



10

Shading Objects

Applying Shaders



This chapter explains shading, the process of assigning surface properties to your objects. By designing and applying shaders, you can precisely control the color, texture, and finish on your objects.

Ray Dream Studio's drag and drop interface for applying shaders makes shading easy. You'll keep a collection of shaders in the **Browser** palette's **Shaders** tab and simply drop them onto your objects in the **Perspective**, **Free Form**, or **Mesh Form** modeling window.

Shading Overview



Using a process called shading, you can assign a variety of surface characteristics to each object in your scene. When Ray Dream Studio renders your final artwork, these characteristics determine whether an object appears rough or smooth, shiny or dull, transparent or opaque.



Using shaders you can create surfaces that are rough, smooth, shiny or transparent.



By adjusting the properties of a shader you can create any number of surfaces. For instance you can change the surface from shiny to wood grain.

Shading allows you to describe which objects are glass and which are wood, metal, stone, skin, painted or otherwise.

Shaders

A shader is a set of surface characteristics. Each shader may contain settings for one or more of the following attributes: **Color, Highlight, Shininess, Bump, Reflection, Transparency, Refraction, and Glow.**

Each shader is saved as a document. Ray Dream Studio includes dozens of pre-defined shaders, which are ready to use right out of the box. In time, you'll build your own collection by editing existing shaders and creating new ones from scratch.

Note: As you learn how to build your own shaders, you'll find the pre-defined shaders to be invaluable. Examine them closely, for they demonstrate techniques you might not immediately discover through experimentation or reading these chapters.

The Primer

Every object has a base shader called the primer, which covers the entire object. By applying a shader to an object's primer, you give the complete object its surface characteristics. The default shader used for new objects is a simple red color.

3D Paint

Many real-world objects have non-uniform surfaces. Variations on an object's surface might be as simple as a painted-on logo, or as complex as an intricate inlaid wood design.

To achieve effects such as these, you can use Ray Dream Studio 5's **3D Paint** tools.



You can use the 3D Paint tools to place paint shapes on objects.

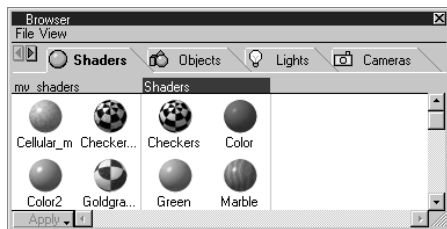
The **3D Paint** tools allow you to apply different shaders to various regions on the surface of an object. These regions, called paint shapes, may take the form of geometric shapes, or of freely brushed designs. Once created, paint shapes can be selected, moved along the surface of the object, modified (in shape, size, or shader content), layered, or deleted.



The **3D Paint** tools are discussed in ["3D Paint Tools"](#) on page 186.

The Browser Palette

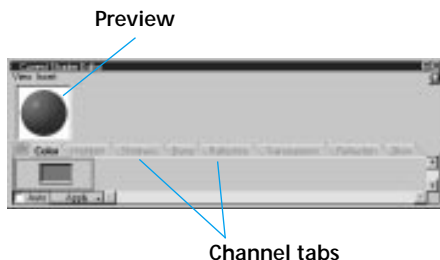
As you create shaders you want to keep, you'll save them in the **Browser palette: Shaders tab**. You can select a shader in the **Browser** palette and apply it to an object. You'll also use the **Browser** palette to create, open and edit shader documents.



Use the Browser palette to store your Shaders in your personal folders.

The Current Shader Editor

The Shader Editor gives you complete control over the appearance of your shaders. You can use the Shader Editor to edit shaders stored in the Shaders Browser or shaders you've applied to objects in your scene.



The Shader Editor, expanded.

Each shader channel is on a different tab in the editor. The preview shows you how your shader will appear on the surface of an object and provides you with immediate feedback when you change shading parameters.



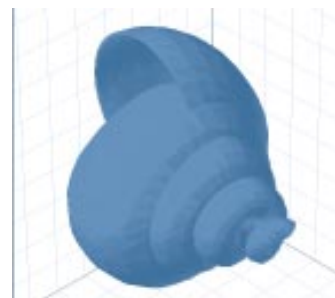
The Shader Editor is thoroughly discussed in [“Building and Editing Shaders”](#) on page 217.



