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Animation in Ray Dream 3D

Animation Overview

Animation with Ray Dream 3D is a matter of adding a fourth dimension—time—to your 3D illustrations. To create an animation you arrange your scene at key points in time. Ray Dream 3D then fills in the gaps to complete the animation.

You can animate almost everything in your scene:

- the motion of objects, lights, and cameras
- object size, shape, and shading attributes
- camera and light parameters
- ambient lighting, background, backdrop, and atmospheric effects.

The Animation Process

Animation is like an extension to creating an illustration. To create a scene you need to set up scene properties. To create an animation, you change those properties over time. When you play the animation, the changing properties create action.

The steps to creating an animation are as follows:

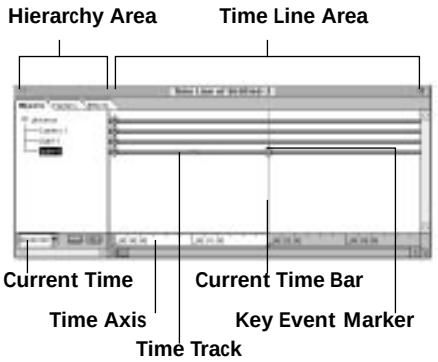
- Create objects using the **Primitive** tools and the **Free Form** modeler.
- Build the scene by arranging objects and setting lights and cameras.
- Animate the scene by making changes to the properties of the elements in your scene at different points in time. Each time you change a property, you create a *key event*. Ray Dream 3D creates the illusion of motion by filling in the transitions between key events.
- Render the final animation. You can save your rendered animation as a QuickTime™ (Macintosh) or AVI (Windows) movie or as a series of sequential image files in a variety of Windows and Macintosh formats.

Animation Tools

Ray Dream 3D has a number of tools for creating animations.

Time Line Window

The **Time Line** window is the principal tool for creating animations. The window displays a graphical representation of your animation.

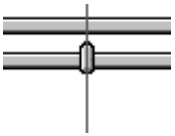


The Time Line window is used to position key frames in your animation and add tweeners.

The **Time Line** window consists of three areas:

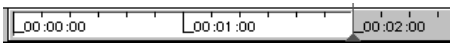
- The Hierarchy area shows the scene's hierarchical structure, including links and groups. Individual objects and effects in the **Time Line** window's Hierarchy area can be expanded to show their animatable properties. This allows you to animate each property individually.
- The Time Line area to the right of the hierarchy area displays a time track for each item (object, effect, or property) currently shown in the hierarchy area.

A key event marker on a particular time track indicates a key event that modifies the associated object, effect, or property. Key event markers can be created, copied, deleted, or moved along the Time Axis by dragging them



The key event marker on time line shows the position of a key frame in an animation.

- The **Time Axis** extends across the bottom of the window. It's a ruler, with marks indicating time increments (minutes, seconds, and frames).



The Time Axis in time line shows the length of your animation.

The location of the **Current Time Bar** along the **Time Axis** indicates the current time—the point in the animation that is currently being edited and displayed in the **Perspective** window.

You can change the current time by dragging the **Current Time** bar along the **Time Axis**.

If you are working on an illustration project in Ray Dream 3D and prefer to work with an iconic Hierarchy mode rather than the Time Line mode, bring the **Time Line** window to the front and choose **View menu▸ Vertical** or **Horizontal**. This replaces the **Time Line** view with the **Hierarchy** view.

Time Controller Toolbar

The Time Controller's VCR-like controls allow you to preview your animation in the **Perspective** window. You can also use the **Time Controller** to change the current time.

Use the Time Controller toolbar to preview your animation or change the current time.

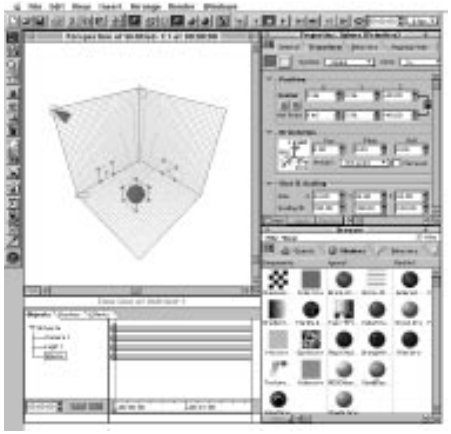
If the **Time Controller** toolbar is not visible, you can choose **View menu▸ Toolbars** and select it in the dialog that appears.

