15

Lesson Files

Lesson 15 > media

Projects

Media

Lesson 15

Time

This lesson takes approximately 1 hour to complete

Goals

Discover the new features of Motion 2

Unravel the mysteries of float space

Work with the Replicator

Understand the new keyframing methodology

Examine some of the new filters, generators and behaviors

Lesson **15**

Motion 2

Motion 2 brings with it significant new features for the Motion user. From extra precision—float space—to just plain silly fun—MIDI behaviors—Motion 2 significantly improves the workflow of a motion graphics project.

In this Lesson, we'll take a look at the major new features of Motion 2. We'll begin by examining float space and why it's important. We'll then build on what was learned in Lesson 12, by taking a look at some new keyframing functionality. The brand-spanking new Replicator will also get a review, along with some of the more significant new filters and behaviors.

Working in Float Space

Float space is important for a number of reasons. First of all, it's really essential when working with content destined for output to film. Secondly, it can protect the hours invested in perfecting your motion graphics program from disappearing down the proverbial gurgler when you output to 8 bit video. Finally, it enables you to make some dramatic changes to 3D renders without flattening out the contrast. Just what is float space, and how is it able to perform these miraculous feats? These are all good questions, so read on!

Demystifying Float Space

NOTE ► Float space is only available when working with Motion 2 on an OS X 10.4 or above.

Float space can seem quite confusing at first, but we've enlisted the help of the Stay Puff marshmallow man to help clear things up.

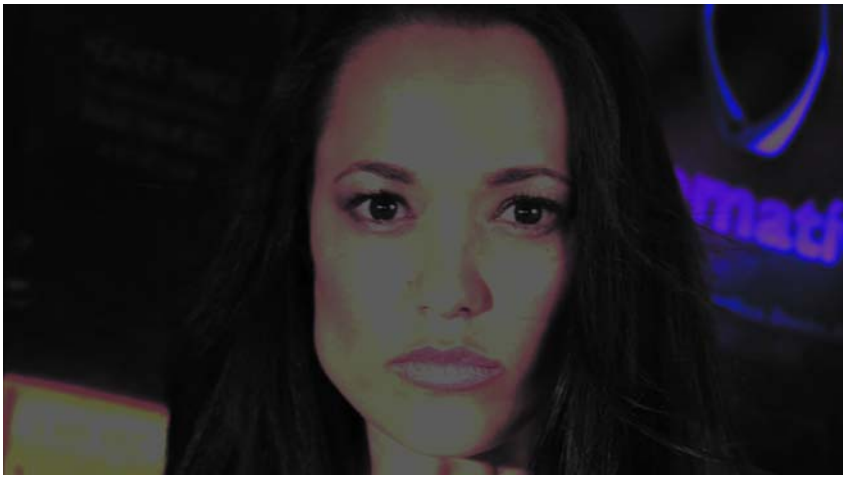
First of all, let's recap what we know about the way Motion represents color values. For every pixel in an image, there are separate red, green, and blue values, referring to the amount of red, green, and blue that make up the color of that pixel. Motion allows each of these "channels" of color data to have values from 0 to 1. A value of 0 is "suck-the-soul-out-of-you black" – you can't get any darker than zero. A value of 1 is "visitation-from-God bright" – that is, 1 is the brightest a pixel can get on your computer monitor. So, a value of 1 in a pixel's red channel would mean that pixel is as red as it can get; a value of 0 would mean that there is absolutely *no* red in that pixel.

NOTE ► As mentioned in an earlier chapter, other applications refer to color values between 0 and 255, referring to the 8 bits of data used to store color values in those programs. For the purpose of the current discussion, just know that a value of 255 in those applications is equivalent to Motion's value of 1.

So what happens when you try to brighten pixels that already have color data close to a value of 1? The answer is that the values *clip* to 1. That is, if you try to brighten a pixel beyond a value of 1, its value will be set to 1. This results in flat areas of an image that lack any contrast detail. You may have seen this in

digital video that was overexposed during filming. Once data in an image has been clipped, you can't recover it. If you try to reduce the brightness of the image, you just end up with flat gray patches where the clipping occurred, instead of flat white patches.

Clipped image



Clipped image with brightness reduced

Unclipped image with brightness reduced

So how what is float space, how does it help out with this clipping, and what does it all have to do with the marshmallow man? Imagine that the marshmallow man stepped into a large auditorium with a concrete roof and stood up. Let's assume our friend Puffy is taller than the auditorium roof. As he stands, his head is squished by the concrete roof. If he crouches back down again, his head remains squished and looks horribly flat and deformed (what the marshmallow community refers to as a bad s'more day). This is what happens to normal color data when it's brightened too far.

Now imagine instead that the auditorium had a false drop ceiling (you know, the ones in corporate offices with the foam tiles made of some carcinogenic substance). As Puffy stands up in this kind of building his head goes through the drop ceiling, but it isn't squished. To an audience member in the auditorium it may look just like the situation with the concrete roof, but instead of being squished, the top part of his marshmallow head is simply hidden from view. When he stoops back down, the part of his head hidden above the drop ceiling is revealed again, exactly as it was to start with (albeit with the unfortunate additions of carcinogens from the foam tiles).

This latter scenario is analogous to what happens in a float color space. In float, image data is permitted to have values bigger than one and less than zero. Even

though a pixel will only ever be displayed to screen with a value of one (we've already said that 1 is the brightest that a pixel will display to your monitor), the pixels are allowed to have values above one in order to preserve their appearance should a color correction ever bring their value back below a value of one. So, instead of Puffy having his head permanently squished, the head is allowed to live above the drop ceiling (the ceiling being the value of 1 in our color scale) so that its shape is retained if it returns below the roof level later.

Float Space and Film

Float space is especially important for film work. Film images have a very high dynamic range of colors—much bigger than the range that can be displayed on a computer. When film images are brought into a computer, the black and white points of the film are clipped to "fit" the most important parts of the image onto the computer's display. In normal color spaces, that means that some of the subtle shadow detail is clipped to 0 and some of the fine detail in the super-bright parts of the image (such as a cloudy sky) is clipped to 1. In float space, this extra detail is retained unclipped, and can be recovered when the footage is converted back out to film.

