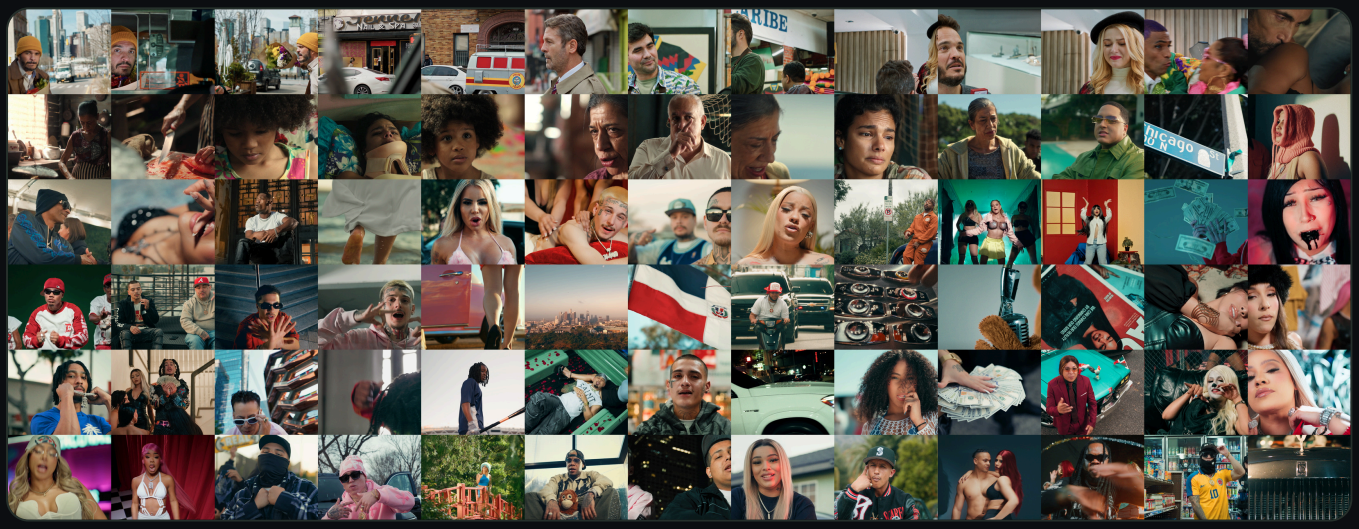
PRACTICAL GUIDE

Noise Types

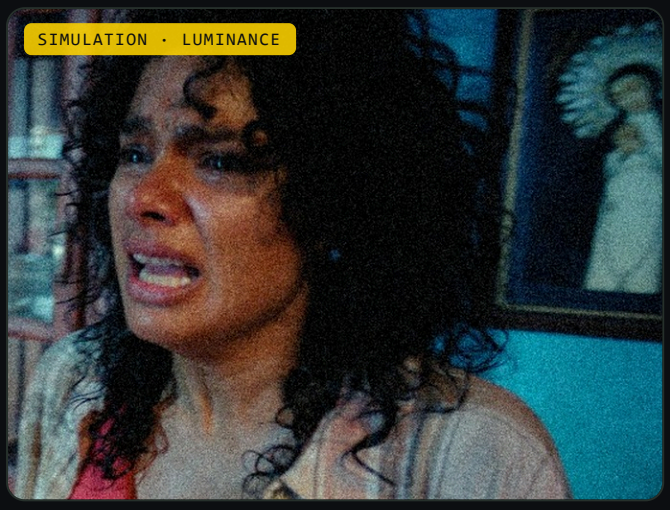
Luminance and chroma: which cameras give more color noise and which give cleaner noise



by Luis Taveras · Colorist

Not all noise is the same

When a director says their image “has noise”, they’re almost always mixing two different things. Separating them explains why one camera costs a thousand dollars and another a hundred thousand, and what the colorist can do with each.



Luminance noise: light and dark specks, no color. It reads as texture.



Chroma noise: green, magenta and purple blotches in the shadows. It reads as dirt.

Why one looks like texture and the other like dirt

Our vision is far more sensitive to brightness detail than to color detail; that’s why video can store color at a lower resolution than brightness without us noticing. Fine, even brightness noise looks like film grain. Color blotches, on the other hand, don’t exist in nature or on film: the eye reads them as a digital defect.

