS cylinder, choose Create  $\rightarrow$  NURBS Primitives  $\rightarrow$  Cylinder  $\Box$  (choosing the  $\Box$  symbol—the *option box*—in a Maya menu item always opens an options window). Upon releasing the mouse button, you should see the window shown in Figure 1.6.

In this window, you can define any of the following:

- The pivot point
- The axis the cylinder will use as its long axis
- The start and end angles of the cylinder
- The radius
- The height (a higher number will make a taller cylinder)
- The number of sections (horizontal segments) and spans (vertical segments) the cylinder has

For the purposes of this little example, try setting the End Sweep Angle to 270 (this will create a three-quarters cylinder), set the Radius to 1 and the Height to 4 (making the cylinder taller), and set the Caps option to Both (creating a cap on both the top and bottom of the cylinder). When you click the Create button at the bottom, you should get the object shown in Figure 1.7.

You can almost always reset an object's creation settings to their default values by choosing Edit  $\rightarrow$  Reset Settings in the options window.

To see the object smooth shaded with textures (instead of a wireframe), press the 6 key on your keyboard. To view an object at a smoother interactive resolution, press the 3 key. (Pressing these keys will not affect how the object renders, only how it is displayed.) Figure 1.7 uses these settings to display the cylinder.

Creating a camera object is as simple as creating a geometric primitive object. Choose Create  $\rightarrow$  Cameras, and then choose Camera, Camera And Aim, or Camera, Aim, And Up from the submenu. A new perspective camera is created. (Perspective cameras are initially called camera1, camera2, and so on until you save them with more specific names.) To adjust the camera's options as you create it, choose the option box ( $\Box$ ), and change the camera's settings. Although all the settings in the camera options window are a bit much for an introductory chapter, most are fairly self-explanatory to anyone familiar with photography or 3D animation. The following are some notable options:

- You can make any new camera orthographic (as opposed to perspective).
- You have control over near and far clipping planes (where the camera stops "seeing" objects that are too far away or too close).
- You can choose to have an aim point or an aim point and an up vector on the camera (allowing you to manipulate where the camera is looking, for example, via a manipulator handle outside the camera itself).



Figure 1.7 A cylinder created using custom options

Try creating a camera with an aim point (choose Create  $\rightarrow$  Cameras  $\rightarrow$  Camera And Aim). When you create this camera, shown in Figure 1.8, it automatically has a second manipulator handle for a new view node that you can move (by pressing the W key and dragging the handle around), and the camera pans and tilts to point at the manipulator handle. For more on camera options and other rendering basics, see Chapter 19, "Rendering Basics."

To create lights, choose Create  $\Rightarrow$  Lights and select a type of light. When creating lights, you can choose from the following:

- Ambient (a light that fills all space evenly, such as indirect sunlight in a room)
- Directional (parallel light rays from one source, mimicking direct sunlight)
- Point (radial light such as that from a bare lightbulb)
- Spot (light as from a theatrical spotlight)
- Area (light emitted from a rectangular area that imitates a block light source such as a window)
- Volume (a light that illuminates within the space of a given boundary)

For example, create a spotlight (choose Create  $\rightarrow$  Lights  $\rightarrow$  Spot Light  $\Box$ ) with the following options: Intensity 1.5, Cone Angle 50, Penumbra Angle 10, and Color a light blue. (Click the default white color chip to display the Color Chooser; then choose a light blue color.) The penumbra controls how quickly your spotlight "fades out" around its edges: a value of 0 means that the spotlight goes from full intensity to 0 at its edges (not a very natural look); a value of 10 or 20 degrees makes the spotlight fade out from full intensity to 0 over that number of degrees. If your spotlight were aimed at a simple plane, the rendered image would look something like the light on the right in Figure 1.9. (The one on the left is a spotlight with a penumbra of 0.)



Figure 1.9

Two spotlights: the one on the left has no penumbra, and the one on the right has a Penumbra setting of 10 degrees.



A camera with

an aim point

#### Figure 1.10

An area light shining on a distorted sphere



To see how an area light works, create a sphere, stretch it out, and add an area light. (Be sure its direction vector is pointing at the sphere.) Stretch the area light out, and in the Attribute Editor set the light's decay rate to Quadratic. As you move the light (very) close to the sphere, you will see an oblong of light appear on the sphere, shown in Figure 1.10, matching the points where the light is closest to the sphere. Use the IPR renderer (click the IPR icon in the status line) to see the light's effect change as you adjust its attributes, and note that the light falls off rapidly as distance from the area light increases.

#### For more on creating and using lights, see Chapter 20.

You can also create either CV (control vertex) or EP (Edit Point) curves by using the Create menu (choose Create  $\rightarrow$  CV Curve Tool or Create  $\rightarrow$  EP Curve Tool). The CV Curve tool creates a CV with each click of the mouse. The EP Curve tool creates edit points as you click the mouse button. There is really no difference between a CV curve and an EP curve except in the way that they are created. Each type of curve tool is useful under certain circumstances—the basic rule of thumb is that for smoother curves, you use the CV Curve tool, and for more tightly controlled curves you use the EP Curve tool. Figure 1.11 shows a CV curve (on the left) and an EP curve (on the right) created with identical mouse clicks. Since the CV curve does not pass through each point that you define, the resulting curve is smoother than the EP curve. The extremes of the EP curve are much more pronounced because the curve *is* forced to pass through exact points.