Float Space and Video

Even though video is traditionally stored as in 8-bit or 10-bit non-float format (the number 8 or 10 refers to the number of bits per channel, a standard image including red, green, blue and possible alpha channels), video composites can still benefit from float space. As we've already mentioned, the computer works in an RGB color space, and each pixel has a red, green and blue value defining its color. Video as it's stored and broadcast out in the video world, however, is stored in a different color space. In video, pixel values are broken into a luminance component and one or two chrominance components. The luminance component stores the basic contrast information of an image, while the chrominance components carry the color information. Two common formats are YIQ for NTSC, and YUV for PAL.

If an 8-bit RGB image is converted to an 8-bit YIQ or YUV image, rounding errors in the conversion can often result in what's called banding. This is

especially common in fine graduated backgrounds. So after hours of tweaking your particle system, you may find the beautiful collage of yellow and purple looks like a topographical map of the Himalayas instead of the inspiring psychedelia you had intended.

Original image

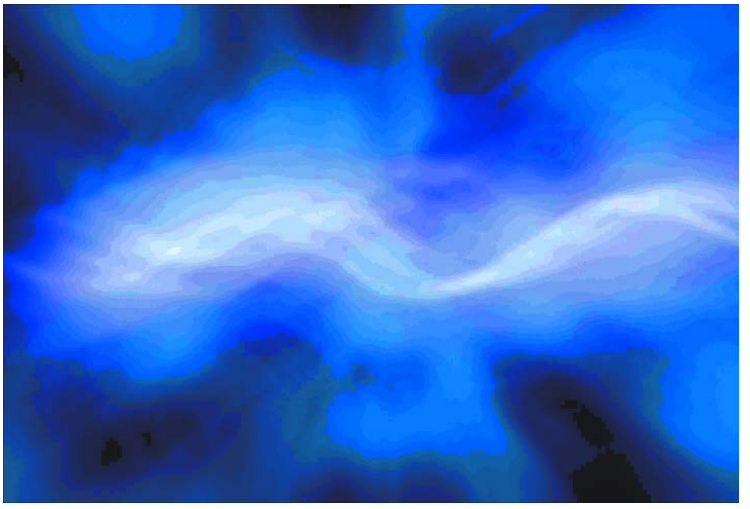


Image with banding after conversion to video space

The solution? You may have guessed it—float space. Simply put, float space provides sufficient data "headroom" to perform the conversion to video space without causing banding in the image.

Importing Float Space Images

As mentioned above, you can benefit from the extra data precision of float space even when working with regular images. However, if you want to work with float images created in another application or acquired from film, Motion 2 enables you to do that as well.

Motion supports the OpenEXR file format for importing and exporting float images. OpenEXR is an open source file format developed by the good people at Industrial Light &Magic, and it has quickly become adopted as the standard file format for storing float data. So if you want to import images already in float space, make sure the application from which you are receiving the images has exported them as OpenEXR. If your application doesn't natively support OpenEXR, do a quick search of the web—chances are someone's already written a free (or cheap) plug-in to do just that.

> **TIP** If you're importing files from a film scanner, you'll probably need to convert the files from log to linear before importing the frames as OpenEXR into Motion 2.

Setting Up Float Space in Motion

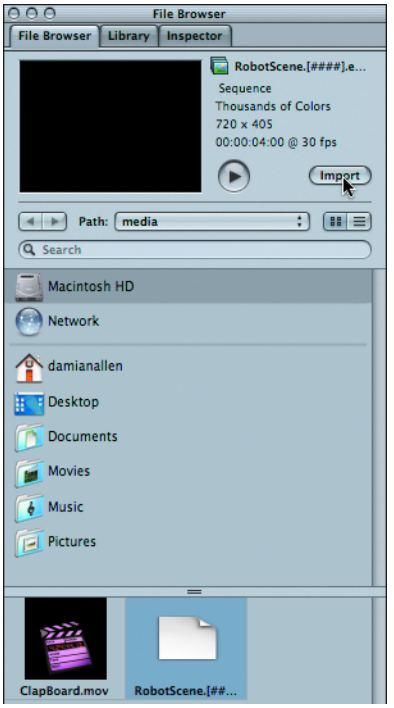
Working with float in Motion is very simple. The following steps will prepare a project for work in float space.

> **NOTE ►** As mentioned earlier, float space is only available when operating Motion 2 on OS X 10.4 or later.

1. Launch Motion 2.
2. Press Cmd-O to open a project, navigate to the media accompanying this lesson, and open Lesson 15 > **FloatStart.motn**

3 In the File Browser, navigate to Lesson 15 > media, select RobotScene and click the import button at the top of the File Browser to import it into the Canvas.

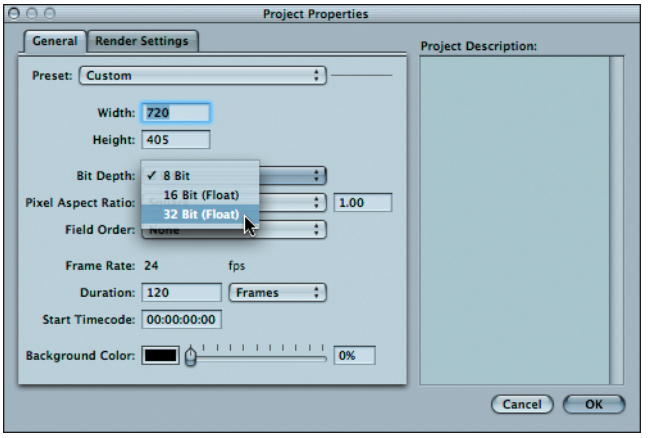
NOTE ► If RobotScene appears as a list of several images, press the Show Image Sequences as Collapsed button at the base of the File Browser.



