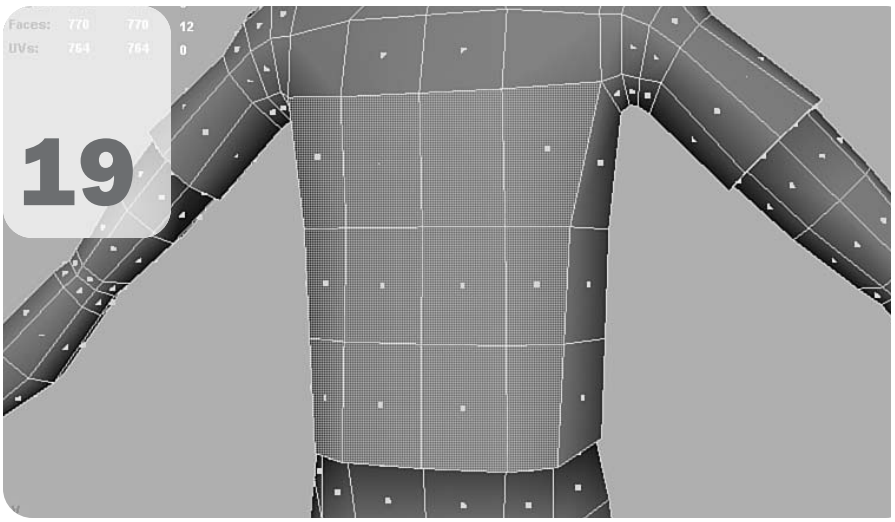
Chapter 19



The Art of Texturing in Maya

In this chapter, you examine how to prepare your polygonal model to receive a custom texture in Photoshop. This process requires understanding the concepts behind UVs and UV layouts for polygons in Maya. You learn how to create these UV layouts, import them into Photoshop, and use them as a template to create a texture for your objects.

UVs and the UV Coordinate System

Every polygonal object in Maya has UVs. They are a vertex-like polygon component used strictly for texturing purposes. UVs enable you to take a three-dimensional surface and lay it out flat so that you can paint a texture on it in a program such as Photoshop. As an analogy, consider having to print a design on a beach ball using a computer printer. To do this, the beach ball's surface needs to be completely flat and laid out in a configuration that fits completely within a standard sheet of paper. Unfortunately, laying the surface out in this manner means you would have to completely destroy the beach ball. This is where UVs come into play. UVs are an

entirely separate coordinate system, fully independent of the location of a model's vertices. They are almost like a "second surface" that you can use to flatten the object out without destroying the model's shape.

All the polygonal primitives in Maya are created with a default set of UVs that can be viewed with the UV Texture Editor, located under the Window menu in Maya. In **TUTORIAL 19.1**, you use this editor to get an idea of what a UV layout looks like on a primitive cube.

TUTORIAL 19.1: Examining UV Layouts

1. Open Maya and start a new scene.
2. From the Create menu, choose Polygon Primitives > Cube.
3. Choose Window > UV Texture Editor. This window shows you the UV layout on selected objects (see **FIGURE 19.1**). Keep in mind that if you have nothing selected, this window is blank.

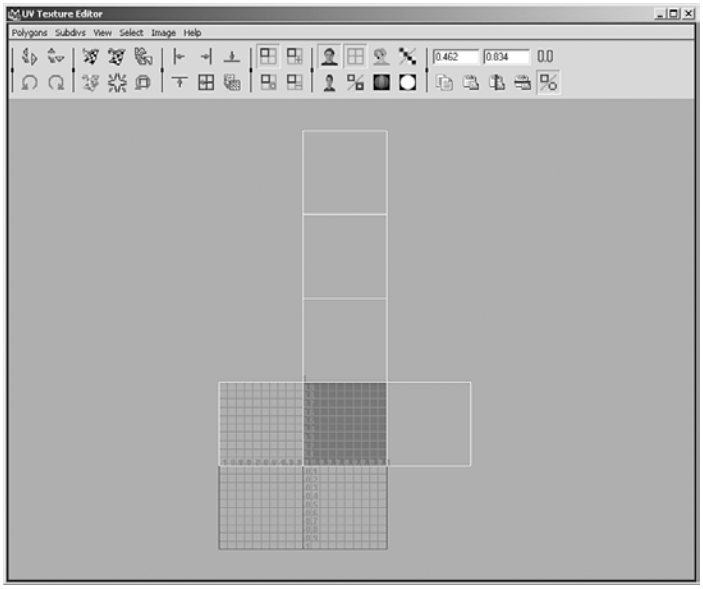


FIGURE 19.1 The default UV layout of a cube.

Notice that the UVs for the cube are arranged as though it were unfolded and laid out flat. At the same time, however, the cube retains its original shape because the actual vertex locations in 3D space are separate from the UV coordinates.

END TUTORIAL 19.1

Because UVs exist in a coordinate system separate from a model's vertices, their position has no effect on the final model. UV coordinate space is a two-dimensional system rather than a three-dimensional one. Its two dimensions, U and V, are surface dependent, meaning they exist only along an object's surface. For example, pretend that your stomach has UV coordinates. The U direction runs horizontally, and the V direction runs vertically. If you draw a line across your stomach from left to right, that line moves only in the U direction of the UV coordinate space. No matter how far you continue the line, even around to your back, you are still moving only in the U direction along the surface. The UV coordinate system, therefore, is a two-dimensional system that "wraps around" a three-dimensional one.

The UV Texture Editor

The UV Texture Editor is the primary tool for creating UV layouts in Maya. UVs can be edited, manipulated, and controlled by using the UV Texture Editor, which you viewed in **TUTORIAL 19.1**. In this section, you examine this editor briefly to see how it's used to control your object's UVs. The editor is divided into three main areas: the menu bar, the toolbar, and the view.

The Menu Bar

The menu bar contains all the relevant commands to control your UVs. The following list describes the menu items:

- *Polygons*—This menu contains all the commands needed to lay out the UVs of a polygon model. Instead of explaining each one now, you learn about these commands as you use them in the following tutorials.
- *Subdivs*—This menu contains a few commands necessary for adjusting UVs on a subdivision surface. This menu isn't covered in this book.
- *View*—This menu contains many commands for controlling what you see in the viewport. Sometimes it can be difficult to tell what UVs are doing, especially when your layout consists of several overlapping pieces. Using this menu, you can show or hide specific groups of UVs to help make the arrangement process easier.
- *Select*—This menu has a variety of useful commands to help with selection of your object's components. You can use these commands to select all UVs within a contiguous piece, or shell, and to convert a specific selection into vertices, edges, faces, or UVs.
- *Image*—This menu provides controls for how the texture is displayed in the UV Texture Editor.
- *Help*—This menu gives you access to Maya's help system.

The Toolbar

Across the toolbar are a series of icons and entry fields that can be used for many commands (see **Table 19.1**); these commands are also available from the main menu. Also, notice that the toolbar is divided into six collapsible groups to save space.

TABLE 19.1 UV Texture Editor Toolbar

Icon	Name	Description
	Flip UVs (U direction)	Flips the selected UVs horizontally in the UV Texture Editor.
	Flip UVs (V direction)	Flips the selected UVs vertically in the UV Texture Editor.
	Rotate UVs Counterclockwise	Rotates all selected UVs 45 degrees in a counterclockwise direction.
	Rotate UVs Clockwise	Rotates all selected UVs 45 degrees in a clockwise direction.
	Cut UVs	Divides a piece of the UV layout along selected edges. Although selecting edges is the most efficient way to use this tool, you can also use it with selections of UVs.
	Sew UVs	Attaches two edges together in UV space. It doesn't affect the shape of the actual model, even though you're working with polygonal edges. Note that when selecting one edge in the UV Texture Editor, the corresponding edge shared on the model is also selected.
	Layout UVs	Automatically generates a layout for the UVs of your model based on a set of criteria you enter in the options dialog box. Using this command from the Polygons menu to open the Options dialog box is usually easier.
	Move and Sew UVs	Moves and attaches selections of edges to one another. The difference between this command and Sew UVs is that Move and Sew UVs tries to move the pieces of the layout, instead of just the edges.
	Split Selected UV	Breaks a single UV up so that there's one UV for each edge that was leading into that UV. For example, if you have four edges leading into a single UV, this command would break that UV into four separate UVs.