Figure 1.11 The curve on the left was produced with the CV Curve tool, and the curve on the right was produced with the EP Curve tool.



#### For more on creating and using curves, see Chapter 5, "NURBS Modeling."

To create, say, a CV curve, choose Create  $\rightarrow$  CV Curve Tool (or click the CV Curve Tool button on the Curves shelf, selected by pressing the tab button at the left of the shelf and choosing the Curves shelf), and then click several times in the scene window. You can also drag the points around as you create them, and you can erase points by pressing the Delete or Backspace key or by pressing the Z key to undo the last action. When you are satisfied with the curve, press the Enter key to complete construction of the curve.

## Moving Scene Objects



Figure 1.12 A cylinder with Move tool manipulator handles

After you create an object, you will probably want to move, rotate, and/or scale it. Because the procedures are the same for all objects (and lights, cameras, and curves), let's just use a cylinder as an example here. Create a new cylinder with default options. (Choose Create  $\rightarrow$ NURBS Primitives  $\rightarrow$  Cylinder  $\Box$ ; then choose Edit  $\rightarrow$  Reset Settings, and click the Create button.) To move this cylinder, press the W key on the keyboard—you should now see the *Move tool manipulator handles* that allow you to move the cylinder on any or all axes, as shown in Figure 1.12.

If you do not see the manipulator handles, be sure the cylinder is highlighted by clicking it (or click+dragging over it).

To move the cylinder on the X axis only, click and drag the red arrow; to move on the Y axis, click and drag the green arrow; to move on the Z axis, click and drag the blue arrow. To move the object freely in all directions, click and drag the yellow box at the center of the manipulator handles. Try moving the object up a little on the Y axis and to the right on the X axis.

All manipulator handle colors are consistent with the axis marker, on the bottom-left of a scene window—X is red, Y is green, and Z is blue. This consistency lets you know which axis you are adjusting, no matter from what angle you are viewing the scene. Also, when you select a manipulator handle, it turns yellow, indicating it is active, which makes it easier for you to determine on which axis or axes you are adjusting.

To scale the cylinder, press the R key, and then scale the object on the X (red), Y (green), or Z (blue) axis—or click and drag the yellow box at the center of the manipulator to scale all axes simultaneously. Try scaling the cylinder up on the Y axis and then out in all directions, until you get something like Figure 1.13.

To rotate the cylinder, press the E key, and then rotate around the X (red), Y (green), or Z (blue) axes—or click the yellow circle on the outside to rotate on all axes at once (rotating on all axes at once is difficult to control and therefore not advisable). Try rotating clockwise on the Z axis and then counterclockwise on the X axis, as in Figure 1.14.

The shortcut keys for manipulator controls are arranged so that they follow the top row of a QWERTY keyboard—Q for select, Ctrl+Q for lasso select, W for move, E for rotate, R for scale, T for the Manipulator tool, and Y for the Last Used tool (the CV Curve tool, for example). This layout makes the manipulator tools easy to access, and it's easy to remember their shortcut keys.

Finally, it is possible to move the pivot point of your cylinder (or any object) so that it is not in the object's center. To move the pivot point, press the Insert key on your keyboard (turning the manipulator handle into the pivot-point handle); then move the handle to where you want the object's center of rotation, movement, or scaling. Try moving the pivot point of the cylinder to its bottom, as shown in Figure 1.15, so that any further rotation will occur from that point.

On the Mac version of Maya, you need to press the Home key on the keyboard, not the Ins(ert) key. This is one of the few differences between the various platform versions of Maya.

After you move the pivot point, you must return the manipulator to its "normal" state by pressing the Insert key once again.



Figure 1.13 A moved and scaled cylinder



Figure 1.14 The cylinder, rotated



Figure 1.15 The cylinder, with its pivot point moved to the bottom

# Figure 1.16 The Tool Box





## **Objects versus Components**

The Tool Box

All geometric objects are made up of component elements. In object mode, clicking or dragging any part of an object selects the entire object. In component mode, however, you can choose specific pieces of an object to manipulate. Using the cylinder from the previous section as an example (just create a default cylinder if you deleted it), select the object (so it turns green) while in object mode and click the Select By Component Type button in the Status line (or just press the F8 key) to change to component mode. You will now see the CVs that make up the cylinder, as shown in Figure 1.17—had you created a polygonal cylinder, you would see the points defining the edges of the polygonal facets.

The Select By Component Type button is on the Status line, just to the right of the floppy disk (save) icon. The leftmost of these three buttons is Select By Hierarchy; the middle button is Select By Object; the right button is Select By Component Type.

You can adjust components of an object just as you adjust an object itself by using the Move, Rotate, and Scale tools. Try selecting the top row of CVs on the cylinder (LM drag a square around them or use the Lasso tool to draw a selection around them) and then move them up some, scaling them out on the X and Z axes and rotating them a bit, as shown in Figure 1.18.