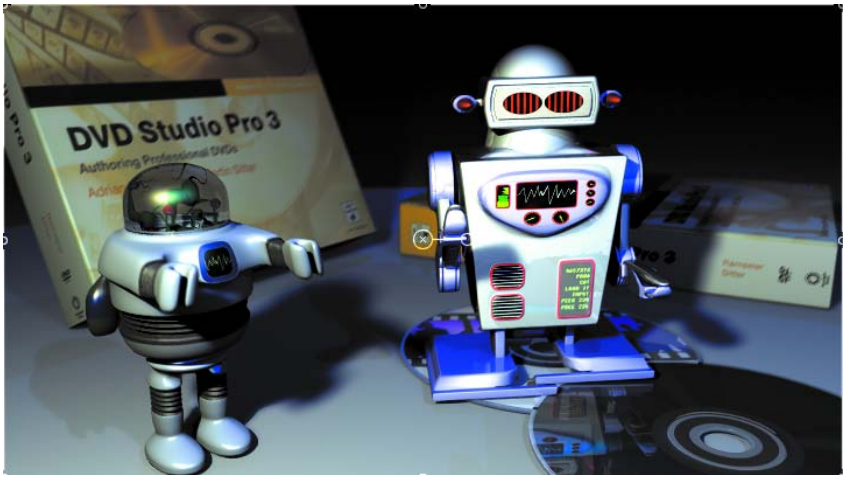
You've just imported an OpenEXR float image into Motion, but by default, the project is only set up to operate in 8 bit.

4 Press Cmd-J to open the Project Properties, or choose Edit > Project Properties. Choose 32 bit (Float) from the Bit Depth pop-up menu, and then click OK.

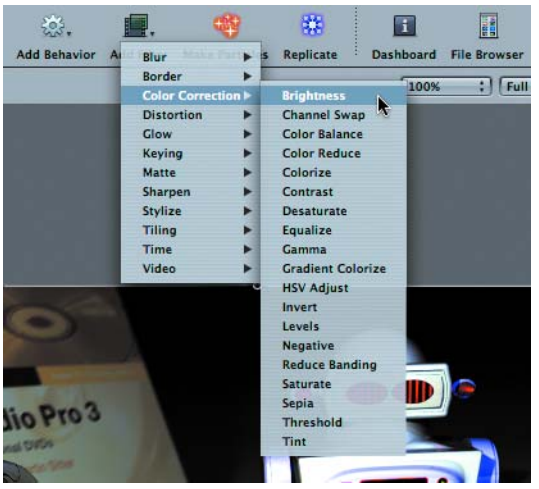
The Bit Depth pop-up gives you two float options: 16 bit and 32 bit. 32 bit is best for film-resolution work, while 16-bit float will probably suffice for video work.



Notice as you look at the image in the Canvas that the highlights are blown out (i.e., they appear clipped). If this was a normal image, there would be no way to recover the clipped areas. Because this image was rendered out of a 3D software package in float, reducing the brightness of the image will recover the clipped areas.

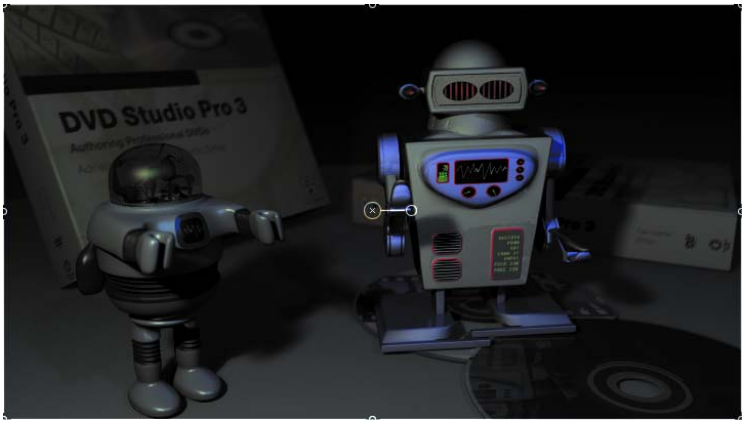


5 Select RobotScene in the Layers tab, then choose Add Filter > Color Correction > Brightness.



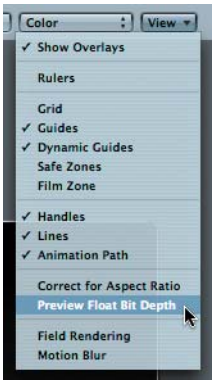
6 In the Dashboard (press F7 to bring it up if it's hidden), drag the Brightness slider down to around 0.4.

Notice how the image in the Canvas gracefully darkens, and the highlights on the round robot are much smaller than they were before you lowered the brightness.



While float space offers many advantages over traditional 8-bit color space, it has the disadvantage of requiring a lot more render time to compute. Rather than bog down Motion's real-time design engine, an option has been added to preview in 8 bit. This will give you the real time performance you're used to in Motion, but still allow you to create your final render utilizing the full precision of float space.

7 In the View menu at the top-right corner of the Canvas, deselect Preview Float Bit Depth.



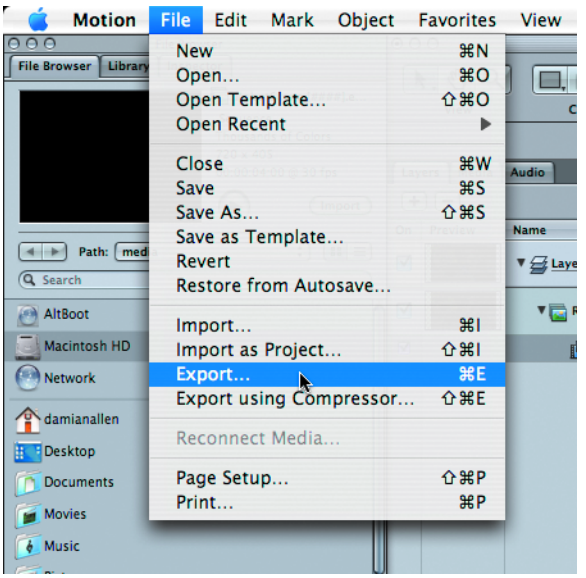
Notice that as soon as you uncheck this item, the highlights on the robots flatten. Toggle the Preview Float Bit Depth option a few times to see the difference. If you playback the timeline, you'll notice that adjusting the Brightness slider is much more responsive with the option deselected.