TABLE 19.1 Continued

Icon	Name	Description
	Cycle UVs	Cycles through all the UVs within the face that contains the selected UV, and then selects all the edges of that face. This command can be useful when you're having a difficult time seeing what a particular face is shaped like in the UV Texture Editor.
	Align UVs (minimum U)	Aligns a selection of two or more UVs in the U direction so that they line up with the UV that was farthest to the left in the UV Texture Editor.
	Align UVs (maximum U)	The same as the previous command, except that the UVs are aligned in the U direction to the UV that was farthest to the right in the UV Texture Editor.
	Align UVs (minimum V)	Aligns a selection of two or more UVs in the V direction so that they line up with the UV that was the closest to the bottom of the UV Texture Editor.
	Align UVs (maximum V)	The same as the previous command, except that the UVs are aligned in the V direction to the UV that was closest to the top of the UV Texture Editor.
	Grid UVs	Moves the selected UVs to the nearest grid intersection based on the settings created for the command. Using this command's Options dialog box from the Polygons menu is easier.
	Relax UVs	More evenly distributes the selected piece of the UV layout to make more efficient use of texture space. The result is not unlike taking an average location for all the UVs of a selected piece.
	Toggle Isolate Select Mode	Hides all UVs that aren't currently selected, which can make manipulating the UVs much easier.
	Add Selected	Adds the current selection to the current isolated selection, making it visible.
	Remove All	Clears the current isolated selection, essentially hiding all objects visible while the isolated select is active.
	Remove Selected	Removes any selected UVs from the current isolated selection.

TABLE 19.1 Continued

Icon	Name	Description
	Show Background Image (toggle on/off)	Shows or hides the texture you're applying to your objects in the UV Texture Editor. The texture tile outside the 0 – 1 texture space, which you discuss in a moment.
	Show Grid (toggle on/off)	Toggles the display of the grid in the UV Texture Editor.
	Snap to Pixels (toggle on/off)	Controls whether you can snap UVs to pixel borders. This option is useful when you're trying to be precise about which texture pixels are included in your UV layout.
	Filtered Display Mode (toggle on/off)	Specifies whether the texture is rendered with hardware filtering in the UV Texture Editor or is drawn with sharply defined pixels.
	Image Ratio (toggle on/off)	Controls whether the texture space is square or matches the size ratio of the selected texture. Because all Unreal textures must be square, you don't need to use this option for game models.
	Texture Borders (toggle on/off)	Controls whether UV borders are drawn with a thick line instead of the single pixel line.
	Display RGB Channels	Displays the color information of the texture in the UV Texture Editor.
	Display Alpha Channel	Displays the alpha information for the texture in the UV Texture Editor.
	U and V coordinate entry fields	Used to type in an exact location in UV space, moving the selected UV to that location.
	Refresh the Current UV Values	Refreshes the UV coordinate entry fields to display the correct number for the selected UV.
	Copy UVs	Copies the selected vertex colors, UVs, or shaders to the Clipboard so that you can paste them onto other UV sets.
	Paste UVs	Pastes any vertex colors, UVs, or shaders that are stored in the Clipboard.
	Paste U Value to Selected UVs	Pastes the U value that has been stored in the Clipboard onto the selected UVs.
	Paste V Value to Selected UVs	Pastes the V value that has been stored in the Clipboard onto the selected UVs.
	Copy/Paste for UVs/Faces (toggle)	Determines whether copy and paste work for UVs or faces.

The Viewport

You navigate the UV Texture Editor viewport exactly the same way as the orthographic views in Maya. Alt+MMB pans the view, and Alt+LMB and MMB zoom the view. You can also use Alt+LMB to pan the camera, something you can't do in an orthographic viewport.

The UV Texture Editor viewport has a unique grid that's divided into four quadrants, with the upper-right quadrant darker than the rest. This quadrant is darker to indicate that your entire texture fits into this quadrant. Outside the upper-right quadrant, the texture simply repeats, or tiles. In most cases, therefore, you want your entire UV layout to exist within this grid's upper-right quadrant, which is also known as the 0–1 texture space because all the coordinates for this quadrant exist within 0 and 1.

Mapping UVs

Before you can start laying out an object's UVs, you must understand how to map UVs in the UV Texture Editor. UV mapping is a way to take a selection of faces and lay out their corresponding UVs in the UV Texture Editor. Several types of UV mapping are available in Maya, but this book focuses on three: automatic mapping, planar mapping, and cylindrical mapping.

Mapping Methods

With *automatic mapping*, Maya automatically lays out your model's UVs based on a series of criteria (see **Figure 19.2**). You can control the method used in automatic mapping in the tool's Options dialog box, which you can access by choosing Edit Polygons > Texture > Automatic Mapping from the main menu. You'll find several options for controlling the way the automatic mapping takes place. Unfortunately, this command rarely yields usable results for your game models because the UVs are usually laid out in a pattern that's practically impossible to follow. However, you can use this method as a "quick fix" to achieve a simple UV layout, especially when you intend to use the textures already included in Unreal.

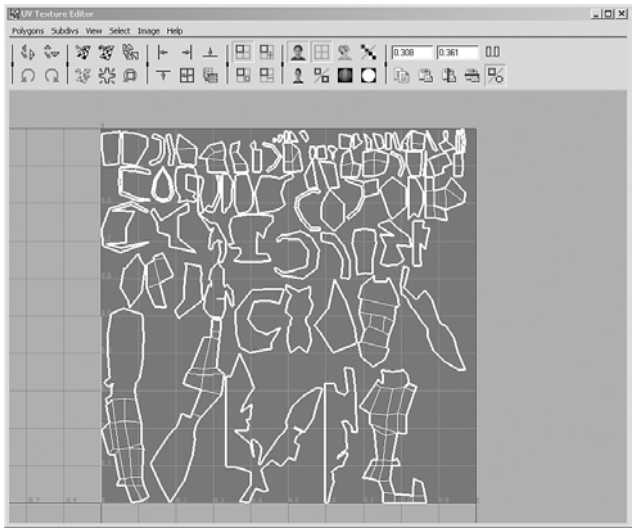


FIGURE 19.2 A character model with UVs laid out with automatic mapping.

In *planar mapping*, the UVs of selected faces are laid out as though they had been pulled off the model and laid out flat onto a single plane. You can choose a specific axis on which the plane is projected, or you can let Maya act to interpolate one based on the angle of all the selected faces. You'll be using this mapping method a bit later. **Figure 19.3** shows a planar mapped sphere, in which the plane is projected down the Z-axis.

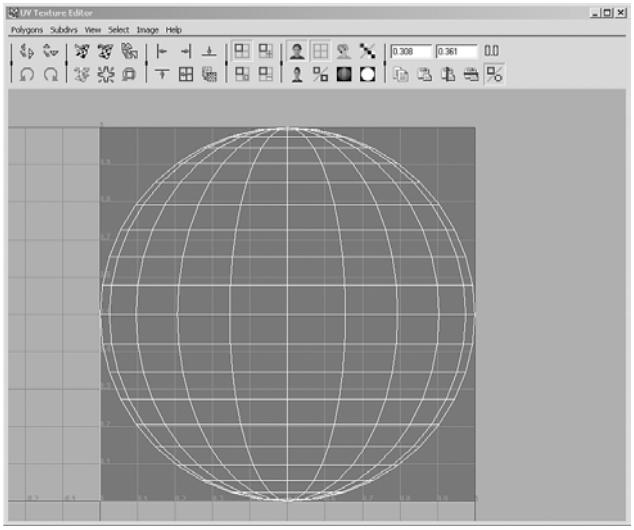


FIGURE 19.3 A planar projected sphere.

In *cylindrical mapping*, the UVs are laid out as though they had been projected onto a cylinder. This mapping method is especially useful for character faces and for any object that's roughly cylindrical in form, such as an arm or leg. For example, if you cut the leg off a pair of pants, the leg would be a cylindrical form. If you make a cut that runs all the way along the inseam, you could then lay the fabric out flat. This is exactly how cylindrical mapping works. **Figure 19.**4 shows a character's leg that has been mapped cylindrically.

