

## From Video to the Web

by Chris & Trish Meyer, CyberMotion

### Tips for web developers on how to handle video content.

We live in a world where content often appears in more than one media format. For example, web cartoons created in programs such as Adobe Flash may be picked up for broadcast, while video content appears regularly on the web (YouTube, anyone?). Despite this, many web developers have not yet mastered digital video's numerous idiosyncrasies. And unfortunately, there is a lot of bad advice out there about how to deal with them. Therefore, we'd like to give the web developers out there (as well as video newbies) a list of issues to be aware of while repurposing video for the web – namely, interlacing, pixel aspect ratio, frame rate, and color space.

#### Playing the Field

The biggest single technical difference between video and the computer has to do with interlacing or fields. Some – but by no means all – video is captured or created using a process known as interlacing or field rendering. We discussed this subject in detail in the Tips N Tricks article [Managing Interlaced Footage](#); let's review it here.

When interlacing is employed, two images are captured or created for every single frame of video. These two images are known as fields. The two fields are offset slightly in time – namely, by half

the duration of a single frame. Alternating horizontal lines are taken from these two fields and woven (interlaced) together to create a frame. Televisions and related video equipment expect this, and un-weave (deinterlace) the fields before they are displayed, playing them back in the proper order to create smooth motion.

*figure 1b*



*figure 1c*



*figure 1a*



*Figure 1: With interlacing, two fields captured at slightly different points in time (a,b) are woven together to create an interlaced frame (c). Televisions and video software know how to unweave these to get back to the source frames, but web software and developers often skip this step. This is clip VRS120 from the Artbeats Recreational Sports (V-Line) collection.*

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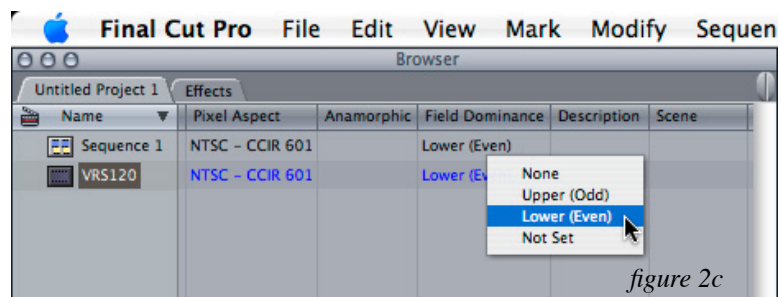
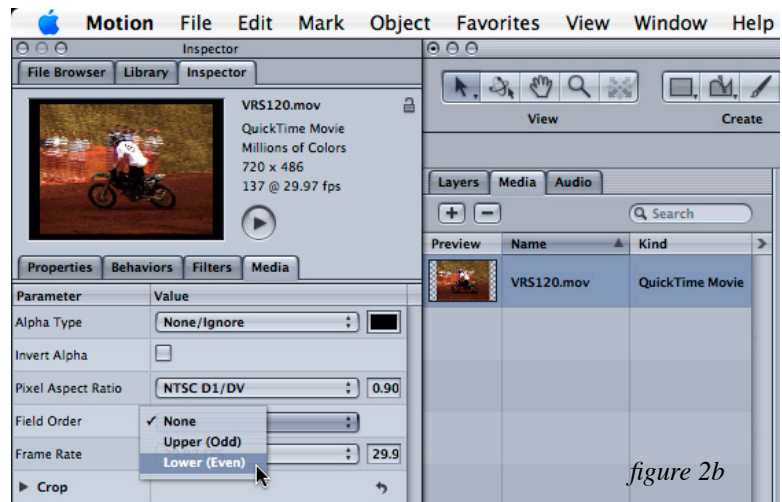
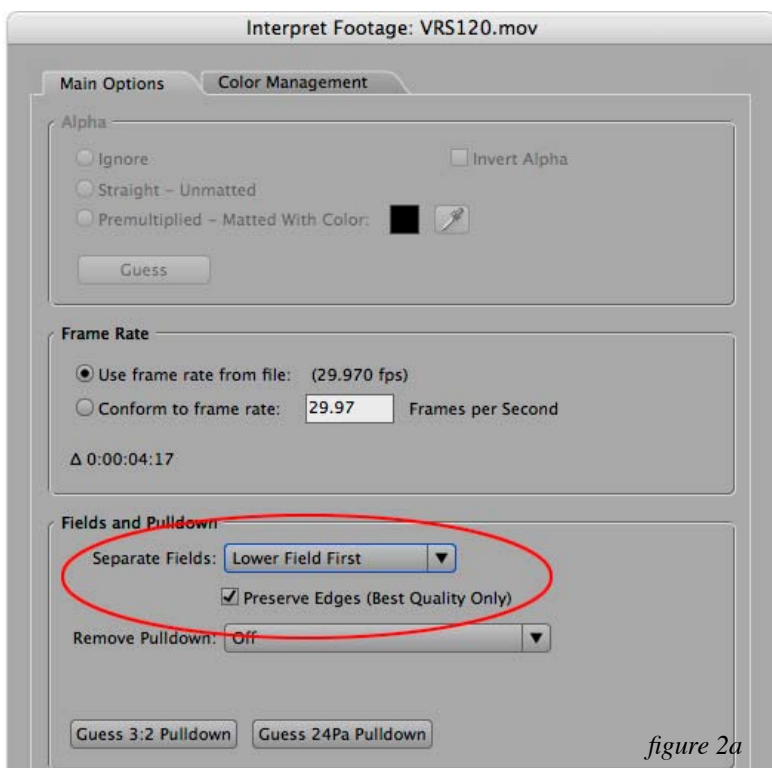
Computers generally don't expect image frames to be interlaced. Therefore, they display both fields at the same time, creating display artifacts where alternating lines appear to be offset wherever something moves around the frame. Therefore, if fields are present (and that's a very important "if"), you will want to separate the fields in the source material, throw one away, and use only the remaining field when repurposing interlaced content for the web. This is a crucial concept that many developers skip or miss!