That's essentially all there is to working in float. As long as the project properties Bit Depth is set to float, your final project will render using float – regardless of the preview setting.

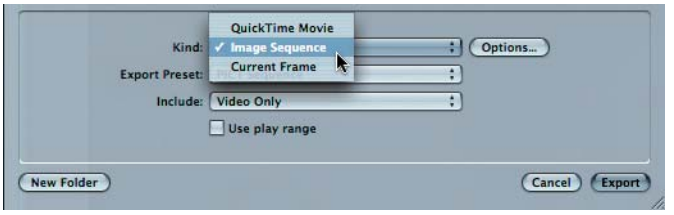
If you want to render out a file that preserves all of that extra float data, you'll need to use the OpenEXR format.

Saving to OpenEXR

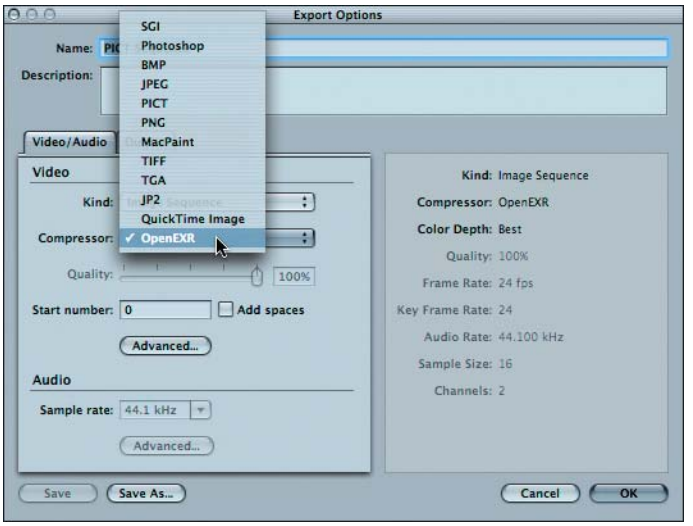
Choose File > Export.



2 In the bottom section of the export window, choose Image Sequence from the Kind pop-up menu.



3 Click the options button, then in the Options window, set the Compressor to OpenEXR. Click OK to close the Options window.



4 Choose a location and save name for the render and click Export to begin rendering.

The Replicator

If you've been working with the original release of Motion for a while, you'll know how addictive the particle generator is. Good news: Motion 2 brings another time-absorbing creative tool to the arsenal, this time with a name fit for a California governor.

The Replicator is similar in some senses to the particle generator, and should actually feel quite familiar. Where Motion's particle system is designed to build complex and often random simulations out of small, simple particles, the Replicator is more about creating patterns. Swirly, exaggerated, video wall-sized, psychosis-inducing patterns, to be exact.

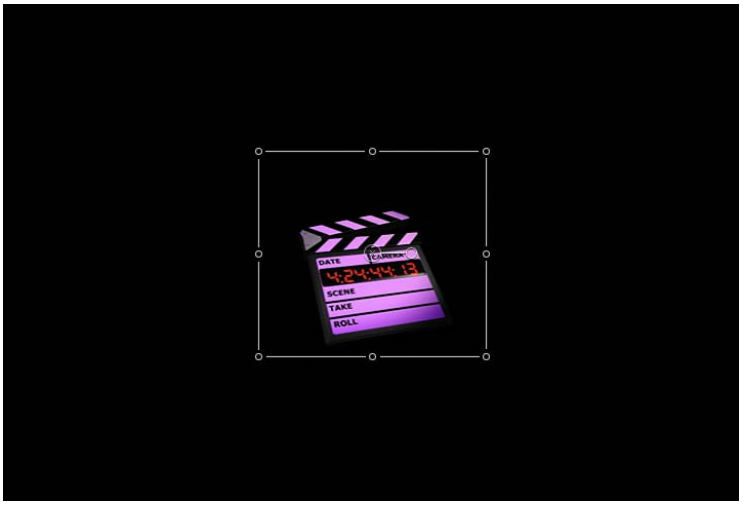
Creating a Replicator

Rather than try to explain the Replicator, let's just take a look at how it works.

Press Cmd-Option-W to close any projects you may have open.

Choose File > Open, and open Lesson 15 > **RepStart.motn**

1 In the File Browser, navigate to Lesson 15 > media, select ClapBoard and click the import button at the top of the File Browser to import it into the Canvas.



2 Press the play button to begin playback.

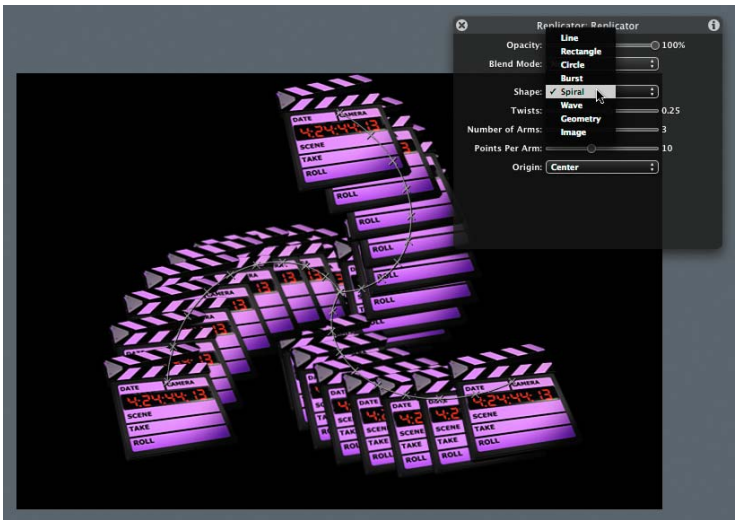
3 At the top of the Canvas, press the Replicate button once.