	LUMINANCE	CHROMA
What it is	Brightness variation from pixel to pixel	Color variation from pixel to pixel
Where it shows	Across the image, more in the shadows	Mostly in shadows and lifted blacks
How it looks	Fine, similar to grain	Green, magenta, purple blotches
On skin	Gives it texture	Changes its color
The colorist	Keeps it, or reduces it slightly	Removes it

Film grain isn’t digital noise

Film grain comes from the silver crystals in the emulsion: it changes every frame, it’s organic and has almost no color of its own. That’s why fine luminance noise is accepted as “cinematic” and color blotches aren’t. When a look needs grain, the colorist adds it under control in the grade.

Frames from *Madre* and *La Fábrica de Bodas*, color graded by Luis Taveras.

What does your camera's noise depend on?

Three things: the sensor, how the camera reads it, and how it stores the file. That's why two cameras with the same resolution can give very different images when light is short.

FACTOR	WHAT HAPPENS	WHAT TO LOOK AT
1 · The sensor	A bigger photosite collects more light; with more light, the signal sits further from the noise. A small sensor with many pixels has tiny photosites.	Sensor and pixel size
2 · The readout	Every time the signal is read and amplified, noise is added. Dual-gain readouts and dual base ISO reduce that noise in the shadows.	Dual native ISO, dual gain
3 · The file	Few bits, subsampled color and heavy compression turn fine noise into blocks and blotches. In-camera noise reduction and sharpening harden it.	Bits, 4:2:2 or 4:2:0, codec

Color at a quarter of the resolution

SAMPLING	COLOR RESOLUTION	WHERE IT'S USED
4:4:4	Full, same as brightness	RAW, ProRes 4444, masters
4:2:2	Half horizontally	Cinema cameras in ProRes / 10-bit XAVC
4:2:0	Half horizontally and half vertically = **a quarter**	8-bit H.264 / H.265, small cameras

Watch out for in-camera noise reduction

In compressed formats, in-camera noise reduction gets baked into the image: it wipes fine skin and hair texture and leaves soft smudges the colorist can no longer separate. If your camera allows it, leave it off or at minimum and let the cleanup happen in the grade, under control.



Fine color noise, at full resolution.



The same noise stored at a quarter of the color resolution: it turns into blotches.

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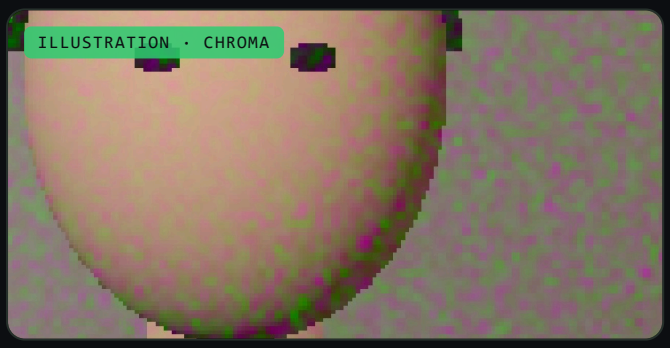
Cameras that give more color noise

These aren't bad cameras: with good light they give excellent images, and many films and music videos have been made with them. Color noise shows up when light is short, when ISO is pushed beyond what the sensor can take, or when shadows shot dark get lifted.

CAMERA	SENSOR AND FILE	WHAT THE COLORIST SEES
Panasonic GH5	Micro Four Thirds (17.3 × 13 mm), smaller than cinema Super 35. 10-bit 4:2:2 up to 4K 30p; 8-bit at 60p. Optional V-Log L (12 stops per Panasonic).	For years the queen of music videos. In practice, above ISO 1600 noise grows fast and skin can shift color.
Blackmagic Pocket 4K	Four Thirds (18.96 × 10 mm). 12-bit Blackmagic RAW. Native ISO 400 and 3200. 13 stops per Blackmagic.	RAW has no in-camera noise reduction: shoot dark and lift the shadows, and color noise appears in the blacks.
Blackmagic Pocket 6K	Super 35. 12-bit Blackmagic RAW. Native ISO 400 and 3200. 13 stops per Blackmagic.	Same behavior: a very good image when well exposed; color noise in lifted shadows.
8-bit 4:2:0 cameras	H.264 / H.265 with heavy compression and in-camera sharpening.	Color noise turns into blotches and blocks that can't be separated from the image.

How to get the best out of them

Expose properly (even slightly over, without clipping), stay at native ISO, record in the format with the most bits and least compression, turn off in-camera sharpening and bring enough light to set. With that, the colorist works on a clean image.



Pixel zoom: color blotches on skin.



Pixel zoom: brightness variation only.

Frames from *Madre* and *La Fábrica de Bodas*, color graded by Luis Taveras. Illustrations from the video's animation. Educational simulations made on real frames, marked as such.