Previewing Shading

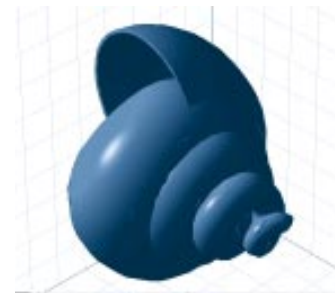
Once you have created or edited a shader, you'll want to see how it looks when applied to a particular object.

The level of detail you're able to see in the **Perspective** window depends on the preview mode you have selected. The Box and Wireframe modes provide no preview of the shaders in your scene. The standard Preview mode displays only the average color of an object across its entire surface. Shaded Preview shows a low resolution approximation of the shaders on your objects. To see your shaders in detail, you must switch to Better Preview mode or use the **Render Preview** tool.



In the standard preview mode, you can only see the basic color of the object. When you're working on shader properties you'll need to use Better Preview mode.

Better Preview mode accurately depicts highlights, bumps, glow, shading (but not shadows), and color variations over the surface of an object. Transparency, shadows, and reflection can be previewed only with the **Render Preview** tool, which allows you to ray trace a specific area of the **Perspective** window at screen resolution.



In Better Preview display mode, most shader properties are visible in the Perspective window.

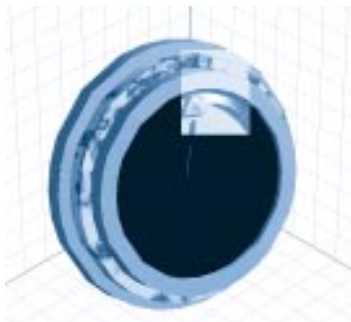


To use the **Render Preview** tool:

- 1 Choose the **Render Preview** tool.



- 2 In the **Perspective** or **Modeling** window, drag a marquee across the area to be previewed. Ray Dream Studio ray traces the area you have selected.



*The **Render Preview** tool renders areas of your object. When rendered, you can see all the shader's attributes including transparency and shadows.*



To work efficiently, keep the size of your render previews small. Larger areas take longer to ray trace, and require more memory. If you want to ray trace more than a small portion of your scene, you might as well do a low resolution rendering. Refer to [Chapter 17, "Rendering."](#)



Shading an Entire Object

When you create a new object, Ray Dream Studio assigns it a default primer. To shade an entire object, you simply apply a shader to the object's primer. You can use the drag and drop technique or click **Apply** in the **Browser** palette.



You can also edit an object's existing shader—for instructions, refer to ["Building and Editing Shaders" on page 217](#).



To apply a shader to an object's primer (drag and drop):

Drag a shader from the **Browser palette: Shaders** tab onto an object in the **Perspective** window, or onto an object's icon in the **Hierarchy** window.



To apply a shader to an object's primer {**Apply** button):

- 1 Select one or more objects in the **Perspective** or **Hierarchy** window.
- 2 Select a shader in the **Browser palette: Shaders** tab, or use the **Eyedropper** tool to "grab" the shader from an object in the **Perspective** window.



- 3 Click **Apply** in the **Browser** palette.

Applying Non-Empty Channels vs. Applying All Channels

An object's primer always contains settings in all eight shader channels. Although you can replace some or all of these settings by applying a shader, you can never completely remove settings from a primer channel.

A shader in the Shaders Browser, however, may have one or more empty channels. By default, Ray Dream Studio ignores these

empty channels when you apply a shader to an object's primer. It applies only channels that contain settings.

| | Primer (before) | Applied Shader | Primer (after) |
|--------------|--------------------|-------------------|-------------------|
| Color | | | |
| Highlight | 20% | 70% | 70% |
| Shininess | 10% | 80% | 80% |
| Bump | | empty | |
| Reflection | 10% | empty | 10% |
| Transparency | 20% | 80% | 80% |
| Refraction | 10% | empty | 10% |
| Glow | | | |

When you apply a shader with empty channels, the primer values replace those in the empty channels.

Applying only non-empty channels allows you to selectively change certain shading attributes, while leaving others intact.

Note: You might keep a catalog of frequently used colors or bump settings in the Shaders Browser, and apply them to objects via the drag and drop technique.

Sometimes, however, you'd rather completely replace an object's primer with the shader you're applying. In this case, you'll need to apply all channels, rather than just those that contain settings. The diagram below demonstrates the effects of

applying all channels, using the same shader and primer used in the previous example.

| | Primer (before) | Applied Shader | Primer (after) |
|--------------|--------------------|-------------------|-------------------|
| Color | | | |
| Highlight | 20% | 70% | 70% |
| Shininess | 10% | 80% | 80% |
| Bump | | empty | 0% (Default) |
| Reflection | 10% | empty | 0% (Default) |
| Transparency | 20% | 80% | 80% |
| Refraction | 10% | empty | 0% (Default) |
| Glow | | | |

When you apply all channels it overrides all the settings in the primer.