Where there was once a single clapboard, you now have 25.

4 Click and drag one of the corner points of the bounding box you see inside the are filled by the clapboards, and drag outwards to resize the group of images.

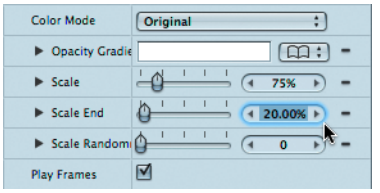
5 As with the particle generator, there are many options available to adjust the look of the replicator. Some of these are available from the Dashboard.

6 In the Dashboard (F7), experiment with some of the different shape settings, such as spiral. Return to the rectangle type when you're finished.



Again, in similar form to the particle generator, there are many more controls for the Replicator available from the parameters tab.

7 Make sure the shape setting has been set back to rectangle. About two thirds of the way down the Replicator parameters tab (F4), set the Scale to 75%, and Scale End to 20%.



8 You'll see now that the center clapboard is 75 percent of its original scale, and the outer clapboards are 20 percent of the size of the center clapboard, creating a nice falloff in scale.

Feel free to experiment with the various knobs and sliders; there are countless other ways to customize your clapboard replicator.

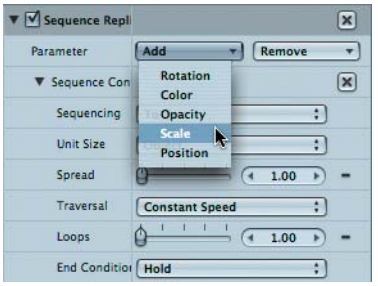
Applying the Sequence Replicator Behavior

Once a Replicator has been established, the various parameters defining it can be animated with keyframes or parameter behaviors. However, a very important new behavior specific to the Replicator can make animating the pattern a very simple proposition.

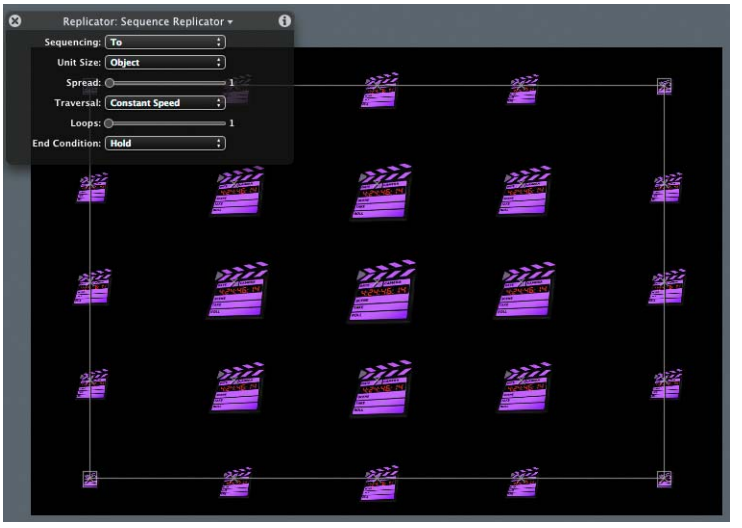
1 Make sure the Replicator object is still selected, and choose Add Behavior > Replicator > Sequence Replicator.

The Sequence Replicator behavior is very similar to the Sequence text behaviors covered in Lesson 13 (see page 425). Several parameters can be animated to create the effect.

2 In the Behaviors inspector (F2), click on the Add pop-up menu, and choose Scale.



3 Set the Scale to 75%.



You should now see the center clapboard slowly shrink to 75 percent of its original scale during the first portion of the timeline, followed by the second row, then the third row. It's not too impressive yet, so let's speed things up.

4 Set loops to a value of 5.

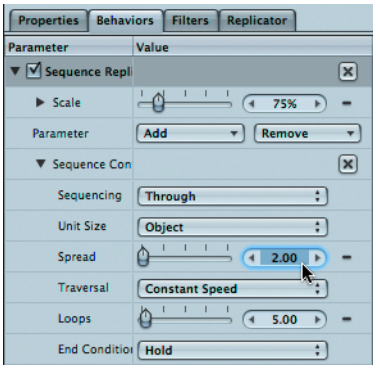
The scaling down now occurs 5 times.

5 Set the Sequencing pop-up to Through.

The sequence now scales down, then back again for each of the 5 loops.

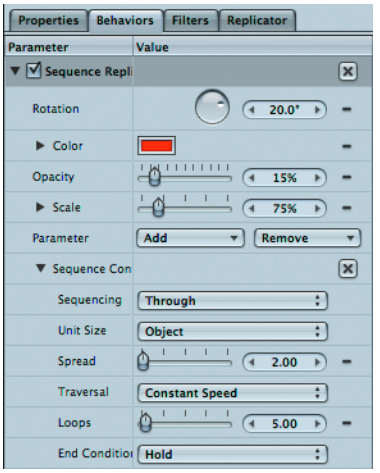
6 Set the Spread to 2.

There is now much more overlap between the rows, and the animation looks much smoother.

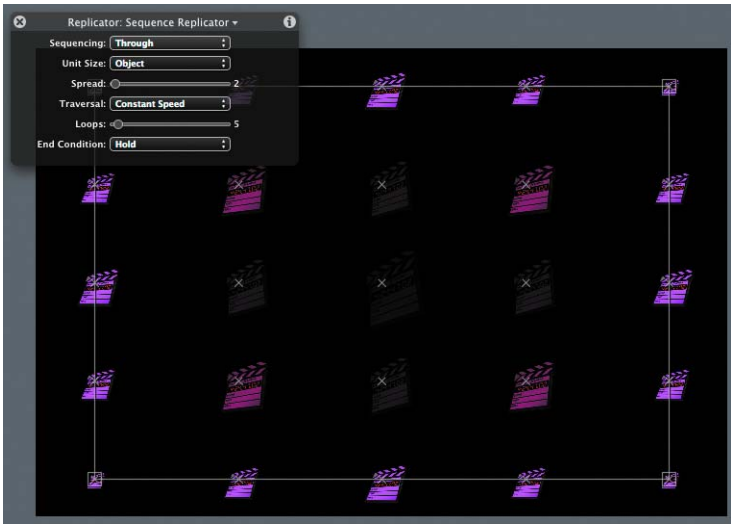


To finish the effect, let's add some parameters other than Scale to be adjusted with the sequence.

