

Video reporting on a mission using a mirrorless camera and entry-level cameras

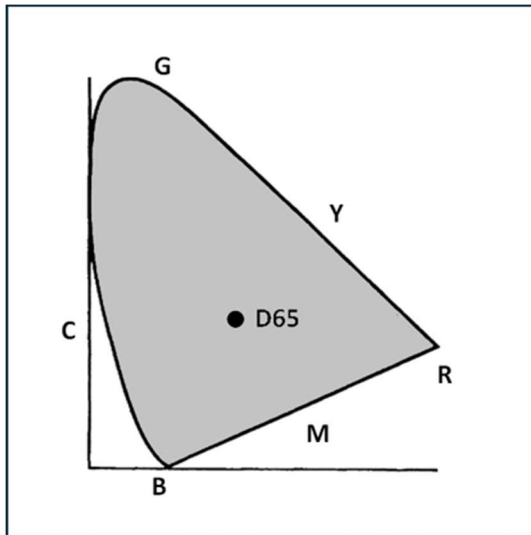
Photo and video image technology

As image specifications are concerned, here are some of them among the most overlooked or misunderstood:

- Colour spaces
- Resolution
- Aspect Ratio
- Bit depth
- Components subsampling
- Group of pictures (GOP – for video)
- High Dynamic Range (HDR)
- What is white?
- The camera sensor
- Video container and codec
- 1, 2 and 3 light setups

Colour spaces

This graph, a colour space, represents all the colours perceptible by humans (with perfect vision)

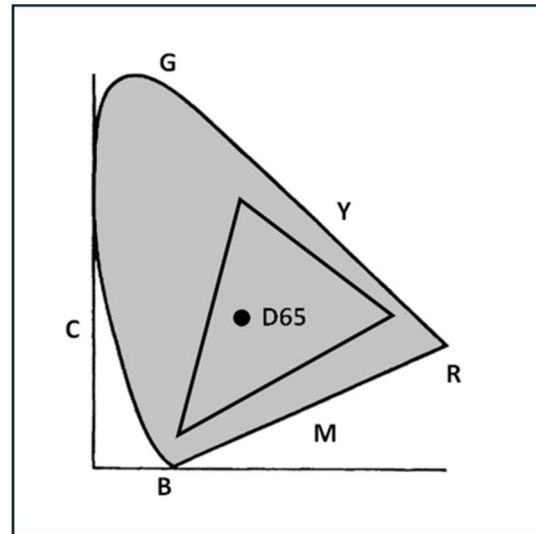


G (Green) R (Red) and B (Blue) are the primary colours, Y (Yellow), M (Magenta)

and C (Cyan) are the secondary colours. The D65 is the “reference” white.

In this graph the triangle represents the colour range in photography (sRGB) and in videography (BT.709 for FHD), which is 35.9 % of the full visible colour space.

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Aspect Ratio (AR) and Resolution

RAW and JPEG 3:2 L

24.0 megapixels (6000 x 4000)

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JPEG L 4:3

21.3 megapixels (5328 x 4000)

JPEG L 16:9

20.2 megapixels (6000 x 3368)

JPEG L 1:1

16.0 megapixels (4000 x 4000)

In Full HD video it is:

1920 x 1080, 59.94, 60 Mbps

29.97 or 23.98 fps. 30 Mbps

IPB (Standard).

YCbCr 4:2:0, 8-bit

Bit Depth

The number of bits used to represent

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colour information for a single pixel in an image.

Photography

In RAW it is 14 bits (16,384 levels)

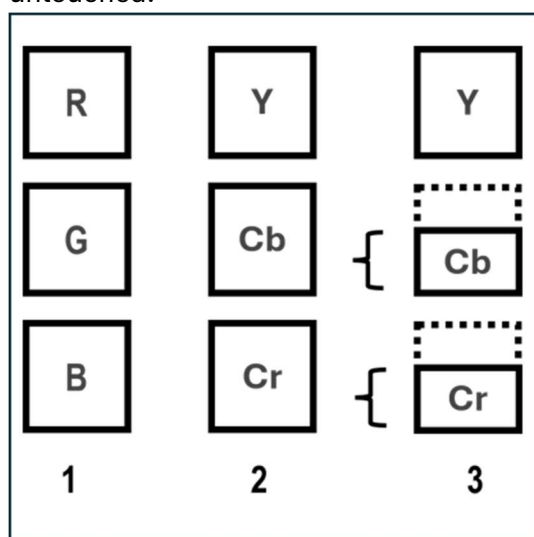
In JPEG it is 8 bits (256 levels)