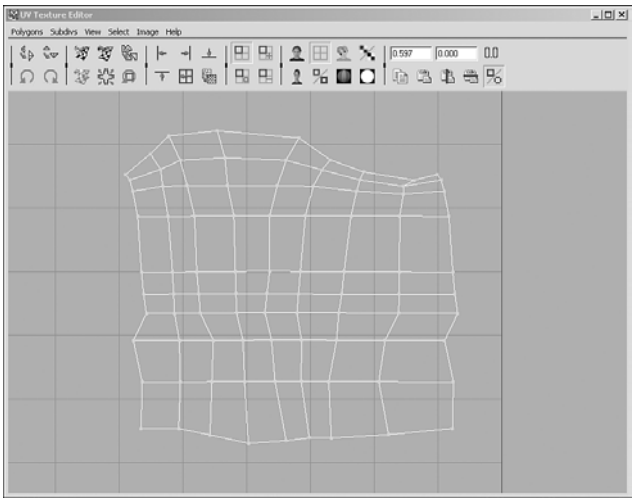


FIGURE 19.4 A cylindrically mapped leg.

Creating UV Layouts

Mapping is only the first step in creating a proper layout for your UVs. On an actual model, you map each part of the model, a piece at a time, using the mapping method best suited to that specific area of the model. When finished, you have a series of pieces representing your model that are laid out flat. At that point, all you need to do is move, rotate, and scale each piece in the UV Texture Editor so that they all fit in the 0–1 texture space.

This process might seem easy, and in concept, it *is* quite easy; in practice, however, laying out an object's UVs can be time consuming. Also, many beginners wonder what's the *right* or *correct* way to lay out an object's UVs. Unfortunately, this is where many users run into the fine line between a skill and an art form. The truth is that there is no single "correct" way to create a UV layout—only the method that works best for you or your texture artist. Before you get too far into that, however, try creating your own UV layout for a simple object in **TUTORIAL 19.2**. Over the next few tutorials, you create a static mesh of a dice; later, using the skills you learn in **Chapter 20**, "Static Meshes," you can import it into Unreal with a complete texture.

TUTORIAL 19.2: Creating a Mesh and Preparing for UV Layout

1. Start a new scene in Maya. Verify that you're in the Modeling menu set (if not, press F3).
2. Create a polygon cube with a length, width, and height of 64 (see **FIGURE 19.5**). Name the cube `Dice`.
3. With the cube selected, choose Edit Polygons > Bevel > options box from the menu. In the Bevel Options dialog box, set the Offset value to 6, and click Bevel. This creates an extra set of faces at the corners of the cube, which round it out without adding too much detail (see **FIGURE 19.6**).
4. The bevel action has caused the cube to lose its UVs, so you need to create them from scratch. You can verify this by selecting the `Dice` and opening the UV Texture Editor from the Window menu.

   For now, you'll just create a simple mapping to use as a reference so that you can tell what has been laid out and what has not. To do this, select the `Dice` and choose Edit Polygons > Texture > Planar Map > options box from the menu. Make sure the Fit to Best Plane option is enabled, and click Project. This creates a single map that includes all the faces.

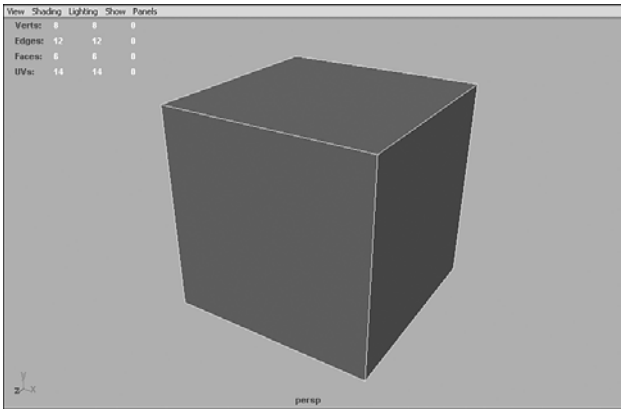


FIGURE 19.5 The cube that will become your `Dice`.

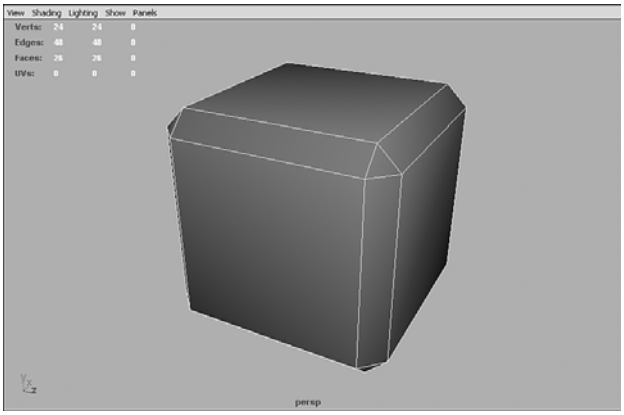


FIGURE 19.6 The edges of the cube have been beveled to create a simple rounding.

5. Select the `Dice` in Object mode, and open the UV Texture Editor. You see the UV layout for the object, which looks similar to an orthographic view.
6. Press F12 to make UVs selectable, and then draw a marquee selection across all the UVs in the UV Texture Editor. Try the Move, Rotate, and Scale tools to see how they work on the UV selection. When you're finished, move the UVs to the side, outside the 0–1 texture space. You'll be using these UVs only as a starting point for your layout. With that, your `Dice` is ready to create the UV layout. Save the file as `UnrealDice`.

END TUTORIAL 19.2

As mentioned earlier, there's no right or wrong way to lay out an object's UVs. There are some fundamental guidelines to consider, however, and they are explained as you come across them in subsequent tutorials. In **TUTORIAL 19.3**, you create a simple UV layout for the static mesh created in **TUTORIAL 19.2**.

TUTORIAL 19.3: Creating a UV Layout for the Static Mesh

1. Continue from **TUTORIAL 19.2**, or open the file you saved at the end of that tutorial. You're going to create a UV layout that you can paint in Photoshop.
2. In the Perspective viewport, press F11 to make faces selectable. Select the face at the top of the `Dice`. From the Edit Polygons menu, choose Texture > Planar Map.
3. Open the UV Texture Editor. Notice the interesting manipulator visible on the mapped UVs (see **FIGURE 19.7**). It's a combination of the Move, Rotate, and Scale tools. You can use the arrows or the small blue ring in the center to move. The arc in the middle is for rotation. The three squares are

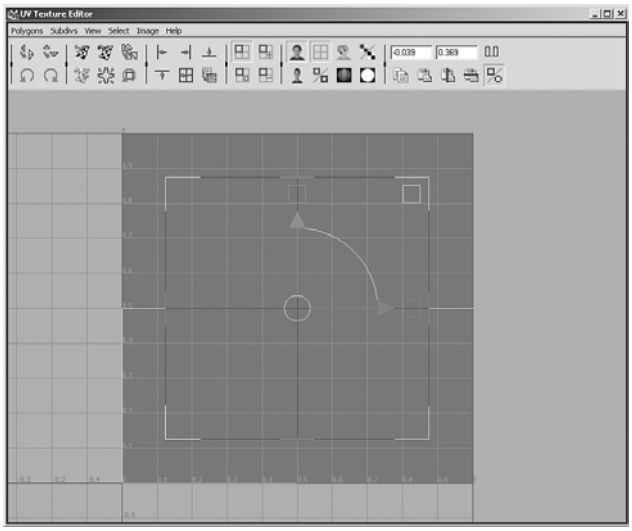


FIGURE 19.7 This manipulator becomes available when you create mappings.

used for scaling in U, V, or U and V simultaneously. Areas on the border of the manipulator, such as at the corners, are pale blue, red, or green. They are used for a special type of scaling that enables you to expand the manipulator without affecting the other sides.

4. Move and scale the selected face so that its lower-left corner is at the UV coordinates 0.4, 0.7. Place the upper-right corner at the coordinates 0.6, 0.9. You can use the numeric entry fields in the toolbar, or simply use the Move tool with grid snapping activated to help. Make sure the piece remains a perfect square, as in **FIGURE 19.8**.

5. Now, select the bottommost face of the `Dice` and apply planar mapping to it. Adjust the face so that it's aligned with the grid, exactly one grid space to the right of the first face you mapped (see **FIGURE 19.9**).