All video software has a way to separate fields and to fill in the "missing" lines with interpolated pixels from the field it keeps. Your job is to tell the software which field occurs first in time – the one used for the very first line in the frame (the "upper" field), or the

*Figure 2: In After Effects (a), open the Interpret Footage dialog and set the Separate Fields popup, enabling Preserve Edges for additional quality. In Motion (b), use the Field Order popup under the Inspector > Media tab. In Final Cut Pro (c), scroll over to the Field Dominance column and right-click on the current value to change it.*

scroll over to the (technically misnamed) Field Dominance column, and right-click the current setting. There are also dedicated plug-ins such as the FieldsKit suite from RE:Vision Effects that perform these tasks in a more sophisticated manner than the default software routines. The correct setting to use depends on the format of the source footage; this was discussed in the Tips N Tricks article [Managing Interlaced Footage](#) we mentioned earlier.

Just as important as separating fields on input is making sure you don't reintroduce fields on output. Remember, video for the web is never interlaced. In After Effects, you make this decision after you've added a composition to the Render Queue: Open up the Render Settings for your queued comp, and make sure the Field Render popup is set to Off. In Apple products, you make this setting for the



one used for the last line in the frame ("lower"). In Adobe After Effects, import the footage, select it in the Project panel, open File > Interpret Footage > Main and then set the Separate Fields popup; enable Preserve Edges to improve the interpolation quality. In Apple Motion, add the footage to your project, open the Project panel and select the footage under the Media tab, then in the Inspector panel select the Media tab and look for the Field Order popup. In Apple Final Cut Pro, import the footage, select it in the Browser window,