Since you wanted to replace the primer completely, applying only non-empty channels would have left unwanted settings in the Bump, Reflection, and Refraction channels. Applying all channels removes these unwanted settings and replaces them with the default settings.

For a thorough discussion of shader channels and settings, refer to ["Shader Structure and Content"](#) on page 198.



To replace an object's primer (apply all channels):

- 1 Select one or more objects in the **Perspective** or **Hierarchy** window.
- 2 Select a shader in the **Browser palette: Shaders** tab.
- 3 Pop-up the **Apply** button in the **Browser** palette and choose **Apply All Channels**.



This method also applies to the **Apply** button on the Current Shader Editor. If you prefer, you can change the **Default Apply Mode** so that the Shader Editor applies all channels by default, instead of non-empty channels only. Choose **File menu» Preferences**. Choose **Current Shader Editor** from the pop-up in the **Preferences** dialog. Set your choice for the Default Apply Mode.



3D Paint

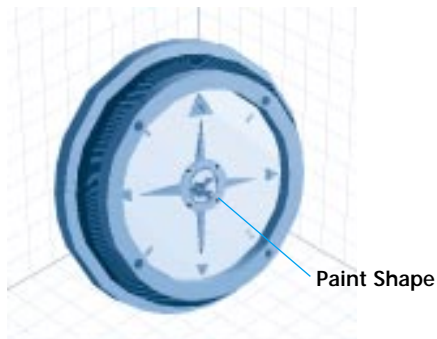


When you want to apply a shader to a limited region on the surface of an object, you'll use Ray Dream Studio's **3D Paint** tools. The **3D Paint** tools allow you to create paint shapes directly on the surface of an object in the **Perspective** or **Modeling** window. A paint shape may be rectangular, elliptical, polygonal, or freely brushed.

Because the **3D Paint** tools work with the shaders in the **Browser palette: Shaders tab**, you're not limited to painting with color. You can load your brush with gold, marble, or concrete and apply not only color, but bump, reflection, transparency, and the other shading attributes as well.

Once you've created paint shapes, you can move them, resize them, layer them, and delete them. You may create any number of paint shapes on the surface of an object.

This section introduces the **3D Paint** tools and explains how to use them. It also explains how layered paint shapes relate to each other and to the object's primer. Finally, it discusses advanced topics such as mapping modes, and the Master and Object shading layers.



Using the 3D Paint Brush you can use a shader like a paint color and paint shader properties onto objects like brush strokes.

3D Paint Tools

Ray Dream Studio's **3D Paint** tools allow you to paint directly on your 3D objects. Each tool provides visual feedback as you paint to show you how your paint shape appears on the surface of your object.



The **3D Paint** tools work best on objects created in Ray Dream Studio. You can paint on an object imported from another application, but you may need to change the object's mapping mode to achieve satisfactory results. For more information, refer to "[Advanced 3D Paint Topics](#)" on page 191.



With the exception of the **Brush** tool, all of the **3D Paint** tools work in Preview, Shaded Preview and Better Preview display modes. In Preview mode, you'll see only the

outlines of your paint shapes, not the shaders they contain. The **Brush** tool works only in **Better Preview** mode.



To use a 3D Paint tool:

- 1 Select the shader you want to use.

Click on a shader in the **Browser palette**, or use the **Eyedropper** tool to "grab" the shader from another object.

- 2 Choose a **3D Paint** tool. The behavior of each tool is described below.

- 3 Paint on the surface of an object in the **Perspective** or **Modeling** window.

It's not necessary to select the object.



Rectangle Tool

Drag to create a rectangle. As you drag, a "rubber band" preview is drawn in real time to show you the boundaries of the rectangle. If you're working in **Shaded Preview** or **Better Preview** mode, the paint shape is shaded when you release the mouse button.



Ellipse Tool

Drag to create an ellipse. As you drag, a “rubber band” preview is drawn in real time to show you the perimeter of the ellipse.



When you draw with the **Rectangle** or **Ellipse** tool, your first mouse click positions one corner of your paint shape's bounding rectangle, then you drag to position the opposite corner. Ray Dream Studio normally uses the shortest path to connect these opposite corners—that is, the paint shape will not wrap all the way around the object. If you want the shape to wrap “the other way” around your object, hold down the **Option/Alt** key as you drag.