7 Using the Parameter Add pop-up, add the parameters Rotation, Color, and Opacity. Set Rotation to 20 degrees, Opacity to 15%, and choose a red hue for Color.



Starting to get the idea? The possibilities are, as they say, endless. Sadly, the amount of time you can reasonably bill to the client is not.



A New Way to Keyframe

In the original release of Motion, the Record Animation button at the base of the Canvas determined whether or not changes made to parameters would automatically create keyframes or not. (For a review, see Lesson 12). From the standpoint of simplicity, this works great: Turn the record animation button on, and any slider you move or value you change sets a keyframe at the current frame. The only major downside to this method is that if you forget to turn it off, you end up with a mess of unintended keyframes to clean up.

Motion 2 brings with it the solution, the "Record keyframes on animated parameters only" option. A mouthful to be sure, but also a lifesaver. What it means is that when the option is enabled, automatic creation of keyframes will only occur if the parameter being adjusted *already* has keyframe set. Motion graphics artists coming from After Effects will be familiar with this; it's the default method for keyframing in that application.

This new method will make much more sense in a moment, as you actually perform the steps.

Using the Animated Parameters Only Option

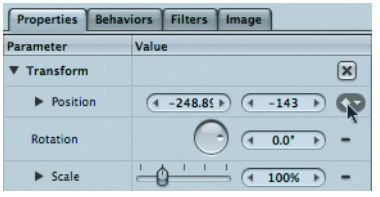
1 Press Cmd-Option-W to close any open projects.

2 Choose File > Open, and open Lesson 15 > **KeyStart.motn**

3 Double-click the Record Animation button at the base of the Canvas to activate it and jump immediately to the Recording Options window.

4 In the Recording Options window, select the "Record keyframes on animated parameters only" checkbox, then click OK.

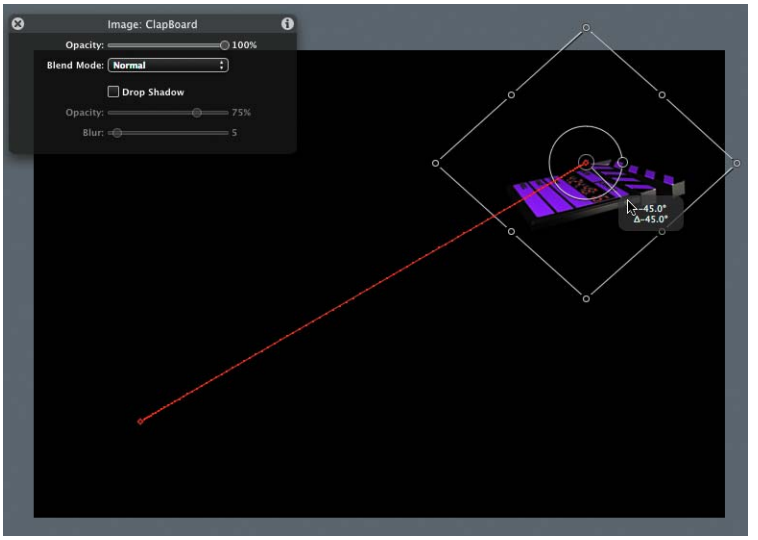
5 If you're not already there, move to frame 1. Make sure Clapboard is selected, and in the Properties inspector (F1), option-click the Animation Menu button (the minus sign) to the right of the Position parameter.



We've now set a keyframe for Position. It's now considered an "animated" parameter, since it has at least one keyframe (the one we set here at frame 1).

6 Move to frame 100.

7 In the Canvas, drag the Clapboard to the upper-right corner of the screen and release the mouse. Then use the rotation control (the small hollow circle just to the right of Clapboard's center) to rotate the Clapboard 45 degrees to the right (clockwise).

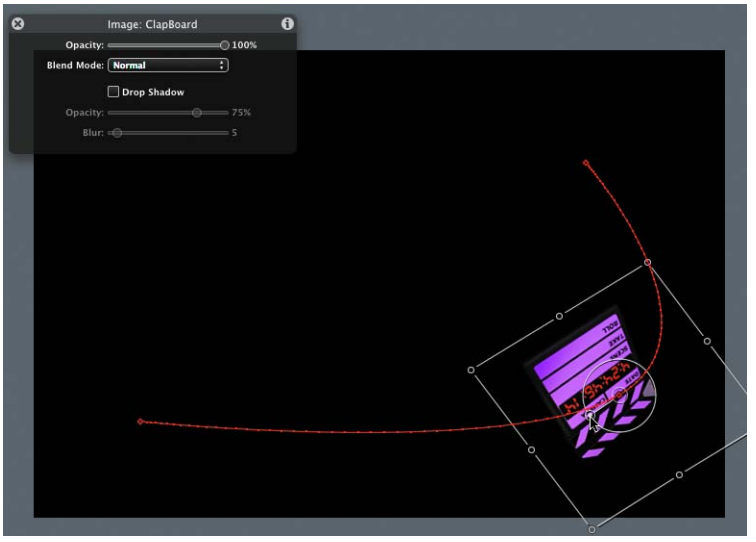


8 Move back to frame 1, and then resume playback.

Notice that the clapboard's *position* animates – it moves from the lower-left to the upper-right – but its *rotation* does not. That's because we never set any keyframes for Rotation. It's therefore not considered an animated parameter and a keyframe was not set at frame 100.

Let's set one more point, just to drive the idea home.

9 Move to frame 50. Adjust the position of the Clapboard to the lower-right of the screen, and adjust the rotation even further in the clockwise direction.



10 Move back to frame 1 and resume playback.

The Clapboard now animates through the new position keyframe at frame 50, but since rotation is not an animated parameter, no keyframe is set and the rotation remains at its most recent setting throughout the timeline.