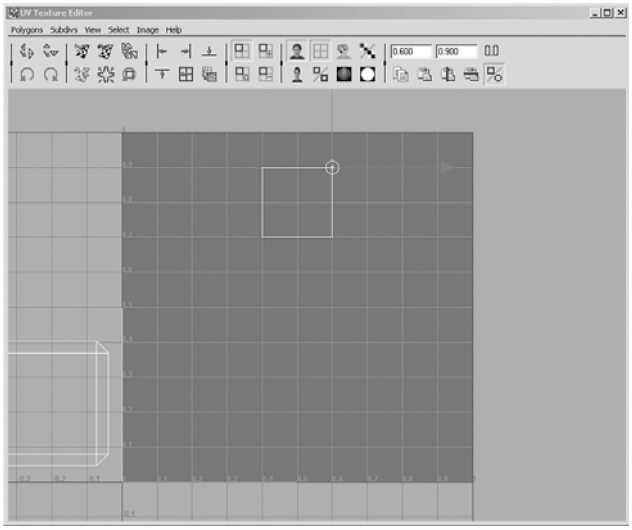


FIGURE 19.8 The first face of the `Dice` is now laid out.

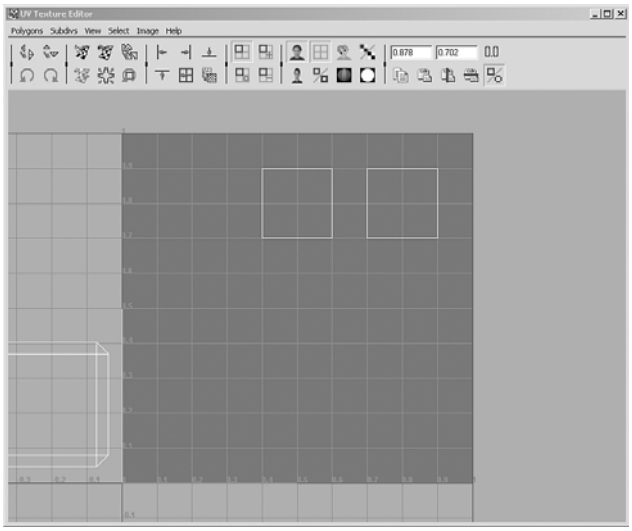


FIGURE 19.9 Two faces are now laid out.

6. Continue this pattern to lay out the rest of the `Dice` object's major faces. After you map a face, always place the face on the opposite side next to it. For example, place the left and right faces next to each other and the front and back faces next to each other. When finished, you should have something similar to **FIGURE 19.10**.
7. In the UV Texture Editor, move and scale the remaining UVs that are still outside the UV Texture Editor so that they fit in the area to the right of the major faces you just laid out. All these corner faces have the same color, so their placement is not that important. In fact, if you want to, you could scale them down so that they fit inside a single pixel. Whatever color that single pixel contains is spread across all the UV faces that were scaled into the area.
8. Save your work. Now you're ready to take this UV layout into Photoshop.

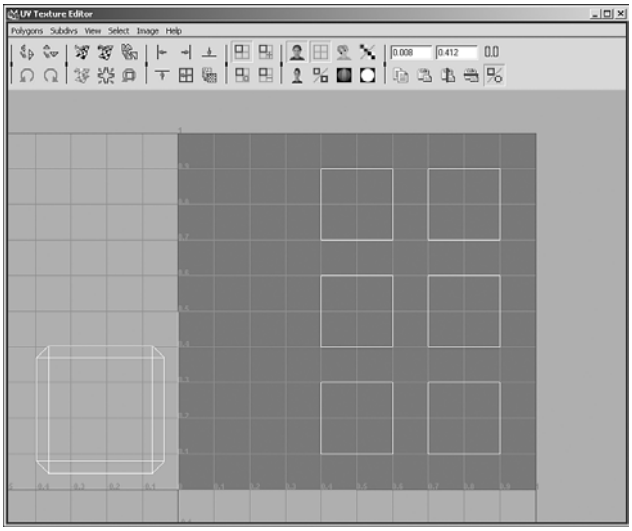


FIGURE 19.10 The major faces of the `Dice` object are now laid out.

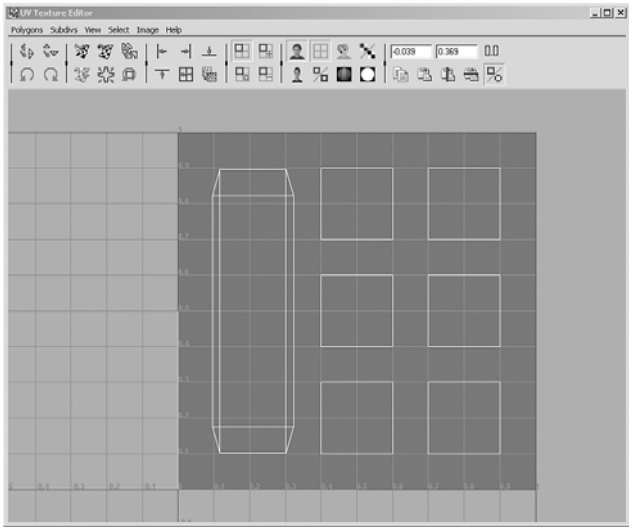


FIGURE 19.11 All the faces of the `Dice` are completely laid out.

END TUTORIAL 19.3

Creating Textures from UV Layouts

Now that you have seen how to create a UV layout for your object, you need to learn how this layout can be used to create a texture in an external paint application, such as Photoshop. You won't, however, import the texture into Unreal, as the methods for this process have already been

covered in **Chapter 9**, "Interactive Elements." In **TUTORIAL 19.4**, you import the UV layout created in Maya into Photoshop to create a texture.

TUTORIAL 19.4: Exporting Your UVs into Photoshop

1. Continue from **TUTORIAL 19.3**, or open the file you saved at the end of that tutorial. You're going to import the UV layout you created into Photoshop so that you can create a texture with it.
2. With the `Dice` selected, go to the UV Texture Editor. From the Polygons menu, choose UV Snapshot. Set the File Name text box to a path and name you can easily locate. Set the size in X and Y to 512. The Color Value setting controls what color the lines of the UV layout are. Because the background is always black, stick with white for the UV layout lines. Also, make sure the image format is set to Targa (see **FIGURE 19.12**). Click OK when done.
3. Open Photoshop, and open the Targa file you just created from the same path used in the UV Snapshot dialog box. You see the same thing you saw in the 0–1 texture space in Maya's UV Texture Editor, except that the image is white UVs on a black background.
4. As a rule, you should never paint on your UV snapshot, so create a new layer over the background layer. Name this layer `DiceColor`.
5. With the new layer selected, use the Paint Bucket tool and fill the layer with white. Bring the layer's opacity down to about 90% so that you can barely see where the UVs exist.
6. Remember how you mapped first one side of the `Dice` object and then the opposite side? On real dice, numbers on opposite sides always add up to seven. With that in mind, make a series of dots in the laid out UVs that coincide with the dots on an actual set of dice. Use **FIGURE 19.13** if you need help.
7. Set the opacity for the DiceColor layer back to 100%. Save your work as a new Targa file with the name `DiceTextureComplete`. Choose 32-bit when prompted how to save the Targa file.

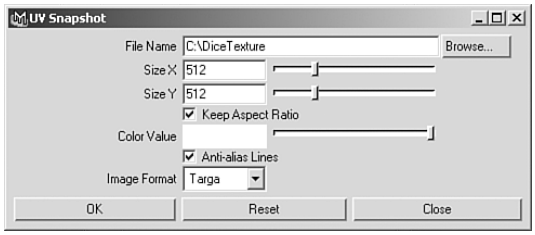


FIGURE 19.12 These are the settings you need in the UV Snapshot dialog box.

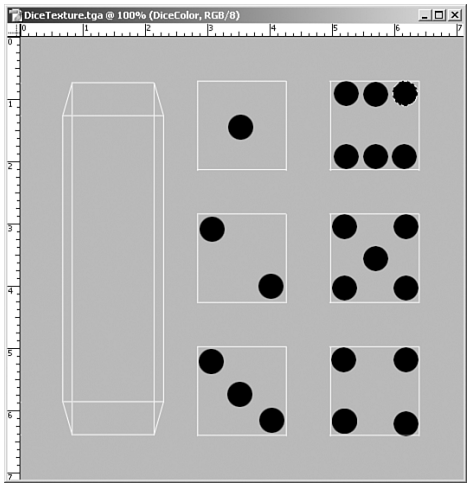


FIGURE 19.13 Here is the dot pattern for your layout. Note that the DiceColor layer has been lightened a bit for clarity.

