

## A Brief Analysis of Digital Cinema Color Grading Techniques: Postprint

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### Abstract

With the contraction of the film market, film production has transitioned comprehensively into the digital era. The widespread adoption of digital cinematography has substantially reduced production costs and lowered entry barriers. In recent years, numerous high-quality films and micro-films have been produced using cost-effective digital high-definition cinema cameras, enabling many ordinary individuals aspiring to filmmaking to realize their directorial aspirations and document their creative visions, personal lives, and narratives in visual form. Concurrently, digital film color grading software has proliferated extensively, with numerous free versions available, significantly empowering digital film production. Through proficient utilization of such grading software, footage captured with inexpensive cinema cameras can achieve visual qualities approaching those of cinematic imagery. This paper examines digital film color grading, offering a concise analysis of fundamental color grading techniques.

### Full Text

#### A Brief Analysis of Digital Film Color Grading Techniques

**Abstract:** As the film stock market continues to shrink, film production has fully entered the digital era. The proliferation of digital cinematography has significantly reduced production costs and lowered barriers to entry. In recent years, numerous high-quality films and micro-movies have been shot using affordable digital cinema cameras, enabling aspiring filmmakers to realize their creative visions and personal stories through the cinematic medium. Concurrently, digital film color grading software has emerged in abundance, with many free versions available, further empowering digital film production. Through proficient use of these tools, even footage captured with inexpensive cameras can achieve cinematic-quality results. This paper examines the fundamental techniques of digital film color grading.

**Keywords:** Colorist; Creative Style; Cinematography Knowledge

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With the development of multimedia and film technology, new innovations are quietly transforming our working methods. Each technological revolution brings greater convenience to our craft. Since the era of photochemical film, color has been an eternal theme in cinema—whether monochrome, cool tones, warm tones, or neutral palettes, every film employs a color scheme that reinforces its narrative themes. Before digital cinema cameras became widespread, color grading was a highly complex process. In the 1990s, “film-to-tape” transfer was popular: developed film negatives were scanned into digital video signals for computer-based color correction, then transferred back to film stock after grading was complete.

Today, film shot on photochemical stock is rare, as digital cinema cameras have completely dominated the market. Professional manufacturers such as ARRI, RED, and SONY have captured the majority of global film and television production with their high-end digital cinema cameras. Meanwhile, newer companies like Blackmagic Design (BMD) and Canon (with its C300) have seized the mid-to-low-end market by offering affordable prices without compromising quality. Whether for feature films or commercials, digital cinema cameras now capture raw footage in RAW or LOG formats to approximate the latitude and texture of traditional film stock, preserving detail in highlights, midtones, and shadows. This approach maximizes dynamic range for post-production grading, allowing colorists to push the image to its full potential.

Among the color grading software available for digital cinema footage, Mistika, DaVinci Resolve, Filmmaster, Baselight, and Assimilate Scratch represent the mainstream options. Mistika offers the best grading results but commands the highest price, making it less common in domestic markets. DaVinci Resolve, by contrast, has captured a significant share of the domestic color grading industry due to its relatively low cost, powerful capabilities, and free version availability. This paper analyzes film color grading techniques using DaVinci Resolve as its primary example.

## 1. Qualified Colorists Must Possess Solid Cinematography Skills

A competent digital film colorist requires not only software proficiency but also substantial cinematography knowledge. This dual expertise is essential for several reasons. Initially, the colorist’s task involves identifying what is missing from the image, such as exposure issues. Since exposure varies across footage, maintaining continuity during shot matching is critical—brightness cannot fluctuate.

tuate erratically between cuts. Color temperature adjustment is another fundamental concern. Most digital cinema cameras now record in RAW or LOG formats with approximately 15 stops of latitude, preserving maximum detail. Even when the cinematographer's white balance is inaccurate, precise color temperature can be restored through post-production adjustments. In DaVinci Resolve's Color Match menu, the Color Temp option allows precise numerical input for white balance correction, which falls under primary color grading.