New Filters, Generators and Library Features

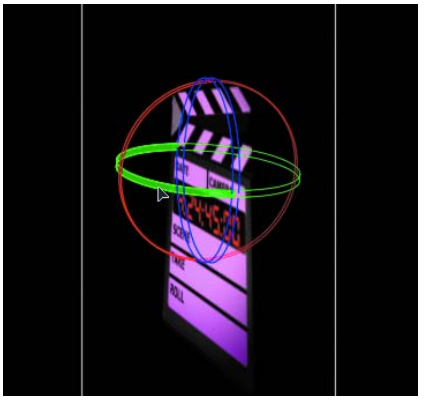
Along with the improved functionality of Motion 2, several new filters, generators and other library items are available. A few of the more notable are described briefly here.

The Caustics Generator

The Caustics generator creates a nice ripple effect, similar to the highlights found on the top of a disturbed water surface. Try using this with a distortion filter like Displace for a nice effect.

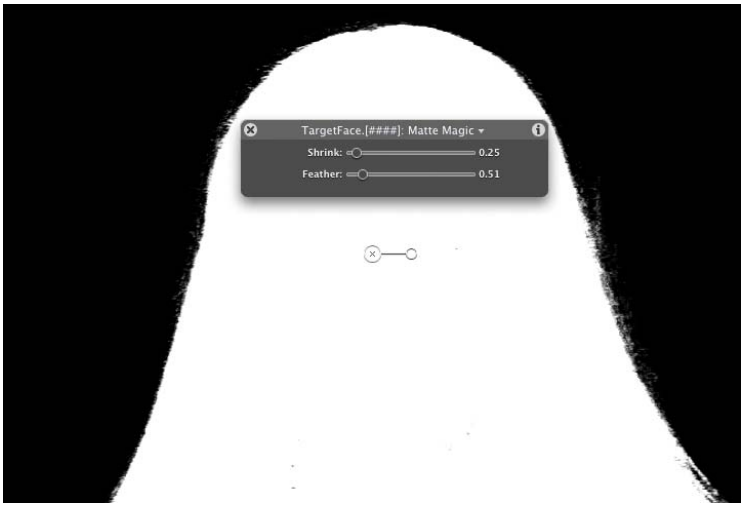
The Basic 3D Filter

Found in the Distortion section, the Basic 3D filter provides a nice way of performing simple perspective adjustments to elements in order to simulate 3D space.



The Matte Magic Filter

Matte Magic provides a much more powerful method for expanding or contracting the edges of a matte than the previous Matte Choker filter (referred to in Lesson 9, on page 290).



The Channel Swap Filter

The channel swap filter is an uninspiring but incredibly useful filter for switching image data from one color channel to another. Very useful for transferring mattes to and from the alpha channel of an image.

The Refraction Filter

This filter creates a glassy effect by default, or it can be used with a control image (applied to the image well in its parameters) to distort an image in a specific way.

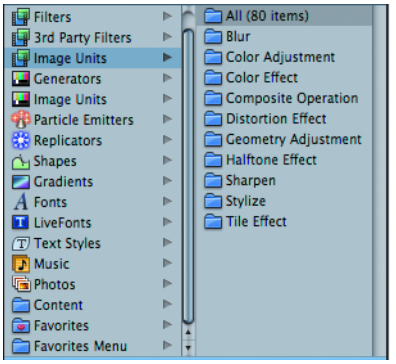
The Scrub Filter

This filter was actually available for the original release of Motion, but was a separate "thank you" download if you registered Motion at the Apple website. It's now bundled with the full version of Motion 2 and ready to go. Basically, it allows you to shift the timing of a clip forwards and backwards, something akin to scrubbing a vinyl record on a turntable, but with video. Now, use this with the new MIDI parameter behavior (see the section below), and things start to get interesting.

Core Image Units

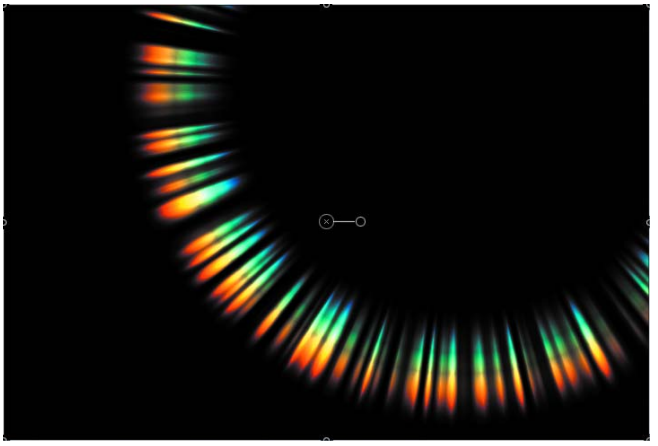
Just when you thought you'd run out of generators and filters, Motion 2 offers access to the Core Image filters that ship with OS X 10.4 Tiger. They're available in the Library under the two categories called Image Units, one for

Core Image generators, and the other for Core Image filters. Of course, just like working with float, you'll need to be running OS X 10.4 or later to take advantage of these.



Core Image Filters and Generators are available in the Library under two sections, both labeled, "Image Units"

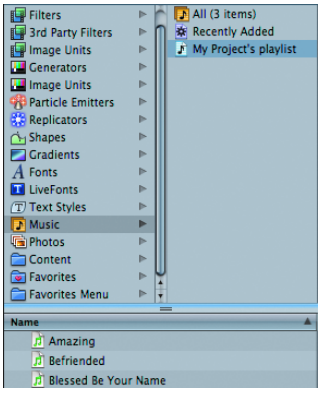
Many of the Core Image filters are duplicates of filters already available in Motion, but there are several that are distinct. Of particular note are the Lenticular Filter generator, and the Stylize (check out the Spot Light filter) and Composite Operations (useful for more complex and isolated compositing tasks) filter categories.



