



Jaggy Jar Jar

“**S**TAR WARS: Episode II” is the first all-digital Hollywood blockbuster. Notice that I’m not using the word “film” to describe it, because not a single frame of conventional silver-halide film was exposed. All real-life images were captured with high-resolution digital-

video cameras, supplemented by a plethora of cyber characters.

Fortunately, Jar Jar Binks’ screen time was much diminished compared with “Episode I.” For this and other reasons, I generally enjoyed “Episode II” more than its predecessor. Because “Episode II” was digitally created, I thought it would be best viewed with a direct-to-digital projection. I brought along a friend who’d previously seen the movie via a conventional transfer-to-film projection and could, therefore, make a comparison between the two approaches.

Unfortunately, we were both quite disappointed. The movie previews that preceded the feature attraction exhibited distracting “stair-stepping” artifacts, most noticeable along diagonal lines that delineated areas of significant changes in brightness, color, or both. I reassured myself with the idea that perhaps the artifacts were results of the digital conversion of the originally film-based trailers and that the main feature would be more pleasing to the eye.

As soon as the opening credits began, I knew I was wrong. Those artifacts originated not with the media itself but with the projection system’s pixel-based Texas Instruments DLP (digital-light-processing) chip set. The DLP projector seemed to be attempting to antialias the digital images, for my eyes saw something akin to Microsoft’s ClearType technology. But it “clearly” wasn’t good enough; I was unable to look beyond the artifacts and suspend disbelief. In addition to the jaggies themselves, I also saw “dot crawl” and rainbow patterns reminiscent of the incomplete sep-

aration of luma and chroma.

The Metreon’s screen is 23 ft tall by 50 ft wide and slightly curved, and we were smack dab in the middle of the fifth row. (The distance between the screen and us was about 30 feet.) Would folks sitting farther back or to the side have been able to notice the artifacts as much as I did? Perhaps not. But I’d wager that their experiences were no less frustrating. When Yoda’s visage didn’t dominate the screen, his facial and other details disappeared into a low-resolution green morass.

DIGITAL CINEMA FEELS LIKE A BIG STEP BACKWARD.

And ironically, digitally created characters fared better than their real-life counterparts, perhaps a reflection of the cyber characters’ inherently lower resolutions and the edge softening that accompanied their merging with the remainder of the scene. Plus, because they weren’t humanoid, we didn’t know what they were *supposed* to look like and, therefore, more easily overlooked their degradation.

The first analogy I thought of when trying to describe my experience that night was the initial generation of audio CDs. When they hit the street, they were almost universally panned for their harsh, unnatural sound compared with the “warmth” of an analog LP. But then I realized that this analogy didn’t hold water; although 24-bit zealots might disagree, I’d argue that 16-bit sample sizes are more than sufficient to ensure an authentic audio presentation, and plenty of great-sounding CDs exist today to back up my opinion. It just took time for audio engineers to alter their tech-

niques in the embryonic digital era.

A better analogy might be the first few generations of digital still cameras. Put their images on a Web site, or blow them up no bigger than 3×5-in., and they were acceptable. Enlarge them beyond this point, though, and digital photography’s quality shortcomings became readily apparent. Even today, you need to spend hundreds or thousands of dollars to get a digital camera that’ll make an 11×14-in. print as good as that of a \$20 point-and-shoot film camera. At least with digital cameras, you’ve got other purchase motivations—the ease at which you can delete images you don’t want, edit those you do want, and distribute them to friends and family via e-mail.

That difference is at the root of my skepticism about digital projection. So far, all the benefits I see are for the movie studios—the ability

to quickly and easily distribute to theaters at low cost movies that are copy-protected to prevent piracy. There’s not much in it for the theaters, aside from an expensive retrofit. More important, digital cinema feels like a big step backward for consumers. The technology needs a few more generations of resolution acceleration before it’ll match what today’s “analog” film-projection systems can deliver.

Almost every signal-processing application you’ll work on requires that you choose between analog and digital implementations, or perhaps some partitioned combination of the two. In this era of 2.5-GHz Pentium 4 processors, less-than-\$100 80-Gbyte hard-disk drives, and gigabyte-memory modules, the decision might seem obvious at first glance. But before you stroll merrily down the binary boulevard, stop and ask yourself why you made the choice, what you’ll gain from it, and what you’ll give up.

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