END TUTORIAL 19.4

Because you already know how to create new textures for materials (covered in **Chapter 8**, "Creating Materials in Unreal") and because you have yet to learn how to get Maya models into Unreal as static meshes, in **TUTORIAL 19.5**, you simply add the texture to the object in Maya. After you read Chapter 20, "Static Meshes," you'll know everything you need to know to create static meshes and import a custom texture based on UV layouts.

TUTORIAL 19.5: Applying the New Texture

1. Return to Maya. Open the Maya file you saved in **TUTORIAL 19.3**, if it's not open already.
2. Right-click on the object, and from the marking menu, choose Material > Assign New Material > Lambert. This creates a new Lambert material, applies it to the object, and opens the Attribute Editor for the new material. Click the Map button (with the checkered pattern) next to the Color slider. In the Create Render Node dialog box, click the File texture button.

NOTE

You can also disconnect the nodes by typing the following Maya Embedded Language (MELScript) line into the command line at the bottom of the interface:

```
disconnectAttr file1.outTransparency lambert2.transparency;
```

This line performs the same function as removing the wire between the two nodes.

NOTE

Because the texture's placement now depends on the UVs, you can delete the Place2DTexture node from the Lambert2 network. It has no effect on the final object.

3. In the Attribute Editor, next to Image Name, is a small button with a folder icon. Click this button, and navigate to the `DiceTextureComplete.tga` texture you finished in **TUTORIAL 19.4**.
4. If you press 6 on the keyboard, you'll notice that the object seems to be almost completely transparent, but this is nothing to worry about. The reason it looks transparent is that the Targa file has an alpha channel to control its transparency. Maya noticed the alpha channel and took the liberty of assigning its data to the Transparency attribute.
5. You need to break the connection from the File texture to the material's Transparency. Open the Hypershade window. Right-click on Lambert2, and choose Graph Network.
6. In the Work Area of the Hypershade, you see the network from the shader. Note that between the File1 and Lambert2 nodes, there are two connections: The top one is feeding the color, and the bottom is feeding the transparency (see **FIGURE 19.14**).

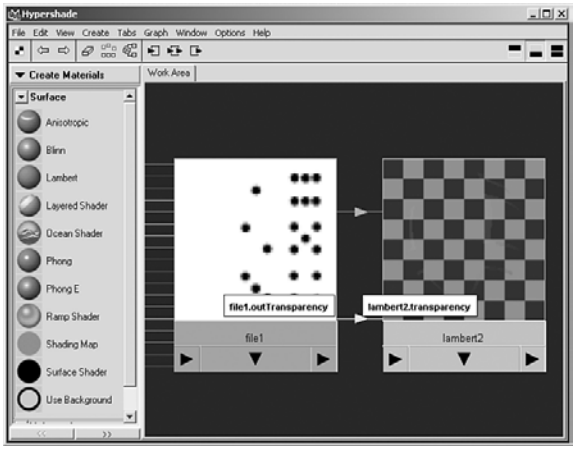


FIGURE 19.14 The two nodes of the shader, with two connections between.

Click on the bottom connection wire. The tooltip should say it connects from file1.outTransparency to lambert2.transparency. With the wire selected, press the Backspace or Delete key to break the connection between the nodes, allowing you to see the `Dice` clearly in the viewport (see **FIGURE 19.15**).

7. Save your work. After **CHAPTER 20**, "Static Meshes," you'll be able to bring this `Dice` into Unreal and use it as a new decoration in your levels.

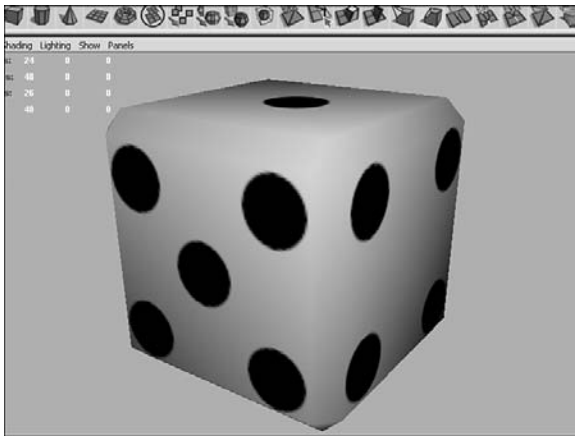


FIGURE 19.15 The `Dice`'s texture can now be seen because the connection from the alpha channel to the transparency has been broken.

END TUTORIAL 19.5

One of the most important things to remember about UVs is that they can be overlapped to repeat a texture on a surface. This process can be a little difficult to picture at first, so in **TUTORIAL 19.6**, you see how it works.

TUTORIAL 19.6: Overlapping UVs

1. Continue from **TUTORIAL 19.5**, or open the file you saved at the end of that tutorial.
2. Select the `Dice` object, and open the UV Texture Editor. You see the texture you created in Photoshop in the background. If necessary, switch off the background image to make it easier to see the UVs.
3. You have six squares of UVs that make up the sides of the `Dice`. For this tutorial, you place each square on top of the square that's in the upper left, which is the side with one dot. One at a time, place the other five squares on top of the first square. You can snap the vertices if you like, but for this example, precision is not vital. In **Figures 19.16** and **19.17**,

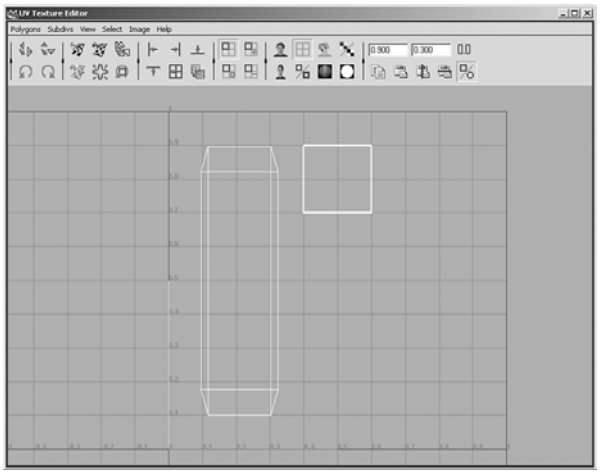


FIGURE 19.16 All six squares have been "stacked" onto the area with the one dot.

you can see what this looks like in the UV Texture Editor and the viewport.

4. Save your work. Remember that you can think of UVs in the UV Texture Editor as points that sample areas of the texture. Moving the UVs around causes your object to sample different parts of the texture at the locations those UVs have on the surface.

NOTE

If you can, watch the viewport as you move the UV squares. You see the texture shift along the surface of the `Dice` until each side contains a single dot.

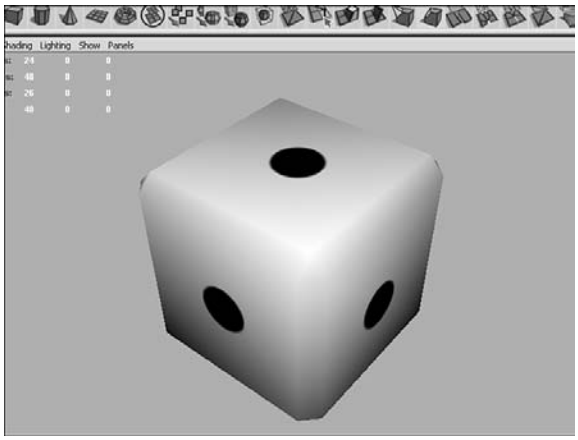


FIGURE 19.17 The result of overlapping these UVs is that the texture repeats on the surface.

END TUTORIAL 19.6

UV Layouts for Characters

At this point, you have created a basic UV layout for a static mesh. Character UV layouts are similar, but often require a lot more planning. When creating a UV layout for your character, you should consider three major points. First, you'll probably have an easier time if you begin the layout process by drafting your layout on a piece of paper. This gives you a map that you can follow as to where certain pieces should be. Second, develop a standard layout for your characters. For example, you place faces for a character's right leg in generally the same location for the UV layouts of all your characters. Having a standard layout makes it easier for you or your texture artist when it's time to paint a texture.