When scenes exhibit extreme contrast—such as bright exterior views visible through windows alongside dimly lit interiors—regional adjustments become necessary. This involves darkening harsh exterior light while boosting saturation in shadow details, sometimes even shifting hues. These operations belong to secondary color grading. A colorist with cinematography expertise possesses a keen sense of composition and lighting that proves invaluable for color correction. In productions using multiple camera systems (ARRI, Canon, Sony, or even GoPro), matching footage captured at different times, under varying lighting conditions, and with different exposures tests a colorist's skill. Audiences immediately notice any shot where color or lighting deviates from surrounding footage, disrupting the viewing experience. The colorist must unify these inconsistent shots into a cohesive visual flow.

## 2. Project Management and Fundamental Techniques in Digital Film Color Grading

The first step in grading any film is conforming, which ensures the highest quality source material is used for color correction. Proper data management during production greatly facilitates this conforming process. Before beginning work, the colorist must thoroughly understand the film's content—its characters, scene transitions, and overall rhythm. Close communication with the director and cinematographer is essential to identify the subject and supporting elements in each frame, determine who is central to the scene, and decide where the visual focus should lie. Based on the director's vision, the colorist controls lighting and color throughout the image, enhancing or diminishing lighting effects, adding color and dimension, and highlighting details where needed. The ultimate goal is to comprehend the director's intent and use all available technical means to emphasize key visual elements, directing audience attention to the intended subjects.

When grading begins, primary correction addresses overall brightness and contrast. Since lighting conditions vary during shooting, some frames may exhibit excessive contrast ratios. For example, in backlit scenes, the difference between a subject and a bright sky can exceed the camera's dynamic range, forcing the cinematographer to choose between exposing for the subject (blowing out the background) or preserving sky detail (rendering the foreground as a silhouette). Colorists can resolve this by replacing the sky or using double-exposure techniques—capturing the subject correctly in one take and the background in another, then compositing them during grading. For underexposed, desatu-

rated footage that appears flat and lifeless, curve tools can adjust the gamma curve to deepen shadows while lifting highlights, enriching the image's dimensionality while preserving maximum detail. Filters such as Hue/Saturation or Lum/Saturation then adjust saturation to enliven the image. Throughout this process, colorists must constantly monitor the waveform scope, as different monitor brands and models display images differently. The scope never lies and cannot mislead your visual judgment.

DaVinci Resolve's node-based workflow represents a crucial tool for sophisticated adjustments. Nodes can be configured in serial, parallel, layer, external, or additive configurations, with each node contributing different elements to the image, such as color mattes. By adding or removing nodes, colorists can refine each frame, applying Power Windows for localized adjustments that modify specific areas without affecting the rest of the image. The RGB Mixer offers another practical function, converting color images to monochrome while allowing independent control over red, green, and blue channel output. Its histogram display facilitates precise color matching.

The Tracker function enables precise tracking of moving objects through fixed selections, reliably capturing motion even with fast-moving subjects. DaVinci Resolve's professional Motion Effects feature includes powerful noise reduction capabilities. Underexposed shadow areas often suffer from noise that degrades image quality. The Temporal NR (temporal noise reduction) and Spatial NR (spatial noise reduction) options reduce noise by adjusting threshold values. This straightforward yet effective tool can salvage footage shot six stops underexposed, transforming it into properly exposed, saturated, and sharp images. Such powerful post-production tools solve many otherwise insurmountable problems.

### 3. Developing Professional Habits to Become an Expert Colorist

A professional colorist must cultivate a distinctive style to create memorable cinematic colors and tones. Experienced practitioners draw inspiration from classic films and the art of painting, recognizing that all arts are interconnected. Through personal interpretation, they craft optimal visual works that reflect the narrative's emotional tone and atmosphere.

Notably, while developing their signature style, seasoned colorists understand the critical boundaries of cinematic art. They avoid gratuitous overuse of techniques and effects, which can prove counterproductive. Excessively exaggerated treatments rarely resonate with audiences.

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