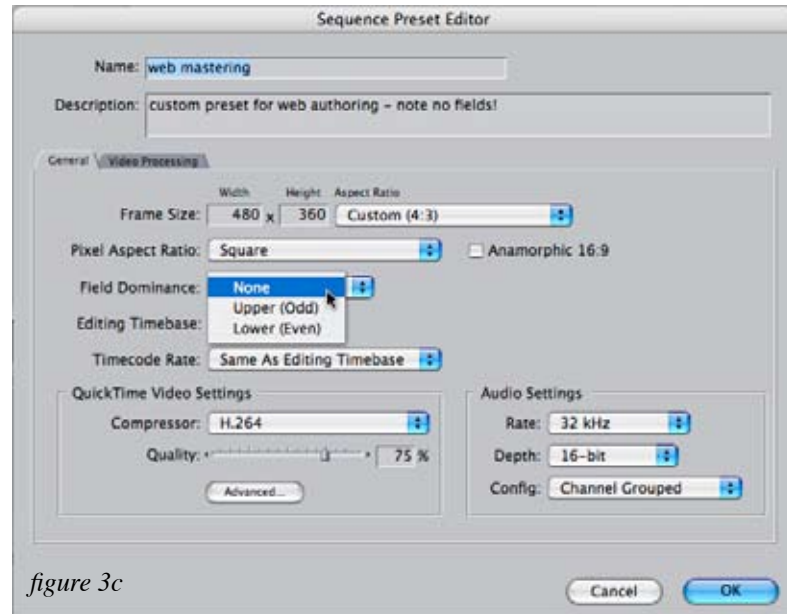
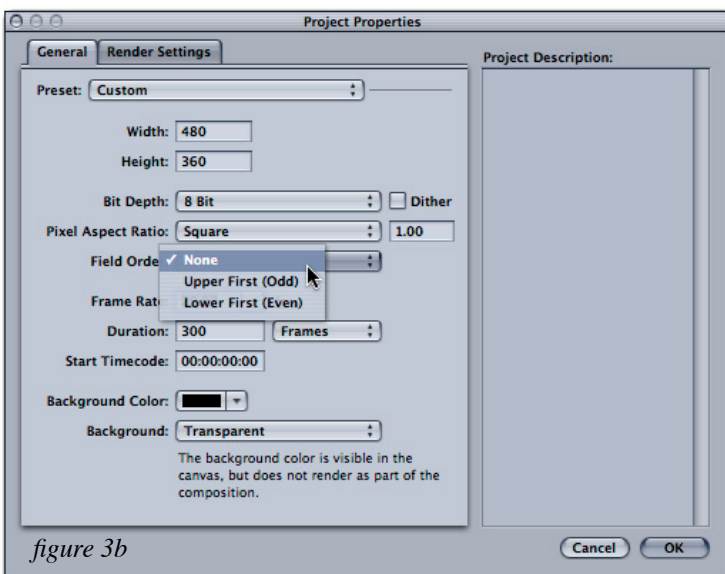
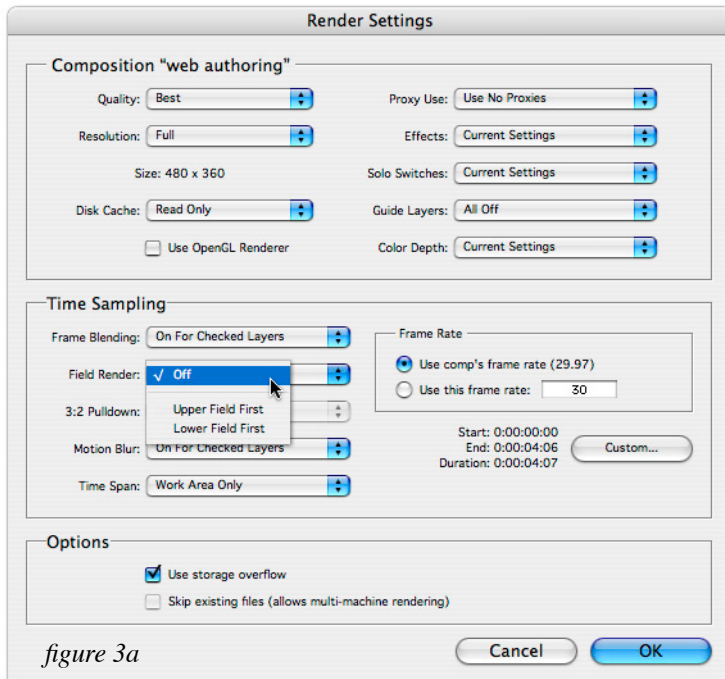
project or sequence before you render: In Motion, open Edit > Project Properties and set Field Order to None. In Final Cut Pro, click on the Final Cut Pro menu item, open Audio Video Settings, select the Sequence Presets tab, and create a new preset for your web work by duplicating then editing an existing preset. Then in the Sequence Preset Editor, set the Field Dominance popup to None.

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Figure 3: After you separate the fields for any interlaced source footage, you need to make sure field rendering is turned off for your composition, project, or sequence. Here are the correct settings in the relevant dialogs for After Effects (a), Motion (b), and Final Cut Pro (c).