The Lenticular Filter generator

iPhoto and iTunes Support

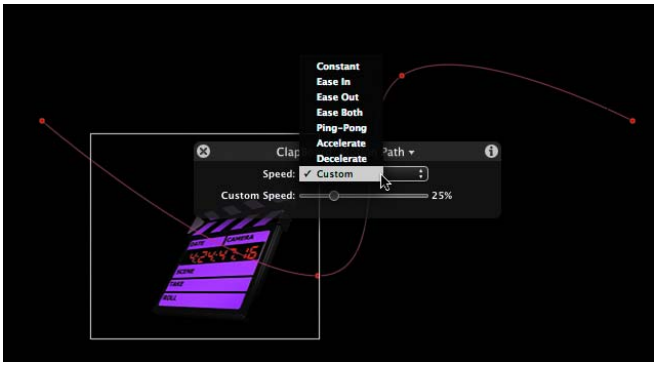
In Motion 2, iPhoto and iTunes content is available directly from the Library. What's more, playlists and photo albums are recognized, so you can have the work experience kid sort through your library for the photos and music tracks you'll need for the current project, and they'll be effectively "soloed" in Motion's library, ready to go.



Motion Path Enhancements

Yet another reason to leave keyframing alone. The Motion Path behavior has received a facelift and now offers several different methods for modifying the way an object travels along its path.

If you hadn't worked with the Motion Path behavior before, this new implementation may save you the headache of frame-by-frame keyframing.



Working With MIDI Parameter Behaviors

Alright, all those former musicians who ended up in the film and video industry after needing to find a real job, this is your chance. Pull out that old MIDI keyboard or foot controller hiding in the closet and put it to use.

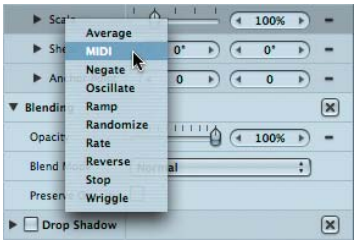
Motion 2 allows you to map MIDI events to parameters. What this means is that you can perform real-time adjustments to filters and behaviors by moving a MIDI slider, or pressing a key on a MIDI keyboard.

Setting Up MIDI Control

The process to access MIDI control in Motion is very simple.

1. Make sure your MIDI device is already powered up, connected to your Macintosh, and recognized by OS X as a valid MIDI input.

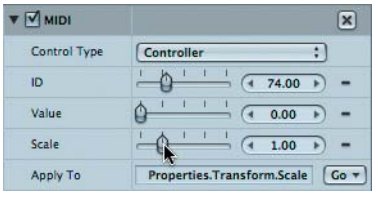
2. Right-click on the parameter you want to control, and choose MIDI.



   This automatically adds a MIDI parameter behavior and sets it to "learning" mode.

3. Move a MIDI slider, dial, expression pedal, or keyboard key. Motion will identify what was pressed and map it to the chosen parameter.

4. Adjust the Scale parameter to suit.



The Scale parameter determines how much influence the MIDI hardware will have on the parameter. Set to the default value of 1, the assigned slider, key, or knob will adjust the parameter from 0 to 100 percent of its original value.

Go ahead and experiment.

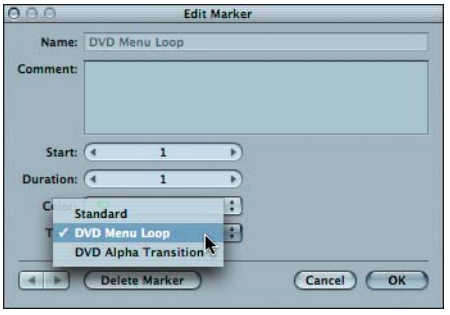
Using Motion Menu Loop Point Markers

One more new feature in Motion 2 definitely worth mentioning is the Loop Point marker feature for use with DVD Studio Pro 4.

Motion menus typically build or fade up from black at the start. When a motion menu loops back to its start (usually 30 or 60 seconds after it commences) it's "bad DVD authoring etiquette" to force the viewer to wait for the menu to build again before being able to make a selection. Instead, the DVD should jump to the point directly *after* the menu has finished building. This is known as the loop point, and in Motion 2 you can specify exactly where you want that to be with a marker. DVD Studio Pro will then automatically set the loop point to your marker.

1. Move to the frame at which you want the loop point to occur.
2. Press Shift-M to create a marker.
3. In the Timeline (F6), double-click the created marker to edit it.

4 In the Edit Marker window, choose DVD Menu Loop from the type pop-up menu and click OK.



Now, if the project is imported as an asset into DVD Studio Pro, the loop point will be set to the designated frame.

Working with Other Applications

Final Cut Studio Integration

In addition to the integration previously seen between Final Cut Pro and DVD Studio Pro, Motion now integrates with the new post-production audio tool, Soundtrack Pro. Individual audio files can be non-destructively edited in Soundtrack Pro, then automatically updated back in Motion.

Final Cut Pro integration has also seen the addition of marker and audio keyframe export into Motion.

Integration Outside of Studio (Including After Effects)

Perhaps the really big news in integration is the interaction with other software via QuickTime. What this means is that After Effects can access Motion content without having to first render the Motion project. Simply by renaming the extension of the Motion file to .mov, After Effects will be fooled into thinking the project is a QuickTime movie and import it just like any other footage. Nice.

TIP Motion projects can now automatically be imported as elements into Shake 4.0 (no file extension change required).

Lesson Review

- Motion 2 brings with it powerful new functionality, in addition to new filters and behaviors.
- Float space offers color precision required for film work, which can also prevent degradation in imagery destined for video.
- The Replicator provides a unique system for generating pattern effects.
- Motion 2 adds the ability to keyframe only on animated parameters when in Record Animation mode.
- New filters and generators have been added to increase the creative possibilities of Motion.
- MIDI behaviors allow parameters to be adjust in real-time by MIDI hardware devices.
- DVD Menu Loop markers allow DVD Studio Pro to automatically set a motion menu loop point.
- Motion 2 integrates now integrates with Adobe After Effects, in addition to the Apple Final Cut Studio applications.