Customizing your Workspace for Animation

You can optimize the layout of your Ray Dream 3D windows by choosing a workspace designed specifically for animation. Ray Dream 3D includes preset animation workspaces to fit most popular screen resolutions.

Generally, the preset animation workspaces widen the **Time Line** window and display it in the lower portion of your screen. The **Browser** palette moves to the upper right corner. The wider **Time Line** window allows you to view more of the time line without scrolling.

You can also create your own custom workspace by arranging the windows in the position you want and then saving the configuration. For more information on configuring your workspace, refer to "Setting up your Workspace" on page 25.



You can customize the layout of the workspace to look something like one shown when you're working on an animation.

Special Animation Features

Ray Dream 3D has several special features to help you create professional-quality animations:

- Tweeners
- Behaviors
- Animating with the modeler
- Rotoscoping.

Tweeners

Ray Dream 3D uses formulas called *tweeners* (from in-be*tween*) to calculate the state of each object between key events. By specifying which tweener to use for each transition, you can control the rate of change between key events in your animation.

Ray Dream 3D includes four different types of tweeners: **Linear** (for a constant rate of change), **Bezier** (for smooth motion paths and greater control over acceleration and deceleration), **discrete** (for instantaneous change), and **oscillate** (for alternating back and forth between key events).

For more information on tweeners, refer to "About Tweeners" on page 232.

Behaviors

Behaviors are a class of tools that help automate the animation process. Some behaviors, like **Bounce** and **Spin**, automatically animate common types of motion. Others, like **Point At** and **Track**, animate one object based on the position or orientation of a second object.

For more information, refer to "Applying Behaviors" on page 236.

Animating with the Modeler

You can animate the shape of any model you create using the **Free Form** modeler by modifying its cross sections, and sweep path over time. This lets you achieve fluid, Bèzier-based object metamorphosis.

For more information, refer to Chapter 14, "Animating Techniques."

Rotoscoping

Rotoscoping lets you add live action or moving textures by incorporating existing animations or digitized videos (movies). You can use QuickTime or Microsoft Video (AVI) files as texture maps or paint shapes on objects, backgrounds, backdrops and light gels.

For more information, refer to "Rotoscoping" on page 244.

Managing your Project

Storyboarding

If you are attempting anything other than a brief animation, it's a good idea to create a storyboard first. A *storyboard* is a series of drawn images showing the key actions in an animation. The storyboard helps you quickly work out the animations viewpoint, framing and composition. Because you're just sketching, it's easy to make changes and other arrangements, Your work on the storyboard will give you an idea of the types of objects you'll need to model and how to arrange the scene.

You can make sample storyboards by drawing a series of horizontal screen outlines on a sheet of paper, using a 4 to 3 aspect ratio (ratio of width to height). Draw the screens as large as necessary, and leave a block of space for the narration or description. You can also purchase cartooning storyboards at art supply stores.

You can use a storyboard to help layout the action in your animation.

Simplifying your Scenes

In general, the 3D scenes you create for animation need not be as complex as a typical illustration scene. The viewer's eye tends to be drawn toward motion and foreground elements. Static objects and background elements are scanned only casually.

By reducing unnecessary detail, you can reduce rendering times dramatically and keep the size of your scene files

manageable. When preparing a scene for animation, keep the following guidelines in mind:

- Refine your animation. Keep the objects as simple as possible. Detail is usually lost in an animation.
- Use fewer objects, and limit the number of reflective and transparent objects.
- Use the minimum number of lights required to achieve an effect. Additional light adds significantly to the rendering time.
- Limit texture map size, and use 8-bit texture maps instead of 24-bit.
- If a complex model remains in the background for the duration of the animation, try substituting a simpler version.
- Avoid using a modeled background. Use a rotoscoped image or procedural background instead.
- If your camera view remains unchanged for an entire scene, consider rendering a still image with just the scene's background elements. Then use this image as a backdrop and animate only the foreground elements. This technique requires some planning to make sure that shadows and transparent objects don't give the "trick" away.

Rendering without Compression

If you are not pressed for hard disk space, it usually makes sense to render your animation without compression. This ensures that you'll have a high quality copy of the animation to work with.

Working from your uncompressed original, you can save copies, experimenting with various compression settings until you are satisfied with both the image quality and playback rate.

An animation compressed multiple times degrades significantly, so you should always render without compression if you intend to do any postprocessing in another application.