Polygon Tool

Click once to position each vertex of your polygonal paint shape. As you position vertices, the line segments connecting the vertices are drawn. Double-click at the last vertex to automatically close the shape.

Although you can later resize or “stretch” a polygonal paint shape, you won’t be able to re-edit its vertices. Refer to [“Working with Paint Shapes” on page 190](#).



Brush Tool

The **Brush** tool has several features and options. The next section explains them in detail.

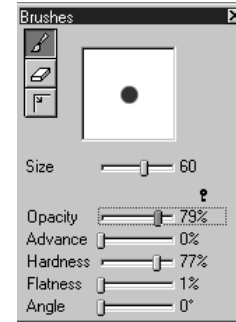
The Brush Tool

The **Brush** tool is the most versatile **3D Paint** tool. It allows you to paint free form designs on the surface of an object. Paint shapes you create with the **Brush** tool are called “brushed shapes.”

Like other paint shapes, a brushed shape may contain only one shader. If you choose a new shader while painting with the **Brush** tool, Ray Dream Studio automatically creates a new brushed shape. You can create any number of brushed shapes on an object.

Brush Options

When you choose the **Brush** tool, Ray Dream Studio opens the **Brush** palette, where you can choose a brush and set its options.



Use the Brush Options dialog to set the 3D Brush tool's size, opacity and other attributes.

The **Paint Brush** tool has three brush types represented by icons at the top of the palette:

- The **Paint Brush** allows you to paint new brushed shapes and add to existing brushed shapes.



- The **Eraser** modifies an existing brushed shape by “cutting away” from it.



- The **Imported Shape Brush** lets you import a 2D image to use as a brushed shape. This brush is described in a separate section below.



To set brush options (Paint Brush or Eraser):

- 1 Click the icon for the brush type you want: **Paint Brush** or **Eraser**.
- 2 Drag the **Size** slider to make the brush smaller or larger.
- 3 Adjust the **Advance** slider to set the frequency at which the brush shape is drawn along the path of the moving mouse.
- 4 Drag the **Hardness** slider to adjust the edge of the brush stroke.

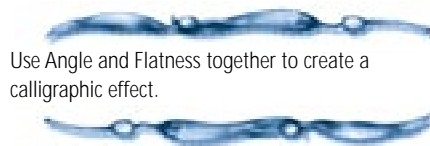
A low **Advance** setting produces a continuous brush stroke. A high **Advance** setting produces a discontinuous brush stroke, giving the impression that the brush has “skipped” across the surface being painted.

The hardest setting shades at 100% opacity all the way to the edge of the brush. Lighter settings fade out the shader effect toward the edge of the brush.

- 5 Drag the **Flatness** slider to adjust the width of the brush.

Low **Flatness** produces a round brush.
High **Flatness** produces a narrow brush.

- 6 Drag the **Angle** slider to adjust the angle of the brush.



Use Angle and Flatness together to create a calligraphic effect.

Painting with the Brush Tool

Like the other **3D Paint** tools, the **Brush** tool provides real time feedback as you work on the surface of an object. When you position the **Brush** tool cursor over an object in the **Perspective** or **Modeling** window, a preview outline of the size, angle and shape of the brush appears on the object.

To start painting, drag the brush across the object. As you drag, the path of your stroke is previewed in real time. In a couple of seconds, Ray Dream Studio draws the fully shaded brush stroke.



You can use the 3D Brush tool to apply a shader to only areas of your object. The spots on this crab were created using the Brush tool.



Because 3D objects can be rendered at any resolution, you rarely need to concern yourself with the resolution of your final output until it's time to render your image. Because brushed shapes are pixel-based, however, they are of a fixed resolution. You can think of the surface of your object as a blank image whose greater dimension (which may be either its height or its width) has a default resolution of 1,024 pixels. The resolution of an individual brushed shape depends on how much of the object's surface it covers. If you plan to render your final image at high resolution, you may wish to increase the default paint shape size. You can set this value in the 3D Paint section of the **Preferences** dialog.





To paint with the Brush tool:

- 1 Select the shader you want to use.
- 2 Choose the **Brush** tool from the toolbar. The **Brush** palette appears.
- 3 Choose a brush and set the brush options (see above).
- 4 Drag the brush cursor over the surface of an object to apply a brush stroke. Drag again to apply additional brush strokes. A brushed shape may contain any number of brush strokes, but only one shader.