To select several components (CVs, facets, vertices, and so on) at once, you can drag a selection marquee around them. (A selection marquee is the square box that you see when you drag in a Maya scene window.) For more control, use the Lasso tool. To add more components, hold down the Shift key and the Ctrl key and drag (or click) more points. Shift alone+clicking or dragging will deselect the CVs already selected while adding points not selected. To deselect CVs only, hold down just the Ctrl key and drag around those points. Remember that you can always maneuver around the scene window (hold down the Alt key as you drag the mouse) to make selection easier.

If you now switch back to object mode, you will once again be able to choose and manipulate the entire object. Modeling (and even animating) is often a dance between object-mode and component-mode manipulation of your objects, and remembering that the F8 key switches between these two modes can be a real time-saver.





Figure 1.17 The cylinder, with CVs displayed in component mode



Figure 1.18 The cylinder, with several CV components manipulated

## Selecting by Component Type

One of the trickier aspects of Maya is selecting the proper component of an object when in component mode. You can select many types of components, including CVs, hulls, faces, edges, and so forth (and there are usually several options in each of these choices), but you can make these selections in only two ways. One way is more thorough; the other is better suited to quick selections of the most common component types.

The quicker, easier method for selecting specific component types is to use a contextual menu while your mouse is over an object. To try this, create a sphere in an empty scene, and then, with your mouse over the sphere, hold down the right mouse button. You will be presented with several options (shown in Figure 1.19) for component masking, plus a menu of actions you can perform on the object (such as templating or untemplating it).

By selecting Control Vertex (for example) from this pop-up menu, you can easily move into component-selection mode for CVs and begin manipulating your CVs. To return to object mode, press the F8 key twice.

Although the contextual menu method is quick and easy, it does not give you access to all the component types. To choose a component Figure 1.19

Options available when RM clicking a NURBS sphere



type that's not listed in the pop-up menu, you need to use the Status line. To the right of the Object/Component text field and Hierarchy/Object/Component icons is a set of eight icons, each representing a class of components you can enable or disable in your selection process. To the left of these icons is a black triangle; clicking this triangle enables or disables all components for selection. The component types you enable here are then available when you drag your mouse over an object in component mode.

All Components On All Components Off Save to Shelf

> If you turn off all components, you will not be able to select anything in the scene window including objects in object mode! This is a good place to look first if you discover you cannot choose any objects in a scene.

Holding down the right mouse button on any of the icons displays a menu of subtypes that you can either enable (check) or disable (uncheck) for component selection. Enabling or disabling component types is known as *selection masking*, and it's a great way to simplify the task of selecting a specific object or component in a complex scene. If you are not familiar with components or selection masking, try playing around with these options in Maya before continuing.

# Window Layouts

In addition to the default window layout (the perspective view plus either the Channel Box or the Attribute Editor), Maya provides many other built-in layouts, and—as is consistent with the Maya interface philosophy—if you want, you can create your own.

## **Built-in Layouts**

Maya offers two types of built-in layouts: generic layouts and saved layouts. Generic layouts are just basic layout elements (such as a four-view layout), and saved layouts are useful combinations of the basic elements prebuilt into layouts for different purposes. To begin with, let's look at how to access a generic layout. You can use the Quick Layout buttons in the Tool Box to select views and switch between layouts, as we did earlier in this chapter. But you can

also use the Panels menu located in the scene windows. Choose Panels → Layouts (accessed either via the Panels menu in the scene panel, as shown in Figure 1.20, or from the Hotbox), which displays several layout choices for your scene windows.

Choosing Four Panes places the active view (often the perspective view) in the upper-left quadrant of a four-view layout. (Note that this is different from the layout you get by pressing the spacebar, as the perspective view—or whichever view you have active—ends up in the top-right quadrant when using the spacebar, but at the top left in this case). The Three Panes Split Top, Three Panes Split Left, Three Panes Split Bottom, or Three Panes Split Right views place the active window on the



Two Panes Side by Side Two Panes Stacked Twoe Panes Spit Top Three Panes Spit Left Three Panes Spit Left Three Panes Spit Right Four Panes Previous Arrangement Next Arrangement

Figure 1.20 The menu choices for generic layouts top (or left, bottom, or right) half of the screen and then split this view into two; the other half of the screen has a single view window. The Two Panes Side By Side or Two Panes Stacked layouts are similar, except that they split the active view in half vertically and horizontally, respectively. There is also a single view, which is the same as selecting a view and pressing the spacebar to make it fill the entire screen.

Although the generic views can be useful (especially for building your own layouts discussed later in this chapter), the saved layouts are more commonly used because they fulfill specific needs. To access the saved layouts, choose Panels  $\rightarrow$  Saved Layouts, as in Figure 1.21, and then select a saved layout to use.

You are already familiar with Single Perspective View and Four View. Rather than look at each saved layout in a list, let's examine just a few—once you understand a couple of the saved layouts, the rest are fairly self-explanatory. Persp/Graph/Hypergraph is a three-panel layout with the top half split between the perspective view and the Hypergraph, while the bottom half of the screen is occupied by the Graph Editor. This view was created from the generic Three Panes Split Top layout by changing each panel to the Perspective, Hypergraph, and Graph Editor views, respectively, and then saving the layout. The Hypershade/Outliner/Persp view is a Three Panes Split Bottom, with the Hypershade occupying the top half of the screen and the Outliner and perspective view splitting the bottom half. Another useful layout is the Persp/Relationship Editor layout, which stacks the perspective view on top of the Relationship Editor. If you have Maya Unlimited and the MayaLive plug-in active, there are several layouts specifically for use with Maya Live toward the bottom of the menu, including MayaLive Setup, MayaLive Track, MayaLive Solve, and MayaLive Manual MatchMove.