Third, you should consider how you plan to use the textures on your character. All the characters available in Unreal Tournament 2004 include two textures: one for the main body, which is usually at a resolution of 1024×1024, and a separate texture just for the head, also at 1024×1024. Having these two textures serves two purposes. First, it allows for highly detailed faces and heads because all the texture's resolution is used to color only the head. Second, it makes it possible to create several different characters by using the same model and body textures. The end result is as though you had several different characters wearing the same uniform or one character wearing different uniforms.

In **Tutorials 19.7** and **19.8**, you take a look at how to lay out some of a character's UVs. The entire character layout process isn't covered, however, as it's typically a slow process involving repeating many of the same techniques.

TUTORIAL 19.7: Laying Out the UVs of a Character's Shirt

1. In Maya, open the `CharacterComplete.mb` file, which contains a completed character model. If you check the UV Texture Editor, you can see that the character's UVs are completely haywire right now.
2. Select the character, and choose Edit Polygons > Texture > Planar Mapping > options box from the main menu. In the Polygon Planar Projection Options dialog box, enable the Fit to Bounding Box option and select Z Axis to create a planar projection of the entire character (see **FIGURE 19.18**). Click the Project button when you're done.
3. Open the UV Texture Editor, and take a look at what you've done. The character's UVs are very similar to what the character would look like in the Front orthographic view. Using an initial mapping of this type gives you a guide for what parts have been mapped and what parts have not.

   Move and scale the UVs a bit, and place them outside the 0–1 texture space, as shown in **FIGURE 19.19**.
4. Back in the viewport, switch to Face component mode by pressing F11. Select the faces on the front of the character's shirt. Make sure you select only faces

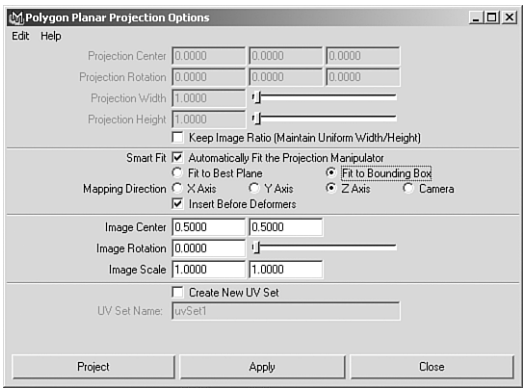


FIGURE 19.18 You can use these settings for your initial planar projection.

NOTE

At this point, you could use the Polygons > Layout UVs command from the UV Texture Editor's menu, and you would get a basic but relatively usable layout. This method is sometimes useful when you need to quickly texture a character or object that isn't seen often or not up close.

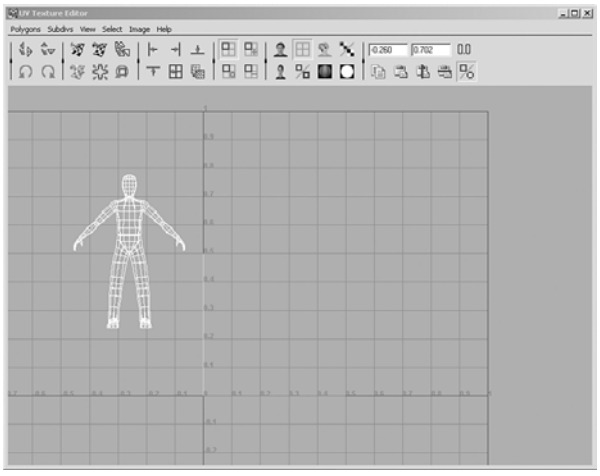


FIGURE 19.19 This initial planar map is just a reminder of which parts have yet to be laid out.

that are relatively planar to each other, meaning that the faces should meet each other at a very slight angle whenever possible. This helps avoid texture stretching later. At the bottom of the shirt, select the first 16 faces, as shown in **FIGURE 19.20**.

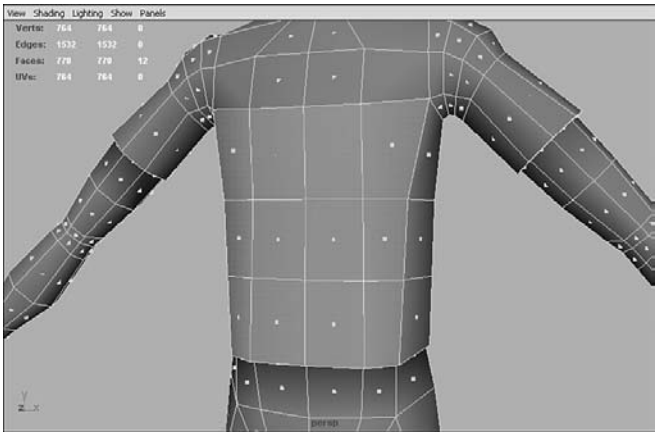


FIGURE 19.20 Faces selected for the next mapping.

5. With the faces selected, choose Edit Polygons > Texture > Planar Mapping > options box. Enable the Fit to Best Plane option, which automatically orients the plane for optimum results. Click the Project button when finished.

6. Back in the UV Texture Editor, move, rotate, and scale the newly mapped faces so that they're somewhere within the 0–1 texture space (see **FIGURE 19.21**). The placement doesn't really matter now; you can always move them around later. Notice that the faces you just mapped have been moved off the original planar map.

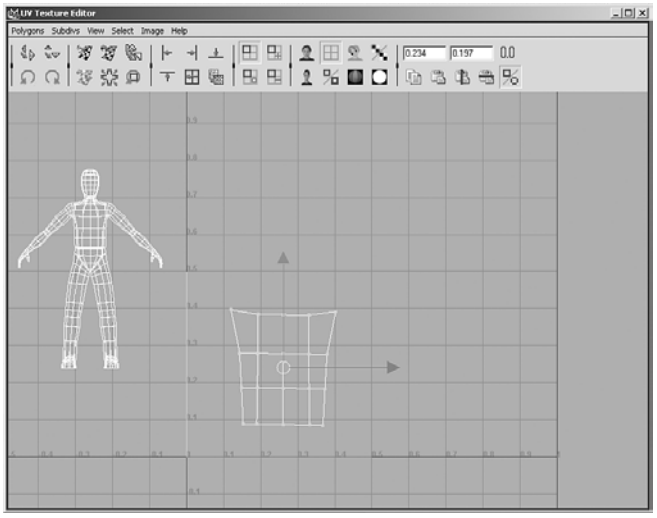


FIGURE 19.21 The first faces of the shirt have been mapped and positioned.

7. In the viewport, select the next row of faces on the shirt, and make another planar map. In the UV Texture Editor, rotate and scale these newly mapped faces so that they're directly above the last set you mapped. Be sure to scale them to a size relative to the faces you mapped earlier.

   When you first map the new faces, you can't see the last mapping you created because when you're selecting faces, you can see only the faces that are selected. Right-click over the new mapping, and choose UVs from the marking menu. Some of these new UVs are

probably overlapping some of your older mappings, as in **FIGURE 19.22**.

8. In this situation, you can use a special selection operation for UVs: selecting a separate piece, or shell. Select a single UV vertex of the four faces you just mapped, and choose Select > Select Shell from the UV Texture Editor menu. This command automatically selects all the UVs in that piece, which makes selecting overlapping UV pieces easy. With the piece selected, move and scale it into position over the first 12 faces you mapped earlier (see **FIGURE 19.23**).

9. You now have a gap between these two pieces. Gaps between UV pieces can lead to seams in the texture, so you should go ahead and remove them. Keep in mind that you can't always remove every gap between your UV pieces. Inevitably, you'll have gaps somewhere. Just do your best to have them fall in places where a seam would be less likely to be noticed, such as on the shirt's sides and under the arms.