You can also add to or subtract from an existing paint shape.



To add to a brushed shape:

- 1 Using the **Paint Shape Selection** tool, choose a brushed shape.
- 2 Using the **Eyedropper** tool, grab the shader from the selected brush shape, or select the same shader from the **Browser palette** ▶ **Shaders** tab.

When you add to a brushed shape, you must use the same shader.

- 3 Start your first stroke within the boundary of the selected brushed shape.

- 4 Continue in this fashion to add brush strokes.



To erase part of a brushed shape:

- 1 Use the **Paint Shape Selection** tool to select a brushed shape.
- 2 Choose the **Brush** tool from the toolbar. The **Brush** palette appears.
- 3 Select the **Eraser** icon.
- 4 Drag the eraser across the portions of the brushed shape you wish to remove.



You can convert any other paint shape to a brushed shape, which you may then edit with the Brush tool. Refer to “[Advanced 3D Paint Topics](#)” on page 191 for more information.



Importing a Brushed Shape

The Imported Shape brush allows you to import a 2D image file and use it as a brushed shape. The image you import creates a brushed shape region that's then filled with the current shader.

When you import a brushed shape from a 2D image file, Ray Dream Studio ignores any color information in the file—only the brightness of each pixel is used to describe the shape. Therefore, bitmap (1 bit black

and white) and 8-bit grayscale images are best suited for use as imported brushed shapes.

If the image you import is a bitmap, the black regions enable (turn on) the shader, and the white regions disable it. A bitmap image is an easy way to create intricately patterned, irregular, or non-contiguous paint shapes.

If you use an 8-bit image, the brightness of each pixel determines how the shader in the brushed shape blends with the primer or the shader of the paint shape below. For each black pixel in the image, the paint shape's shader is applied at 100% opacity to the corresponding point on the object. For each white pixel in the image, the shader is not applied at all. Intermediate shades of gray blend the paint shape's shader with the shader below.



To import a brushed shape:

- 1 Using a 2D art program, prepare the image you want to import. Save it in a convenient folder in one of the formats Ray Dream Studio supports.
- 2 Select a shader from the **Browser palette**: **Shaders** tab.
- 3 Choose the **Brush** tool from the toolbar. The **Brush** palette appears.

- 4 Select the **Imported Shape Brush** icon.



- 5 Drag a marquee across the surface of your object to define the limits of your imported brushed shape.

Ray Dream Studio displays a dialog so you can select your 2D image file.

- 6 Use the file system tools to select and open your image.

Ray Dream Studio closes the dialog and maps the image onto the object as a paint shape. Its proportions are determined by the marquee you have drawn. Ray Dream Studio fills the shape with the current shader.

If you're not happy with the proportions of your brushed shape, you can resize it to the proportions you desire—see the next section.

Working with Paint Shapes



Once you've created paint shapes, you can move, resize, layer and delete them.



To select a paint shape:

- 1 Choose the **Paint Shape Selection** tool.
- 2 Click on the paint shape you want to edit.



Ray Dream Studio shows the paint shape within a bounding rectangle. The rectangle has four handles, one at each corner.



To move a paint shape:

With the **Paint Shape Selection** tool, drag the shape along the surface of the object.

Note: You may also use the **Properties palette: Shaders** tab to reposition a paint shape. Refer to [“Editing Shading in the Properties Palette” on page 191](#).



To delete a paint shape:

- 1 Select the shape.
- 2 Choose **Edit** menu ► **Clear** or press the **Delete/Backspace** key.

Note: You may also use the **Properties palette: Shaders** tab to delete a paint shape. Refer to [“Editing Shading in the Properties Palette” on page 191](#).



To resize a paint shape:

With the **Paint Shape Selection** tool, drag one of the corner handles on the shape's bounding rectangle.

Drag toward the center of the shape to shrink it. Drag outward to stretch it.

Note: You may also use the **Properties palette: Shaders** tab to resize a paint shape. Refer to [“Editing Shading in the Properties Palette” on page 191](#).



To crop a paint shape:

With the **Paint Shape** tool, drag a corner while holding down the **Command/Ctrl** key.

Layering: How Primer and Paint Shapes Interact

When you create a paint shape on the surface of an object, the paint shape's shader overrides the shading characteristics of the object's primer. Likewise, when several paint shapes overlap, the topmost paint shape's shader overrides those below.