### **Building Your Own Layout**

If the prebuilt Maya layouts don't quite fit your needs, never fear: the final choice in the Saved Layouts menu (Edit Layouts) lets you create and save your own layout for later use. You can even erase any or all of the prebuilt layouts from the menu.

Don't erase a saved layout unless you are sure that neither you nor anyone else working on your machine is interested in using that layout any further. To get the layout back, you'll either have to reconstruct it manually or reinstall Maya.

As an example of how to create your own layout for later use, let's create a layout with the perspective view filling half the screen on the top and with the bottom being split between the Hypershade and the Hypergraph. (This can be a useful layout if you need to connect several materials to several objects at a time, because selecting the objects in the perspective window can become tedious.) As with most things in Maya, you have a choice about how to



Single Perspective View Four View Persp/Graph/Hypergraph Hypershade/Render/Persp Hypershade/Outliner/Persp Hypershade/Persp Persp/Outline Persp/Graph/Outliner Persp/Trax/Outliner Persp/Graph Persp/Relationship Editor Persp/UV Texture Editor MayaLive Setup MayaLive Track MayaLive Solve MayaLive Manual MatchMove Edit Layouts.

Figure 1.21

The Saved Layouts menu create your new layout: you can either start from a generic layout or modify a prebuilt layout. Although starting from a prebuilt layout is often simpler, we will start from a generic layout in order to describe the entire procedure. Follow these steps:

- 1. Choose Panels → Layouts → Three Panes Split Bottom.
- Make sure the top half of the window is occupied by the perspective view (if not, select the top half and then choose Panels → Perspective → Persp).
- 3. Select the lower-left quadrant and choose Panel → Panel → Hypershade. This should turn the lower-left window into a view of the Hypershade.
- 4. Select the lower-right quadrant and choose Panels → Panel → Hypergraph, turning this corner into a view of the Hypergraph, as seen in Figure 1.22.
- 5. To save the new layout, choose Panels → Saved Layouts → Edit Layouts, which displays the Panel Editor.
- 6. If necessary, click the Layouts tab.
- 7. In the Layouts tab, click the New Layout button, rename the layout from its default name (Panel Configuration) to something more memorable, such as Persp/Hypergraph /Hypershade, and press the Enter key to change the name.

6 E



You can actually build a custom configuration directly inside the Edit Layouts menu, by using the Panels and Edit Layouts tabs. This method is more difficult than the one outlined here, however, so our recommendation is to stick with the method we just described.

# The Hotbox

The Hotbox in Maya is a tool for displaying all the menus relevant to your work at a given moment, without taking up any screen real estate when it's not in use. Although you can do everything you want in Maya without ever using the Hotbox, once you get used to the way the Hotbox conserves space and puts nearly all of Maya's tools in easy reach, you'll wonder how you ever got along without it. To access the Hotbox, just press (and hold) the spacebar. In its default configuration, you will see something like Figure 1.24.

The top row of the Hotbox always shows the general menus (the menus that are available in all menu sets), such as the File, Edit, Modify, and Create menus. The second row replicates the menu set of the active panel (in this case, the perspective view), with menu items such as View, Lighting, and Panels. The third row has a Recent Commands menu (showing the last 15 commands you issued) and a Hotbox Controls menu, which allows you to finetune how the Hotbox and general menus display information. The bottom row of menus is, in this case, the Modeling menu set, with special menus for editing curves, surfaces, and polygons. In the center of the Hotbox (where the AIW logo sits) is a quick way to change views from perspective to front to side to top, as well as an options menu for how the Hotbox displays. Access to all these menus is the same: click (and hold—the Hotbox menus will not remain open when you release the mouse button) the left mouse button over the menu; then drag inside the new submenu that appears (called a *marking menu*) to select the item you want, as in Figure 1.25, releasing the mouse when it is over your selection.

Fi	le Edit	Modify	Create L	Display	Window	Help
	View	Shading	Lighting	Show	Panels	$\geq$
Recent Co	nmands		AIW		$\geq$	Hotbox Controls
Edit Curves	Surfaces	Edit NURB	IS Polygon	ns Editf	olygons	Subdiv Surface

Figure 1.24
The Hotbox in its default configuration

	File	Edit	Modify	Create	Display	Window	Help
		View	Shadi	Perspect	tive View w	Panel	
Recent C	Comman	nds	Top V	iew Na I	> Side	View	Hotbox Control
Edit Curv	res S	iurfaces	Edit NU	Front Bos Fory	View Edit	Polygons	Subdiv Surfac
			$\sim$	HOLDOX 5			

Figure 1.25
Selecting the top view using the Hotbox



Figure 1.23

The new layout is added to the bottom of the list. In addition to the menus you can see, four regions, called zones (defined by the four lines extending from the Hotbox at 45-degree angles), have special functions. You use the top zone to quickly select from several saved layouts. You use the right zone to toggle elements of Maya's GUI on or off. You use the bottom zone to change the selected window to any of several useful views (such as the Hypergraph or the Hypershade). You use the left zone to toggle on and off several masking modes.