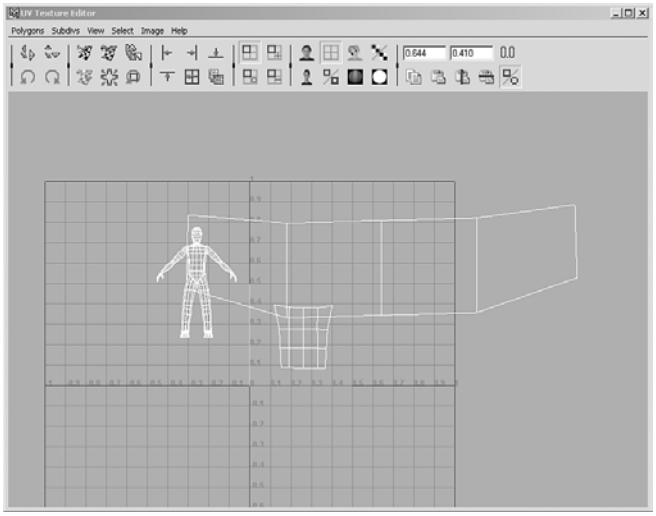


FIGURE 19.22 The new mapping for the four faces of the chest overlaps the other UVs, making it difficult to select specific UVs.

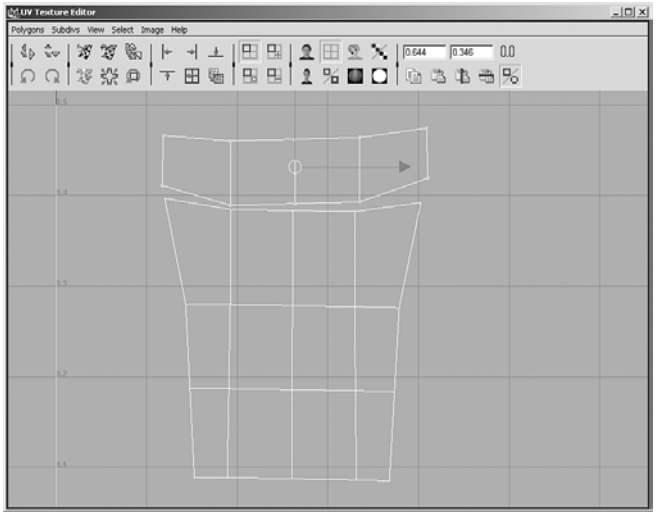


FIGURE 19.23 The next set of UVs has been moved above the first.

To close the gap between these two pieces, you use the Sew UVs command. Press F9 to make edges selectable. Select one edge at the bottom of the most recent mapping. Notice how the corresponding edge beneath it is

automatically selected, too, because these two edges are, in fact, the same edge on the model. Choose Polygons > Sew UVs from the UV Texture Editor menu. You'll see the two edges merge together into one. Repeat this step to sew up the seam between the two pieces (see **FIGURE 19.24**).

10. Repeat the steps for making planar maps and sewing them together until you have a single piece that represents the front of the shirt (see **FIGURE 19.25**). You can then make a separate piece that forms the back of the shirt, or if you prefer, make a single piece that's the whole shirt. This piece would be like making a cut on either side of the shirt, from the bottom, through the armpit, and to the bottom of the end of the sleeve. You could then open the shirt up and lay it flat.
11. Save your work. You could use these methods to move around the entire character, laying out all the UVs you find.

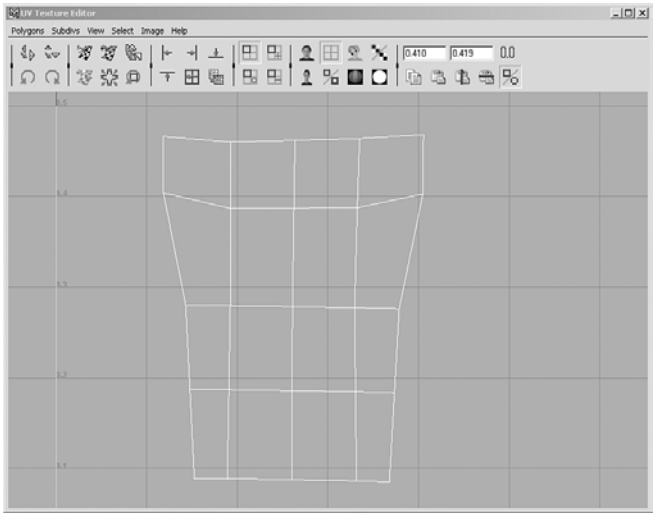


FIGURE 19.24 The two pieces of the shirt have been sewn together.

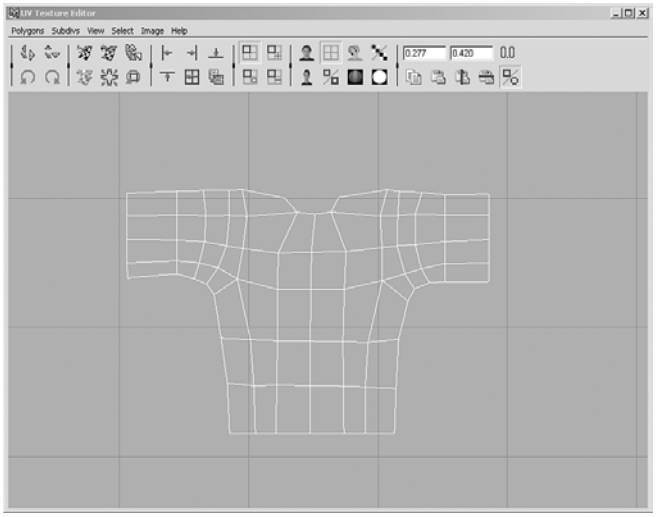


FIGURE 19.25 The UVs of the front of the shirt have been laid out.

You can try the other mapping methods discussed earlier. In **TUTORIAL 19.8**, you'll try using a cylindrical map around the faces of the character's leg.

NOTE

Remember when making your planar maps to select faces that are already close to being planar to each other. This technique helps avoid texture distortions later.

END TUTORIAL 19.7

TUTORIAL 19.8: Using a Cylindrical Map for a UV Layout

1. Continue from **TUTORIAL 19.7**. You're going to lay out the UVs for one of the character's legs.
2. First, select all the faces around the character's left leg (see **FIGURE 19.26**). You can make several marquee selections while holding the Shift and Ctrl keys, or you can use the Paint Selection tool, found under the Edit menu. This tool enables you to select components in a paintbrush fashion across your model.
3. With the faces selected, choose Edit Polygons > Texture > Cylindrical Mapping to create a wireframe cylinder to be used for the map. To begin using it, MMB-drag one of the red handles midway along the cylinder. This enables you to close the cylinder's sweep (circumference).
4. At the middle of the cylinder, MMB-drag the red ring to rotate the cylinder so that its seam runs along the inside of the character's leg (see **FIGURE 19.27**). If possible, watch the UV Texture Editor while you're doing this to help prevent obvious texture seams on the leg.

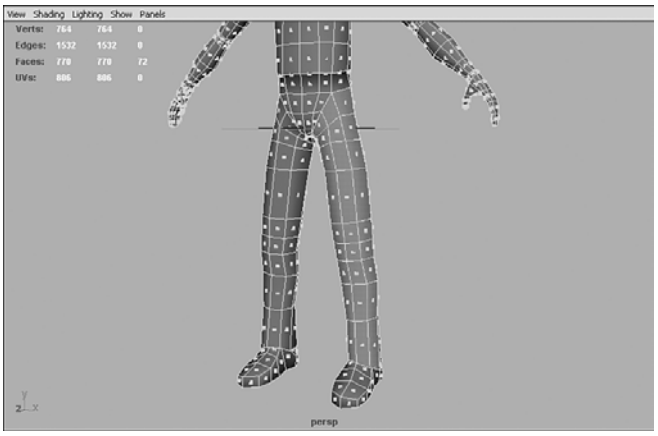


FIGURE 19.26 All faces of the leg have been selected.

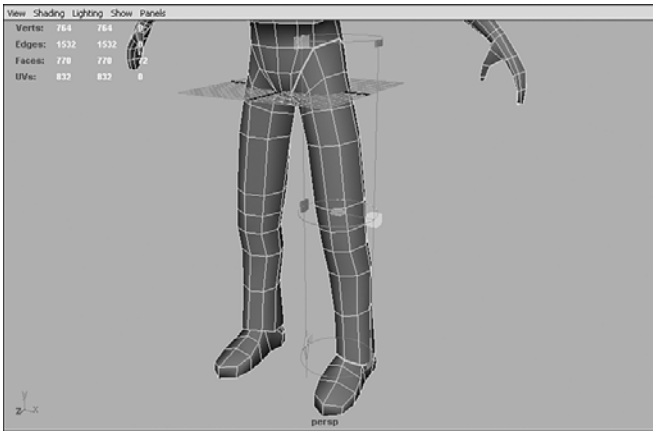


FIGURE 19.27 The Cylindrical Mapping manipulator is surrounding the leg.