There is one important corollary to this rule, however. When a paint shape's shader has one or more empty channels, it inherits the settings for these channels from the paint shape immediately below it (or from the primer, if there is no paint shape below).

For example, if you paint on an object with a bumpy primer, any paint shape you create will also be bumpy unless the shader you're painting with specifies different bump settings. To create a smooth paint shape on a bumpy object, you would use a shader with a constant value in the Bump channel.



The **Properties palette: Shading tab** allows you to control the opacity of an object's paint shapes. Unlike a shader's Transparency setting, paint shape opacity does not affect an object's translucence; rather it controls how paint shapes interact. If a paint shape's opacity is less than 100%, its shader does not fully override the shaders of the primer and paint shapes below; rather, the shaders effects are mixed. Refer to “Advanced 3D Paint Topics” on page 191.



To change the layering order of paint shapes:

- 1 Select one of the shapes you want to re-order.
- 2 Choose **Arrange menu ▶ Paint Shape Order ▶** and select **To Front** or **To Back**.

Note: You may also use the **Properties palette: Shading tab** to change layering. This is covered in the next section.

Advanced 3D Paint Topics



Editing Shading in the Properties Palette

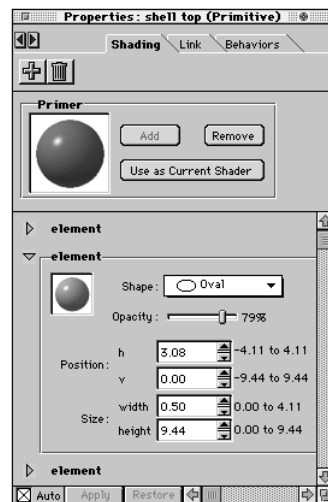
The **Shading** tab of the **Properties** palette allows you to edit the position and size of an object's 3D Paint shapes with numerical precision. You can also add and delete paint shapes, change layering, specify a paint shape's opacity, convert a paint shape from one type to another, remove an object's primer, and change an object's mapping mode. For more information, refer to “Mapping Modes” on page 193.



To display the Shading tab in the Properties palette:

- 1 Select an object.
- 2 Choose **Windows menu ▶ Properties**.
- 3 Click the **Shading** tab.

You may need to advance through the tabs using the arrow buttons at the top of the palette to display the **Shading** tab.



*Use the **Shading** tab on the **Properties** palette to edit the attributes of the paint shapes on an object.*


The **Shading** tab displays the primer and each applied paint shape (“element”).




To remove an object's primer:

Click **Remove** from within the **Properties palette: Shading tab**.

Note: If you have not changed an object's primer since you created the object, this option is not available.



When you apply a primer to an object in the **Perspective** window, it is applied over the primer of the corresponding Master object. Removing an object's primer simply reveals the Master object's primer. For more information, refer to “[Master and Object Shading Layers](#)” on page 194.



To change the layering order of an object's paint shapes:

Drag the element listings into the order you want from within the **Properties palette: Shading tab**.

In a moment, the object preview updates to your changes.



To create a new paint shape:

Click the **Plus** icon from within the **Properties palette: Shading tab**.

Ray Dream Studio creates a new paint shape on the surface of the object. The new shape has the default size, position, and shader—all of which you can change.



To delete a paint shape:

- 1 Select an **element** on the **Shading tab**.
- 2 Click the **Minus** icon.



To set paint shape options:

- 1 Click the **triangle** (Macintosh) or **plus** sign (Windows) to display the controls for the paint shape element you wish to edit.
- 2 Adjust the **Opacity** slider to set a value between zero and 100%.



The opacity of a paint shape is not related to the transparency value you set in the Shader Editor. Whereas a shader's transparency setting determines the degree to which light passes through a surface, the opacity setting simply determines the extent to which a particular paint shape hides or shows the paint shapes below it.



- 3 Edit the **Position** (h and v) values to move the shape on the object surface.

The **Position** values determine the position of the paint shape's upper left corner on the surface of the object.

The numbers just to the right describe the range of possible values

- 4 Edit the **Size** (Height and Width) values to alter the size of the shape.

The **Size** values determine the size of the paint shape's bounding rectangle.

The numbers just to the right describe the range of possible values

- 5 If you want, you can change the paint shape to a different type. Choose the type you want from the **Shape** pop-up.
- 6 Click **Apply**.