Although you can use the Hotbox in its default configuration, it is more useful (if a bit more cluttered) when you turn on all menu sets (Modeling, Rendering, and so on). In the Hotbox Controls menu, choose Show All, which displays all menu sets, as shown in Figure 1.26.

In this configuration, you have access to nearly all of Maya's tools in one place, and it's all available at the press of the spacebar. If you are not familiar with using the Hotbox, try forcing yourself to use it for all your menu choices for a couple of hours of work; you may find that you prefer using the Hotbox over the standard menu selection method.

#### Menus

Although we have discussed menu sets on and off throughout this chapter, let's take a moment to look at how Maya's menus are organized. The top row of menus (or the top row in the Hotbox) is split into two parts: the menus that are always present (the constant menus) and those that change according to the mode of the program (the mode menus, such as the Animation menu set, for example). Always present are File, Edit, Modify, Create, Display, Window, and Help. To change the variable menus, choose the menu set you want from the Status line (just below the menus—or under Hotbox Controls in the Hotbox). You can choose from Modeling, Animation, Dynamics, and Rendering sets. If you have Maya Unlimited, you will also see an entry for MayaLive.

Figure 1.26

The results of selecting the Show All option in the Hotbox

In addition to the general menus, nearly every view and options window in Maya has a built-in menu. The perspective view, for example, has the following menus: View, Shading,



Lighting, Show, and Panels. (You use the Show menu to display and hide different types of objects.) The Hypergraph view contains these menus: Edit, View, Bookmarks, Graph, Rendering, Options, Show, and Help. For perspective and orthographic views, you can either access their menus from the top of the window pane or use the second row of menus in the Hotbox. For views such as the Hypergraph or the Hypershade, clicking and holding the right mouse button in the body of the pane displays the menus (or you can use the menu across the top of the window). There are also menus for the Channel Box and the Attribute Editor. Many of the options windows also have menus with Edit and Help options.

Generally speaking, most windows in Maya have their own menu set, which explains why Maya doesn't use just one menu bar across the top of the screen: there are at least 100 individual menus, and there would be no space to place all these menus across one screen. Attempting to nest all these menus, on the other hand, might have taken 10 or more levels to fit all the menus into one menu bar, making the task of choosing any individual menu item both laborious and baffling. Given the complexity of the task, organizing Maya's windows into contextual subsets was both a necessity and a more elegant solution to the problem.

Even so, it is often difficult to locate a menu item you have not used in a while. Fortunately Maya provides a menu search function. Choose Help  $\rightarrow$  Find Menu, enter the text of the menu (a partial name is fine), and press Enter. For example, if you enter **sm** in the text box, the menu search will find all occurrences of *smooth*, *smoothness*, *smart*, and *smoke*. This is a handy feature and worth trying out.

# Shelves

Although we have not yet dealt much with shelves, they are a convenient way to group your most frequently used commands and tools. The shelf (see Figure 1.27) is one of the most noticeable features of Maya's GUI, appearing just below the Status line. Several icons, organized into tabs called General, Curves, and so on, perform useful commands. For example, to create a NURBS sphere, you merely click the blue Sphere button when the Surfaces shelf tab is selected; to create a spotlight, click the Spotlight button in the Rendering tab; to create a CV curve, click the CV Curve Tool button with the Curves tab selected. Most useful are the two widgets just to the left of the shelf icons. By clicking the top one (a gray tab icon), you can quickly navigate to any tab (useful for selecting the preinstalled tabs, as well as any that you create). Clicking the bottom widget opens a menu of common shelf commands, plus access to the Shelf Editor.

You can customize any shelf tab, adding a new button to it by simply Ctrl+Shift clicking the menu item (on a Mac, use Command+Control+Shift). To discard a shelf icon, just MM drag it to the trash can icon at the right of the shelf.

Having these buttons available on a shelf makes the process of creating each item much more straightforward than having to find them in a hierarchical menu set.



The shelf, with the Surfaces shelf tab selected

Figure 1.27

# The Outliner and the Hypergraph

The basic purpose of the Outliner and the Hypergraph is the same: to allow you to see an abstract (or outline) of the scene. The ways the two display a scene's outline, however, are very different.

If you have used a 3D animation program in the past, you are probably familiar with a scene management tool such as the Outliner, shown in Figure 1.28. From top to bottom, the Outliner (choose Window  $\rightarrow$  Outliner) lists all objects in your scene, including cameras (note that the orthographic views—top, side, and front—are just cameras listed in the Outliner), lights, curves, and geometric objects. If you have objects that are parented to one another (a leg, for example, is parented to a body so that they move together), the Outliner indicates this relationship by displaying a plus sign to the left of the parent object (the body in this case). Clicking the plus sign displays the child object (the leg), which, because it is the child object, is tabbed in under the parent.

The Hypergraph, by contrast, is probably like nothing you've seen before. It is, essentially, a linked (or hyperlinked) outline of your scene, showing not only your scene elements, but how they are connected. Although the Hypergraph may at first appear bewildering, its fashion of laying out a scene can prove invaluable. Figure 1.29 shows how the scene shown in the Outliner, in Figure 1.28, would look in the Hypergraph.