5. At the bottom of the Cylindrical Mapping manipulator is a small red cross. MMB-click it to activate a new manipulator that's similar to the Move/Rotate/Scale tool. Use it to rotate the entire cylinder in the X-axis so that it's aligned more with the angle of the leg. A rotation of about -5 degrees should do. Look at your results in the UV Texture Editor (see **FIGURE 19.28**).
6. You can repeat this process with the right leg and both arms. Combining the skills you learned in **TUTORIAL 19.7**, you could then create your own UV layout.

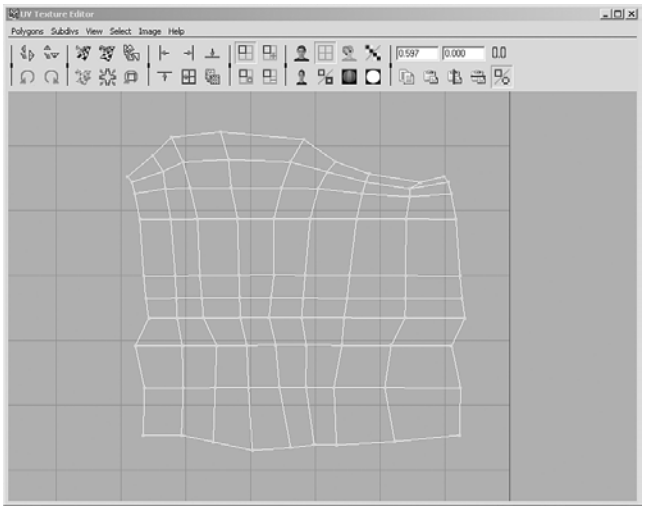


FIGURE 19.28 The UVs of the leg have been cylindrically mapped and are ready to be laid out.

END TUTORIAL 19.8

Considerations for UV Layouts

Remember that laying out UVs for a character isn't the kind of process you're going to finish in a matter of minutes or even hours. Creating an efficient UV layout is a skill that comes with practice and effort. The following list offers a few pointers, however, that should help you as you get started:

- Go slow. Don't rush by mapping several faces at the same time and just fitting them in wherever you can.
- Be organized. Don't just sling your mappings into the texture space. Have a plan when you begin, and try to follow it.
- Use as much of the texture space as you can. Typically, your texture is 1024×1024. Any gaps in your pieces are a waste of precious pixels. Try to keep everything as tight as possible.

- Keep UV face sizes in relation to their polygonal counterparts. This guideline can be confusing, but think about it: If a single face of your model is very small, you don't want that face to take up half your available texture space. Keeping the sizes of polygon faces and faces relative in the UV Texture Editor prevents your texture from becoming distorted.
- You can place the UVs of your character's head so that they stretch across the entire 0–1 texture space, even though they overlap other UVs. This is because you're usually placing a separate face texture on the head anyway.
- Practice and use as many of the tools in the UV Texture Editor as you can, especially those in the View menu. Hiding what you're not working on makes your life far easier when working on UV layouts.
- Don't be hard on yourself. UV layouts are an art form that no one just knows spontaneously. Becoming skilled at UV layouts takes a lot of time and effort.

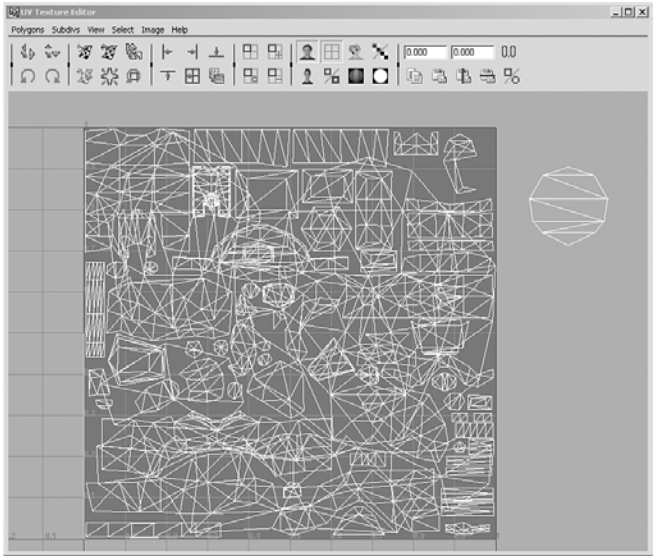


FIGURE 19.29 The UV layout for an official Unreal Tournament 2004 character.

As an example, **FIGURE 19.29** shows the UV layout for the Jugg character in Unreal Tournament 2004, such as Gorge. Notice that it's broken up into many pieces—so many pieces, in fact, that differentiating one piece from the next is hard. On the other hand, you can also see that it uses almost every pixel of the texture area, so the character can be covered with as much texture as

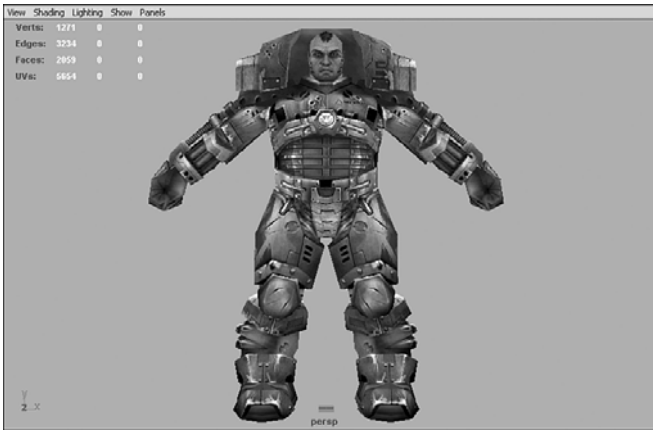


FIGURE 19.30 The same Unreal Tournament 2004 character whose UV layout is shown in **Figure 19.29**.

possible. Obviously, this layout required a lot of planning and work to ensure that the texture artist knows which pieces of the UV layout correspond with what parts of the character. Also, notice a piece that sits outside the 0–1 texture space. This piece is making use of the fact that textures repeat as you go outside the 0–1 texture space. **FIGURES 19.30** and **19.31** show the character with his texture applied and what the texture looks like in the UV Texture Editor.

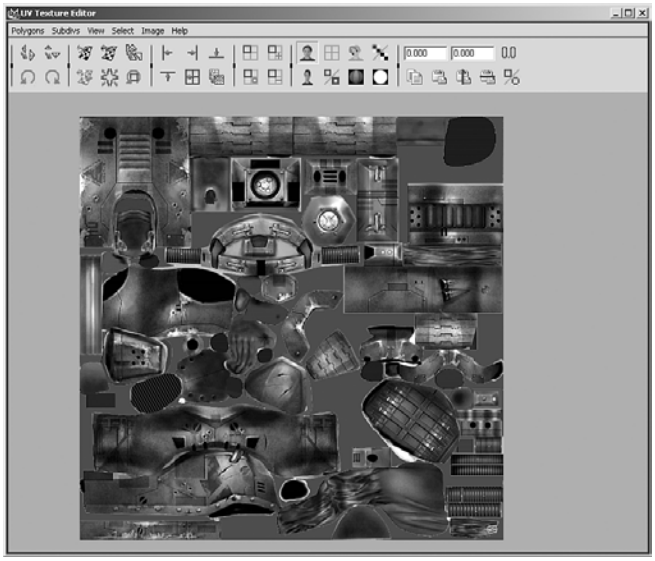


FIGURE 19.31 The texture used on the character, as seen in the UV Texture Editor.

Summary

In this chapter, you've taken a look at several aspects of creating a UV layout for your character. You learned how to use the UV Texture Editor, a variety of mapping methods, and several tools you can use to lay your UVs out in the 0–1 texture space. Remember that no one can tell you the "right" way to lay out the UVs of your characters or objects. The best way is always the way that's easiest for you to understand and follow.