Now, back to that important “if” we mentioned: Not all video is interlaced. And if it is not interlaced, you don’t want to separate the fields – you’d just be throwing away half of your resolution. You will find a large number of clips you receive are progressive scan (which means not interlaced – every line in a frame is from the same point in time). Film is not interlaced. A large percentage of computer-generated imagery is not field-rendered, and therefore is not interlaced. Many video cameras now have progressive scan options as well. Additionally, Flash animations don’t have fields; neither do still images, scans, or illustration.

Indeed, the vast majority of the Artbeats stock footage library uses the progressive scan format. You can tell by finding the clip you like on their web site, clicking on the “i” (More Information) icon under it, and looking at the Field Rendering specification for that clip; if you have one of their collections, look at the Specifications section at the end of the printed card of thumbnails that came with the collection. Progressive scan is nice because it plays well on both computers and televisions.

The point to remember is this: If a clip employs progressive scan, leave the separate fields option to Off or None. But if fields are present, you always want to separate them before compressing the movie for playback on the web.

*Figure 4: Study each clip before the fields are separated (such as in QuickTime Player): If you see the “comb teeth” pattern of interlacing on moving objects (a), the clip is interlaced, and you should separate the fields. If you don’t see this pattern (b), the clip is progressive and you should not separate its fields. If you see both in the same clip – as is the case here (clip ES130 from the Artbeats Extreme Sports (V-Line) collection), the file was encoded using pulldown, which should be removed.*

figure 4a



figure 4b



What if your video clip seems to be progressive scan on some frames, and interlaced on others? Then it was created using a special procedure known as pulldown. This is a trick used to spread whole frames from film (which usually has a lower frame rate) over multiple fields of video, which sometimes requires splitting source frames across video fields. You want to remove pulldown and get back to the source film frames before compressing the clip for the web. After Effects even has a “guess” button to try to help find and remove pulldown for you. (For more information on pulldown, see the Tips N Tricks article [Getting Down with Pulldown](#).)

Now that you have the most complex item on your checklist mastered, let’s move onto some other important subjects.

## Pixel Aspect Ratio

Computers are logical beasts. For example, they assume every pixel should be displayed as tall as it is wide – makes sense, doesn’t it? Video is nowhere near as logical: Quite often, it expect pixels to be

projected onto the screen either wider or skinnier than they appear on a computer. If you don’t compensate for this, circular logos will look like eggs, and people will magically gain or lose weight as television monitors stretch or squish them.

Fortunately, video software is familiar with this idiosyncrasy, and gives you options to correct it. Check each piece of source footage and make sure its Pixel Aspect Ratio setting matches the video’s format, such as “anamorphic” (widescreen) DV. You’ll find these settings in the same general area in the program that you found the field order settings. In most cases, it will be set automatically, but it’s a good idea to verify it just to be safe.

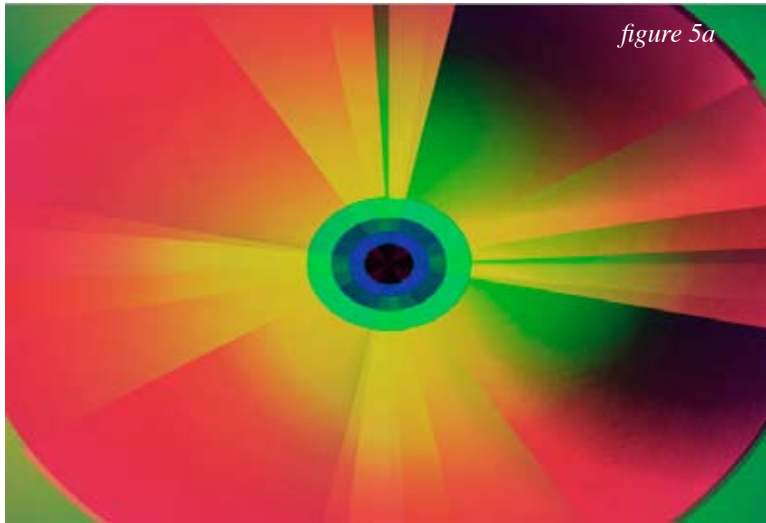


figure 5a

Figure 5: Most digital video has non-square pixels. If you don't compensate for this, supposedly perfect circles will appear as eggs when displayed on a computer (a). However, if you tag the aspect ratio of your footage correctly (b), most programs will compensate for this when you scale them down in a square pixel timeline or composition for eventual use on the web (c). Clip DG101 from Artbeats Digidelic.