# The Channel Box and the Attribute Editor

The Channel Box (to the right of the main scene window) and the Attribute Editor are related windows that give you access to just about every aspect of the objects and materials in your scene. The Attribute Editor (to open it, press Ctrl+A) gives you access to all of an object's attributes, and the Channel Box displays a more simplified view of only the object's *keyable* (or animatable) attributes. Because these two panels are counterparts, it makes sense for them to be grouped together, and by default the two are set to toggle, the Attribute Editor replacing the Channel Box on the right side of the window.



The Hypergraph with leg and body





Figure 1.28 The Outliner, showing a leg object childed to a body object The Channel Box is so named because elements that can be animated in a 3D program have often been termed *channels*. To animate a ball going up and down, you animate its Y-axis channel (by setting several keyframes over time). Although Maya uses the term *attribute* for anything that could potentially be keyable in a scene, those that have actually been set to keyable are placed in the Channel Box.

As you'll see throughout this book, the Attribute Editor and the Channel Box are your keys to controlling all of an object's attributes, including numeric inputs for translation, rotation, scale, and visibility, as well as its construction history, such as spans of CVs and the radius of a circular object. The Attribute Editor, in addition (via its tabbed windows), allows you to access materials, tessellation criteria for NURBS objects, and other features. To toggle between the Channel Box and the Attribute Editor, press Ctrl+A.

Materials? Tessellation? If you're new to 3D animation, don't worry about absorbing all the jargon right away. The following chapters introduce all the essential concepts in a logical and straightforward way as they are needed.

If you click the name (not the text box, but the actual name—see Figure 1.30) of an attribute in the Channel Box and then MM drag in the scene window, you will get a "virtual slider" that controls the number next to the channel name, as shown in Figure 1.30. This is a powerful, time-saving feature in Maya.



Figure 1.30

Creating and using a virtual slider

# The Timeline

The Timeline, just below the main scene window(s) and shown in Figure 1.31, is the key to animation in Maya.

By default, the numbers on the Timeline are set to frames (and by default, frames per second is set to film rate—24—so 24 frames equals one second of animation). To the right of the Time Slider is the Current Time marker (probably set to 1.00). To change the current time in your animation, you can either drag the Current Time marker in the Time Slider or double-click the Current Time field and enter a number (such as 5). You will then see the Current Time marker move to that frame. Larger numbers (such as frame 20) are, of course, later in the animation. Below the Time Slider is the Range Slider (the gray bar with a 1 on one end and a 24 on the other) that lets you control the range of the Time Slider within a larger animation. To change the position of the Time Slider while maintaining the same range (24 frames by default), drag the Range Slider by its middle. To change the starting point of the range, drag the left square left or right. To change the ending point, drag the right square to the left or right, as shown in Figure 1.32.

To the left of the Range Slider are two numeric fields. The leftmost field sets the animation start frame (often people set this number to 0 for the first frame instead of 1). The field to its right sets the starting frame of the time range. (Changing this number is equivalent to dragging the left square of the Range Slider.) To the right of the Range Slider are two more fields; the left field sets the ending time of the animation range (equivalent to dragging the right square on the Range Slider), and the right field controls the end point of the animation (set to 48 frames by default).

To change the settings for the Time Slider, open the Animation Timeline and Playback Preferences in the Preferences window (either click the Animation Preferences button, to the right of the key icon at the bottom right of the screen or choose Window → Settings/Preferences  $\rightarrow$  Preferences and then choose the Settings/Timeline category). In the Preferences window, shown in Figure 1.33, you can control the height of the Timeline (useful when sound files are imported), set playback speed to Play Every Frame, Real-time, Half, or Twice (Play Every Frame is required for playback of dynamics), and even adjust animation beginning and

Figure 1.31 The Timeline



Drag the right square to change the ending point of the Time

Figure 1.33 The Animation Timeline and Playback Preferences in the Preferences window

Edit Help				
Categories	Timeline: Animation Time	eline and Playba	ack Preference:	5
UI Elements	Timeline Playback Start/End	1.00	60.00	
Misc Display	Animation Start/End	-1.00	375.00	
Kinematics Animation	Height	🖲 1x	○ 2x	○ 4x
Manipulators NURBS	Key Ticks Options	None Timecode	Active Snappin	Channel Box
Polygons Settings	Timecode Offset	00:00:00:00		
Dynamics Files/Projects	Playback		0	
Keys Modeling	Update view	Once	O All	Continuous
Rendering Selection	Playback Speed	Play every fram	ne 🗘	Other 0.00
Sound	Playback by	1.000		
Timeline 4				

end points. In the Settings section, you can change your slider units from the default film (24fps) to PAL (Phase Alternating Lines—used in Europe and other countries), NTSC (National Television Standards Committee—used in the USA among other countries), seconds, minutes, or even hours.

To play back an animation, you can either use the VCR-like controls to the right of the Timeline, or you can press Alt+V to start and stop the animation and Alt+Shift+V to reset the animation to its starting frame.