3D Paint Preferences

The **Preferences** dialog includes a panel for **3D Paint** options. Most of these let you choose between “higher quality” and “better efficiency.”



To set 3D Paint preferences:

- 1 Choose **File menu ▶ Preferences**.
- 2 Click the popup menu and choose **3D Paint**.
- 3 Enable a **Shape/Stroke Redraw** option:
 - Wait for end of stroke to refresh
 - Refresh as stroke is drawn.
- 4 Enable the **Show Transparency/Reflection** option if you want this information as you paint. (Not recommended on slower systems.)
- 5 Adjust the **Paint Brush Shape** resolution slider for the number of pixels used in a brush shape.

Higher values offer better quality, but are more demanding on the system.

- 6 Enable the **Beep on creation** option if you want Ray Dream Studio to alert you when you create a new brush shape.

This might be important if you had intended to extend an existing shape, not create a new one.

- 7 In the **Advice** box, enable the alert dialogs that you want to skip:

Preview mode Ray Dream Studio presents this alert when you try to use the 3D Paint Brush in any mode other than Better Preview.

When you “skip” this alert, Ray Dream Studio switches to **Better Preview** automatically.

Wrong Layer Ray Dream Studio will beep the first and second time you attempt to manipulate a master layer paint shape while working on an object instance. The third time, Ray Dream Studio presents this alert, informing you why your attempt fails.

When you “skip” this alert, Ray Dream Studio beeps each time you attempt to manipulate a master layer paint shape while working on an object instance.

- 8 Adjust the **Rubber Band Fidelity** slider. Higher settings create smoother edges on oval paint shapes.

Mapping Modes

Most shader content is two-dimensional. Texture maps, for example, are nothing more than 2D images. Many procedural shader functions—including Ray Dream Studio’s checkers and wires—also produce two-dimensional image data. Ray Dream Studio uses a process called mapping to apply this 2D shading information to the surface of a 3D object.

Ray Dream Studio’s 3D Paint interface allows you to shade objects without worrying about the internal “nuts and bolts” of mapping. Most of the time, you can simply paint on objects with the **3D Paint** tools and let Ray Dream Studio take care of the details. Occasionally, however, you may find that changing an object’s mapping mode makes it easier for you to achieve the results you want.

When you change an object’s mapping mode, Ray Dream Studio changes the method it uses to map 2D shapes and images to the object’s surface. As a result, the **3D Paint** tools behave differently on the object. Depending on the shape of your object and the mapping mode you choose, the difference may be subtle or quite dramatic.

Ray Dream Studio’s default mapping mode is called parametric mapping. Parametric mapping is like applying a decal to an object’s surface—each pixel in your image maps directly to a specific point on the surface of your object. This straightforward approach minimizes distortion and loss of image quality. You’ll want to use parametric mapping for most objects you create in Ray Dream Studio.

Because objects imported from other applications contain limited information, parametric mapping generally cannot be used on these objects. When you shade an imported object, you’ll need to choose one of Ray Dream Studio’s projection mapping modes: **Box/Face Mapping**, **Spherical Mapping**, or **Cylindrical mapping**.

In the various projection mapping modes, Ray Dream Studio maps the image onto an invisible primitive—a box, a sphere, or a cylinder which encloses the object. The image is then projected from the primitive onto the object itself.

For the best results, you should choose the primitive which best resembles the object you are mapping. For example, spherical mapping would be appropriate for a basketball, and cylindrical mapping would be right for a soup can.

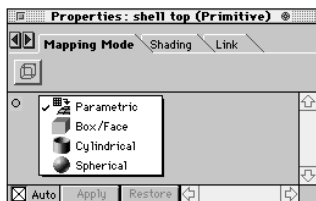
When you choose box mapping, you can specify which face of the box primitive you want to map onto. When you choose

cylindrical or spherical mapping, you can specify the orientation of the primitive in relation to the object.



To change an object's mapping mode:

- 1 Select an object.
- 2 Display the **Properties** palette (**Windows** menu► **Properties**).
- 3 Choose the **Mapping Mode** tab.



Use the Mapping Mode tab lets you select a mapping mode option for a selected object.

- 4 Use the pop-up to choose a mapping mode—**Parametric**, **Box/Face**, **Cylindrical** or **Spherical**.

Ray Dream Studio displays the options appropriate for the selected mode. (Parametric mapping has no options.)

- 5 Set your options (described below).
- 6 Apply your changes.