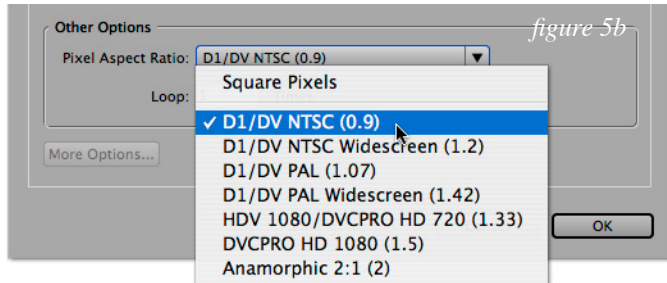


figure 5b



figure 5c

Just like interlacing, you have to set the pixel aspect ratio for every source, as well as the overall composition, project, or sequence you are working in. Time for another important (but occasionally overlooked) truism: When rendering content for the web, your output should always use square pixels. In After Effects, this is set in the Composition Settings dialog. In Motion and Final Cut Pro, it is set in the same dialogs as the output field order, which we discussed earlier.

Again, you will find more on this subject in the Artbeats Tips N Tricks archive: Look for the two-part series on Pixel Aspect Ratio, as well as Going Wide (an article on using the widescreen format).

## Frame Rate

The idiosyncrasies keep on coming! NTSC format video (common in North America and Japan, among other places) tends to run at either 29.97 for 23.976 frames per second (FPS). Resist the temptation to round these numbers to 30 or 24! If you do, there's a chance the audio and video may fall out of sync with each other, and that you may notice hitches in the motion in your video content. Frame rate for your project is usually set in the same place as pixel aspect ratio. Be warned that many software programs provide "web" presets with non-NTSC frame rate; you will need to edit the rate used by these presets.

Flash Video (FLV) can support these oddball rates; the only exception is if you embed your video inside a SWF file – which you probably won't, as this gives a severe limitation in the duration of the file. If you want to use a lower frame rate to save on data, divide this number by exactly 2 or 3 – again, don't round the result.

## Color Space

Most web browsers expect your artwork to be in sRGB color space – this is the standard on Windows, and the Safari browser on the Mac performs color space transformations of tagged files automatically. However, video exists in a color space other than sRGB. For the best results, you should translate your video to sRGB as you compress it for the web.

Unfortunately, as of the time this was written (late 2007), most video software is behind the curve when it comes to color management; you should consider using Adobe After Effects version 7 or later for this process. The simple technique is to add the clip to a composition, apply Effect > Utility > Color Profile Converter to the clip, set the Input Profile popup to match the video format (such as SDTV NTSC for DV or D1 footage shot in North America), and set the Output Profile to sRGB IEC61966-2.1. When you've set this up once, select the effect and use Animation > Save Animation Preset; you can then select subsequent clips and use Animation > Apply Animation Preset to recall these settings.