# The Command Line, the Feedback Line, and the Script Editor

At the bottom of the Maya screen is the Command/Feedback line. The two halves of this line function in tandem and are simply the last lines of the Script Editor's input and history windows,

respectively, so it makes sense for us to first take a quick look at Maya's Script Editor. Although most of your interaction with Maya is via the GUI, what you actually tell Maya to do is passed to it via MEL. The selections and other actions you make in the GUI are recorded as MEL commands. Creating a NURBS sphere, for example, is simply the command . followed by several optional flags. To access the Script Editor, either click the Script Editor icon just to the right of the Feedback line (at the bottom right of the screen), or choose Window → General Editors → Script Editor. The Script Editor, shown in Figure 1.34, is

<pre>phere -p 0 0 0 - au 0 1 0 - ssw 0 -esw 360 -r 1 -d 3 -ut 0 -tol 0.01 -s 0 cale -r 1.423566 1.423566 1.423566 ; cale -r 1.42356111 1.269111 ; phere -p 0 0 0 -au 0 1 0 -ssw 0 -esw 360 -r 1 -d 3 -ut 0 -tol 0.01 -s 0 cale -r 1.37267 0.586242 + 0.61348 ; ove -r 0.573683 0.878001 -0.6848178 ; ove -r 0.573683 0.878001 -0.0848178 ; ove -r - 3.662395 1 1 ;</pre>	<pre>phate -p 0 0 0 - ac 0 1 0 -srw 0 -erw 360 -r 1 -d 3 -ut 0 -tol 0.01 -s 8 coale -r 1.26361 1.25366 1.423565 ; coale -r 1.263111 1.269111 1.269111 ; phate -p 0 0 0 - ac 0 1 0 -srw 0 -erw 360 -r 1 -d 3 -ut 0 -tol 0.01 -s 8 coale -r 1.377702 1.377702 ; core -r 0.51659 0.19087 -0.659742 ; core -r 0.573683 0.878001 -0.0848178 ; core -r -0.573683 0.878001 -0.0848178 ; create -r 3.662395 1 1 ;</pre>	File Edit Script Help				
cale -r 1.269111 1.269111 1.269111 ; phere -p 0 0 0 -ax 0 1 0 -ssw 0 -esw 360 -r 1 -d 3 -ut 0 -tol 0.01 -s 0 cale -r 1.37702 1.377702 1.377702 ; .ove -r 0.51659 0.19007 -0.659742 ; .ove -r 0.573603 0.070601 -0.0848178 ; .ove -r -0.573603 0.070601 -0.0848178 ; .ove -r -0.521331 0.730077 0.073737 ; cale -r 3.662395 1 1 ;	<pre>icale =r 1.269111 1.269111 ; phere =p 0 0 0 -ac 0 1 0 -srs 0 -crs 360 -r 1 -d 3 -ut 0 -tol 0.01 -s 8 cole =r 1.377702 1.377702 1.377702 ; wowe =r 0.51659 0.19087 -0.659742 ; wowe =r 0.573683 0.878001 -0.0848178 ; wowe =r -0.573683 0.878001 -0.0848178 ; wowe =r -3.662395 1 1 ;</pre>	sphere -p 0 0 0 -ax 0 1 0 -ssw scale -r 1 423566 1 423566 1 42	0 -esw 360 -r 3566 :	1 -d 3 -ut	0 -tol	0.01 -= 8
phere -p 0 0 0 -at 0 1 0 -ssw 0 -esw 360 -r 1 -d 3 -ut 0 -tol 0.01 -s 0 cale -r 1.37702 1.377702 1.377702 ; .ove -r 0.51659 0.19007 -0.653742 ; .ove -r 0.573693 0.878001 -0.0848178 ; .ove -r -0.573693 0.878001 -0.0848178 ; .ove -r -0.621331 0.730077 0.0737737 ; cale -r 3.662995 1 1 ;	phate = p 0 0 0 - at 0 1 0 -ssw 0 -esw 360 - r 1 -d 3 -ut 0 -tol 0.01 -s 8 ioste = r 0.51659 0.19007 -0.659742 ; iowe = r 0.57269 0.565242 + -0.61348 ; iowe = r -0.573693 0.878001 -0.0848178 ; iowe = r -0.621331 0.730077 0.0737737 ; icale = r 3.662995 1 1 ;	scale -r 1.269111 1.269111 1.26	9111 ;			
cale - r 0.51659 1.9007 - 0.659742 ; core - r 0.173287 0.586324 - 0.61348 ; core - r - 0.573653 0.873063 - 0.7848179 ; core - r - 0.621331 0.730077 0.0737737 ; cale - r 3.662995 1 1 ;	tala = 1 : 3,7/02 : 13,7/02 : 3,7/02 ; torre = r 0.51659 0.19007 : 0.65942 ; torre = r 0.573669 0.073001 - 0.0644278 ; torre = r - 0.621331 0.730077 0.0737737 ; teale = r 3.662995 1 1 ;	sphere -p 0 0 0 -ax 0 1 0 -ssw	0 -esw 360 -r	1 -d 3 -ut	0 -tol	0.01 -5 8
uore -r 0.173287 0.886524 -0.61348 ; uore -r -0.573683 0.878001 -0.0848178 ; uore -r -0.621331 0.730077 0.0737737 ; cale -r 3.662995 1 1 ;	uore -r 0.173287 0.566524 -0.61346 ; wore -r 0.673663 0.873663 0.870501 -0.0848178 ; wore -r -0.621331 0.730077 0.0737737 ; icale -r 3.662995 1 1 ; ▶	nove -r 0.51659 0.19087 -0.6597	42 ;			
come - x - 0.573653 0.878000 -0.0848178 ; cole - x - 0.621331 0.7300770 0.0737737 ; cole - x 3.662995 1 1 ;	Love - + -0.573683 0.878001 -0.0848278 ; treale -r 3.662995 1 1 ; ▶	nove -r 0.173287 0.586924 -0.61	348 ;			
cale -r 3.662995 1 1 ;	rcala -r 3.662995 1 1 ; ▶	nove -r -0.573683 0.878001 -0.0 nove -r -0.621331 0.230027 0.02	1848178 ; 237737 :			
<u>&gt;</u>	¥	scale -r 3.662995 1 1 ;				_
	2					•
		•				<u> </u>