To set Box/Face options:

- 1 Display the **Properties** palette: **Mapping Mode** tab.
- 2 Choose **Box/Face** from the pop-up.
- 3 Click the icon for the mapping you want—**Full Box** or one of the **Single Faces**.
 - **Full Box** wraps the 2D image onto a box much like you'd wrap a package.
 - The **Single Face** mappings project the image on one side of the object. The projection continues through to the other side of the object.

By default, the image is aligned with the object's bounding box axes. If you need to, you can change the orientation of the image on the object.

- 4 To change the orientation, select **Custom**.
- 5 Enter values in the **Yaw**, **Pitch**, **Roll** fields to change the orientation of the image.
- 6 Click **Apply**.



To set Cylindrical or Spherical options:

- 1 Display the **Properties** palette: **Mapping Mode** tab.

- 2 Choose **Cylindrical** or **Spherical** from the pop-up.

- 3 Click the icon to choose the alignment you want—X, Y or Z axis. You may also design your own orientation:

- Click the **Custom** icon.
- Enter values in the **Yaw**, **Pitch**, **Roll** fields to change the orientation of the image.

- 4 Click **Apply**.

Master and Object Shading Layers

If your scene contains several objects based on the same Master object, you can use the Master object to specify a set of shading characteristics to be shared between all of these objects. You can also assign specific shading characteristics to each individual object.

For example, you might create a bottle and shade it with a green glass shader in the **Modeling** window. You could then duplicate the bottle so that three copies appear in the scene, and use the **3D Paint** tools to apply a unique label to each copy. Suppose you decided later that you wanted marble, rather than glass bottles—you could reopen the Master object in the **Free Form** modeling window and apply a marble shader, affecting all three bottles while leaving the individual labels intact.

When you create multiple copies of an object, each copy has two distinct shading layers: the Master layer and the object layer. Any shading you apply to the Master layer affects all copies of the object in the scene. The shading on the object layer, however, is unique to each copy. The two shading layers may each contain both a primer and paint shapes, and the two layers need not share the same mapping mode.



Because the object layer is on top of the Master layer, paint shapes on the object layer always appear to be in front of paint shapes on the Master layer. Moreover, if you apply a primer to the object layer, it obscures the entire Master layer (both primer and paint shapes).



When you shade an object in the **Perspective** window, you're working on its object layer. To work on the Master layer, you simply shade the Master object in the **Modeling** window.

For more information on the relationship between objects and Master objects, refer to [“Working with Master Objects” on page 266](#).



To work on the Master shading layer:

- 1 Click the **Masters** tab in the **Hierarchy** window. A list of all the Master objects in the scene appears in the window.

- 2 Double-click the icon for the Master object you want to shade. The object is opened for editing in the **Modeling** window.
- 3 Shade the Master object in the **Modeling** window. You can edit the primer and/or work with the **3D Paint** tools there.
- 4 Click **Done** to return to the **Perspective** window. The shading you have applied appears on all copies of the Master object.



To edit the Master shading layer in the Properties palette:

- 1 Click the **Masters** tab in the **Hierarchy** window. A list of all the Master objects in the scene appears in the window.
- 2 Select the Master object whose shading you want to edit.
- 3 Display the **Properties** palette: **Shading** tab.

The **Shading** tab controls now let you work with the master object shading.

Managing your Shaders

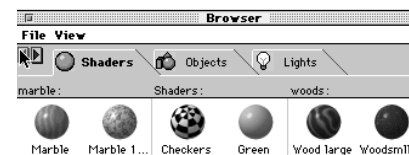


The particular shaders used on your objects are saved with the scene file. These shaders will not necessarily appear in the **Browser** palette. The **Browser** palette displays only shaders that you've saved there.

Don't overload the **Browser** palette with shaders. Each shader thumbnail requires some memory. Too many shaders loaded into the **Browser** palette may impact your performance. It's a good idea to limit the directories listed at any given time.

You might want to organize your shader directories as logical categories. For example, a list of directories might read **Wood, Rocks, Plastic, Glass, Marble**.

For information on adding, moving and removing items and folders in the **Browser** palette, refer to [“Using the Browser Palette” on page 28](#).



You can use the **Browser** palette to organize and store your personal shader library.

A Note on External Texture Maps

If any of the shaders in your shader files contain Texture Map components that reference external image files, you need to maintain the relative path from the shader files to the image files.

If either the shader files or the image files are moved to a different folder, Ray Dream Studio prompts you to locate the missing image files when it loads the shader files into the **Browser** palette.