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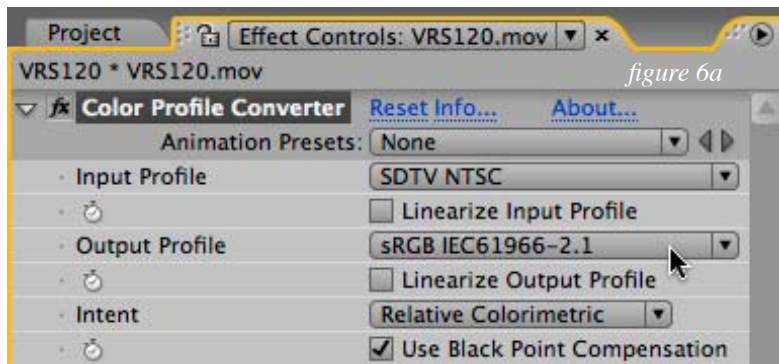
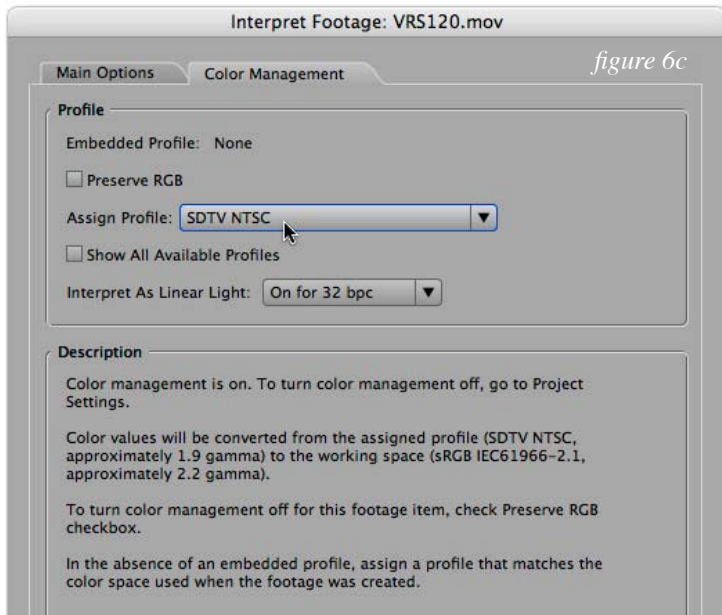
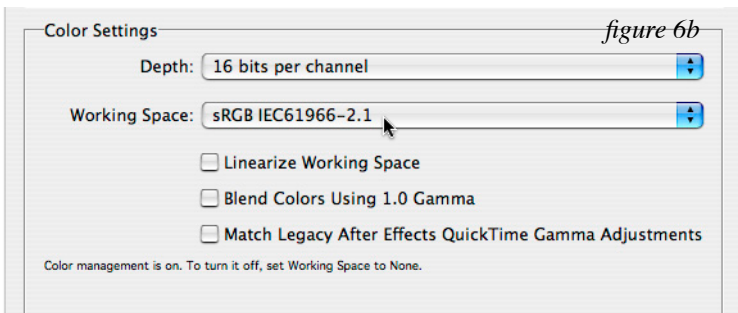


Figure 6: If you are using After Effects 7 or later, use *Effect > Utility > Color Profile Converter* (a) to change the colorspace of video clips from their own standard to the sRGB space most web pages expect. If you are using After Effects CS3, an alternative to this effect is to set the Project Working Space to sRGB (b), and then set the color profile of each clip in its *Interpret Footage* dialog (c).

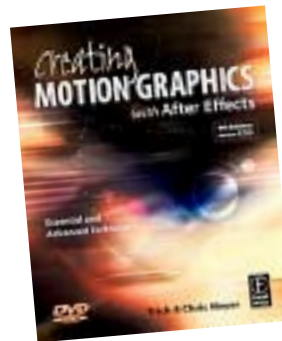


If you are using After Effects CS3 or later, an alternative workflow is to open *File > Project Settings*, and set the *Color Settings > Working Space* popup to sRGB IEC61966-2.1. Then for each video clip, select it in the Project panel, open its *File > Interpret Footage > Main* dialog, click on the *Color Management* tab, and set the *Assign Profile* popup to match the video's format. If you do this, you won't need the Color Profile Converter effect. As a bonus, you can optionally change the color profile that the final file is saved to in the *Output Module* (it defaults to match your Working Space).

We hope these tips help you decode the mystery of repurposing video for the web. Master them, and you will be ahead of the vast majority of other developers! If you want more information, we've covered each topic in more depth in our books *After Effects Apprentice* and *Creating Motion Graphics with After Effects*. We've also created extensive video training modules on the subjects of fields and pulldown; they are available to Lynda.com subscribers as well as for individual purchase – check out [articles.cybmotion.com](http://articles.cybmotion.com) for more information.

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*Chris and Trish Meyer are the founders and owners of CyberMotion ([www.cybmotion.com](http://www.cybmotion.com)), an award-winning motion graphics studio in Los Angeles that has created a wide variety of work for film, broadcast, corporate events, and special venues. They were one of the original development sites for After Effects, wrote the highly-acclaimed books *Creating Motion Graphics* and *After Effects Apprentice* (2007), and are long-time Artbeats users.*



*For even more tips and tricks, Chris and Trish Meyer have just released the fourth edition of their book *Creating Motion Graphics with After Effects*. Most of the examples use Artbeats footage at full D1 size. To learn more, visit: <http://www.books.cybmotion.com>.*