Motion and Timing Principles

As an animator, the most important skill you can master is the ability to portray motion convincingly, whether it is intended to be realistic or exaggerated and cartoonish. No matter how good a 3D modeler you are, the timing of the events in your animation are of paramount importance.

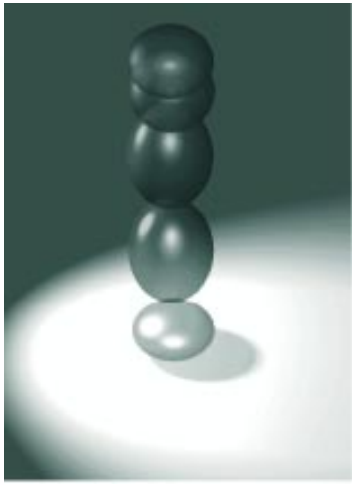
Many of the principles of timing and motion developed by cel animators apply to 3D animation with Ray Dream 3D as well. Many of these principles apply especially to character animation, but most are useful for any subject matter. For more information, you can refer to one of the many excellent books on cartoon animation.

Squash and Stretch

Squash and stretch are animator's terms for the exaggerated re-distribution of an object's mass as it moves or shifts positions. Squash and stretch portray the qualities of elasticity and weight in a character or an object.

Think of a bouncing rubber ball. As it falls it stretches; as soon as it hits the ground it is squashed. If the ball failed to change shape, the audience would interpret it as a solid, rigid mass.

You can accomplish squash and stretch in Ray Dream 3D by animating an object's shape using the **Free Form** modeler.



This ball's bouncing motion is exaggerated by deforming its shape so that it stretches as its descending and squashes when it hit the surface.

Lag and Overlap

When an object moves from one point to another, not everything has to move at once. For true-to-life movement, action that is secondary to the main activity can lag and overlap. For example, when you animate a character in pursuit of a bus, different parts of the body move at different speeds. The character's head may lead, followed by his torso, and finally by his arms and legs. In Ray Dream 3D, the Inverse Kinematics behavior can be used to experiment with poses that convey this type of motion.

A realistic turn is created by moving the head of the skeleton first, followed by the shoulders and then the hips.

A flag waving back and forth is another example of lag and overlap. It lags at one end of the arc and overlaps when moving in the opposite direction. You can use Ray Dream 3D's **Free Form** modeler to create lagging and overlapping effects.

Arc versus Straight Line Movement

Character motion appears more realistic if it follows an arc or curved path instead of a straight line. Most objects affected by gravity also follow curved, rather than straight trajectories.

Ray Dream 3D's Bèzier tweener is optimized for arc type movements. Try experimenting with its **Tighten In** and **Tighten Out** settings to produce narrower or wider arcs.

Secondary Motion

Secondary motion adds realism and credibility to a scene. A character turning his head to stare at something in disbelief shouldn't just turn his head; his jaw should drop and his eyes should blink as well. The viewer focuses on the main action, but registers the secondary motion as supporting it. Ray Dream 3D's time line gives you enough control to manage even the finest details of your animation, so you can add this kind of secondary detail.

Anticipation and Follow-through

In anticipation of a major action, an animated character often makes a small preliminary action in the opposite direction. For example, a character about to move screen right might first make a slight movement screen left, then strike a pose before moving screen right.

Before moving screen right, the skeleton moves slightly to the left.

Follow-through is the continuance of motion after a major action is completed. A baseball bat does not stop moving after

hitting the ball; rather, it continues along its arc of motion. Anticipation and follow-through make actions more believable.

Exaggeration

Exaggerating an action emphasizes it making it more prominent. For example, if intrigue is called for, have a character sneak instead of walk.

If you want your animation to resemble footage from a hand-held camera, give your camera an exaggerated bobbing motion. Virtually any type of action can be exaggerated to get an idea across.

Timing

Timing is as important in animation as it is in any dramatic form. Consider the difference between an abrupt stop and a gradual slowdown. Each conveys a completely different impression. In general, a motion that continues at the same pace lacks interest and seems unreal.

If you are trying to animate realistic character action, act out the sequence yourself, timing how long each pose is held and how long each action takes with a stopwatch.

Timing is one of the most difficult aspects of animation to master. The key events you define at different points on the time line need to be synchronized with those that came before and those that follow. Fortunately, you can use the interactive nature of computer animation to fine-tune your timing. Test your animation frequently by previewing it in the **Perspective** window or by dragging the Current Time bar back and forth between key events. Adjust the event's position until you're satisfied with the timing.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