Figure 1.34 The Script Editor window split into two halves. The top, which is the history window, probably has several lines of code in it (the last commands you issued to Maya). The input window at the bottom awaits any MEL commands you might want to give to Maya.

For information on how to use MEL commands with the Script Editor, see Chapter 17.

To see how the Script Editor works, type **sphere** (in lowercase letters) in the input window and press the Enter key on the *numeric keypad* (not the alpha keyboard). You should see the line

// Result: nurbsSphere1 makeNurbsSphere1 //

appear in the history window (telling you what Maya has done to complete your command), and a sphere will appear at the origin of your scene.

## SAVING MAYA PROJECT AND SCENE FILES

A Maya project consists of several folders (or directories) of information about the scene (which is where your working scene file is stored), any rendering jobs, source images, output images, textures, and so forth. When you first create a new scene in Maya, there are *two* steps to saving: first, save your project (which contains all the proper places for Maya to store your project's information), and then save the actual scene file.

To save your new project, choose File  $\rightarrow$  Project  $\rightarrow$  New. You might want to browse for your new project's file location. With the New Project window open, click the Browse button next to the Location text field, and use the standard file browser to choose the location of your project.

Maya is based on the Unix operating system, which means you *must never* use spaces in your filenames—even if you're running the Windows or Mac versions of Maya. If you do, Maya may display an error message when you try to open your scene later, and you won't be able to access your earlier work! The Windows and Mac operating systems will allow you to save according to their filename conventions, but Maya's file system will have problems recognizing names with spaces.

To save your scene file itself, just choose File  $\rightarrow$  Save (or Save As) and give your scene a name.

It is a good idea to append a number to the name of every scene (for example, rocket001). Maya does this automatically when you turn on the Incremental Save option. Choose File  $\rightarrow$  Save Scene  $\Box$ . When the Save Scene Options window opens, click the Incremental Save check box. As you work, you will want to save your scene often, in case you run into any problems. With Incremental Save turned on, each time you save, Maya will create a new file, numbered sequentially (rocket002, rocket003, and so on). If you are concerned about disk space on your hard drive, you can limit the number of incremental saves since new backup files are created each time you save. In the Save Scene Options window, click the Limit Incremental Saves check box. The default limit is 20 increments, which is a good number of backup copies to keep. If you would rather, you can enter a different number into this field or just leave the limit turned off. Once the incremental save limit is reached, Maya deletes the oldest incremental file and replaces it with the most recently saved one.

#### You can also press Ctrl+Enter (on the main keyboard) to execute your command.

Because the Command line is just the last input line in the Script Editor, you don't have to open the Script Editor for a simple command. Try closing the Script Editor and then, in the Command line, type **cone** (all lowercase letters), and press Enter (or Ctrl+Enter on the alpha keyboard). A cone should appear in your scene, and the Feedback line (to the right of the Command line) should now read

Result: nurbsCone1 makeNurbsCone1

This lets you know what actions Maya has taken to complete your command.

To "focus" on the Command line when you are in a scene window (so you don't have to click in the Command line field with your mouse), press the ` (reverse apostrophe) key on your keyboard.

# Summary

This quick tour has shown that, while Maya is a deep and complex program, a great deal of thought has gone into making the interface intuitive. Consistent interface elements (such as using the Alt key and mouse drags to move around many different windows), grouping tools, and even placing clues about your orientation in space and the type of tool you're using directly in the scene windows—all of these features work together to ease the new user's entrance into this complex environment and to make the experienced user more productive.

More importantly, you can customize the interface, from its smallest to its largest detail, so you can tailor the program to meet your needs. As you grow more comfortable with using Maya, you will want to optimize its interface to allow you to work more quickly with less clutter. Throughout this book, you will find tips and tricks that you can use to optimize your workspace, making you that much more efficient. If you are new to Maya, spend a bit of time playing with the interface after reading this chapter. Otherwise, move on to the next chapter and start the process of creating a large-scale animation from scratch!

If you are very new to Maya and 3D animation and would like to create a smaller, simpler animation before you begin the book-sized animation project, you can read the Rocket Tutorial PDF file on the accompanying CD (rocketTutorial.pdf). That bonus chapter will lead you through the process of creating a simpler animation from start to finish.