Cameras with cleaner luminance noise

At the other end are high-end cinema cameras. Their noise doesn't disappear, but it's fine, even and has very little color, so it reads as texture.

CAMERA	WHY	RANGE (MAKER)
ARRI ALEXA (Mini LF, ALEXA 35)	Large pixels and **dual gain**: each pixel is read at the same time through two paths with different amplification (14 bits each) and merged into one image. Many describe its noise as grain.	14+ · 17
Sony VENICE 2	Two true base ISOs (800 and 3200 on the 8.6K sensor). The high ISO is almost as clean as the low one.	16
Sony FX6 · FX3	Two sensitivities (800 and 12,800 in S-Log3). At the high one noise rises more and a little range is lost, per Sony.	15+
Canon EOS C70	Super 35 **DGO** sensor (Dual Gain Output): two gains combined for less shadow noise.	16+

Dynamic range as stated by each manufacturer (ALEXA Mini LF 14+, ALEXA 35 17; Canon C70 in Canon Log 2). Independent tests usually measure a bit less.



Fine, even noise with very little color.

The ALEXA 35 also includes "ARRI Textures": grain and sharpness profiles that are baked into the image, including ARRIRAW, and can't be changed later. It's a look decision made with the colorist before the shoot.

Why a camera costs what it costs

It's not just resolution. It's how the sensor behaves when light is short, how many stops it holds and what kind of noise it produces. A 4K image with dirty color noise is worth less for cinema than a 4K image with fine luminance noise.

Frames from *Madre* and *La Fábrica de Bodas*, color graded by Luis Taveras. Illustrations from the video's animation. Educational simulations made on real frames, marked as such.

What the colorist does with noise

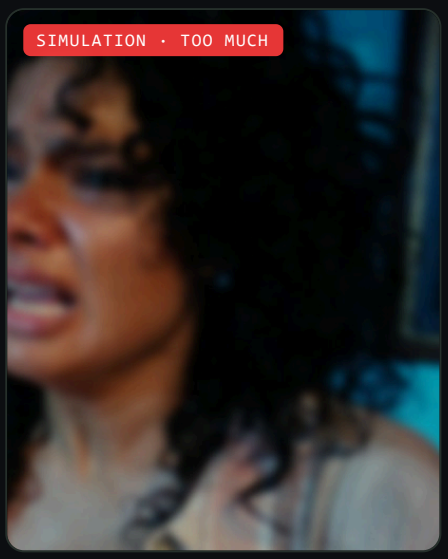
A professional colorist doesn't wipe out all the noise: skin turns waxy and the image loses life. They remove the color blotches and keep the brightness texture that makes the image feel like cinema.



Luminance + chroma.



Color gone, texture stays.



All gone: waxy skin.

In DaVinci Resolve

1. **Temporal NR first**: it compares neighboring frames and protects what moves.
2. **Then spatial** (Spatial NR) for what temporal can't reach.
3. **Unlink Luma and Chroma Threshold**: low luma to keep detail, higher chroma to remove the blotches. The Resolve manual recommends exactly this when there's more color speckling than luma noise.
4. **Limit the correction** to the shadows or the skin with a qualifier or a window if needed.
5. **Add grain on purpose** at the end, if the story calls for it.

On set: quick checklist

- [ ] **Stay at native ISO** (or the high base if your camera has two).
- [ ] **Expose properly**: don't shoot dark to "fix it later".
- [ ] **Record RAW or 10-bit 4:2:2** with light compression.
- [ ] **Turn off in-camera sharpening** and heavy in-camera noise reduction.
- [ ] **Run a low-light test** and give it to the colorist.

Frames from *Madre* and *La Fábrica de Bodas*, color graded by Luis Taveras.



Luis Taveras

COLORIST

Luis Taveras is a colorist, member of the Colorist Society International, with five feature films and more than 500 music videos. His credits include *Madre: a dos centímetros de ti*, winner of five awards at the 2025 New York Dominican Film Festival, and *La Fábrica de Bodas*, which premiered at the United Palace in New York. For him, color is the last place where a film can still change its emotion, and the skin always has to feel true.

5	500+	10
feature films	music videos	years in the craft

What I do

- Color grading for film
- Music videos
- Commercials and brands
- Cinema mastering and delivery (DCP)

Member, Colorist Society International · ID 98523302

DGCINE Film Agent · SIRECINE AC-PTA 18224

Planning your next shoot?

I'd love to collaborate with you on the color of your next project. Write to me and watch my demo reel.

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