Videography

In H.264/AVC it is 8 bits (256 levels)

Components subsampling

The compression technique is used to reduce file sizes and bitrate (in transport) by lowering the resolution of colour components while keeping brightness untouched.



RGB is converted in Y, Cb and Cr:

Y: The luminance (Luma), basically the image in black and white

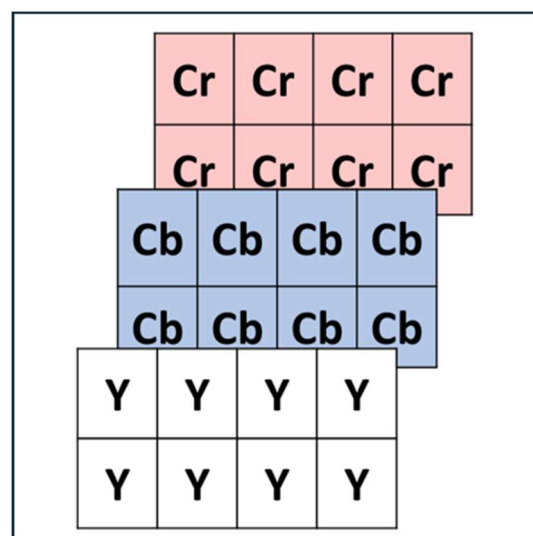
Cb: The difference between the blue colour and the luma

Cr: The difference between the red colour and the luma.

Then a process called *chroma subsampling* compresses the Cb and Cr components without damaging the perceived picture quality.

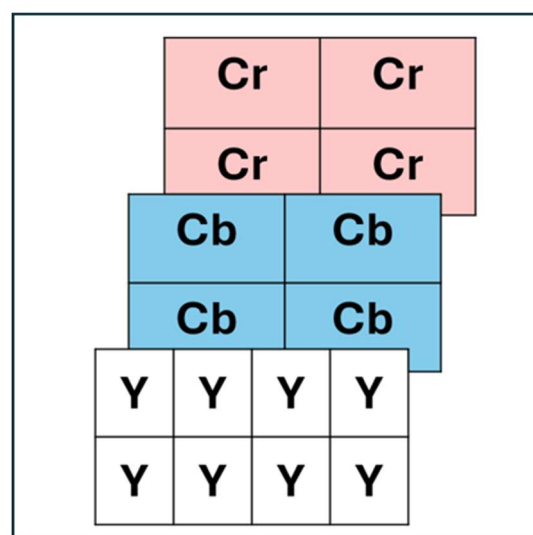
In the 3 following illustrations, there are the first 4 pixels of the first 2 lines, presenting the Y, Cb and Cr components.

4:4:4



For each Y pixel, there is a Cb and a Cr pixel.

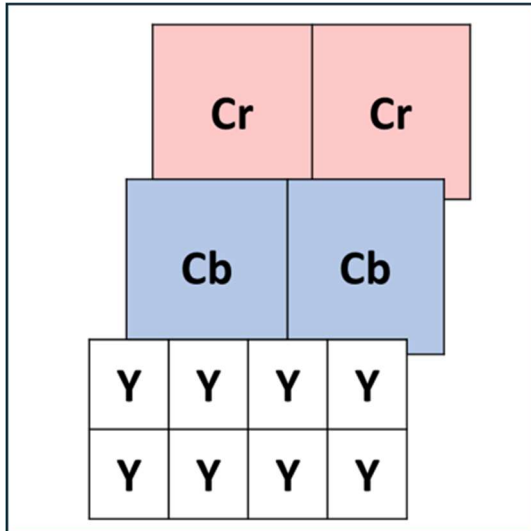
4:2:2



For every two Y pixels, there is one Cb and one Cr pixel.

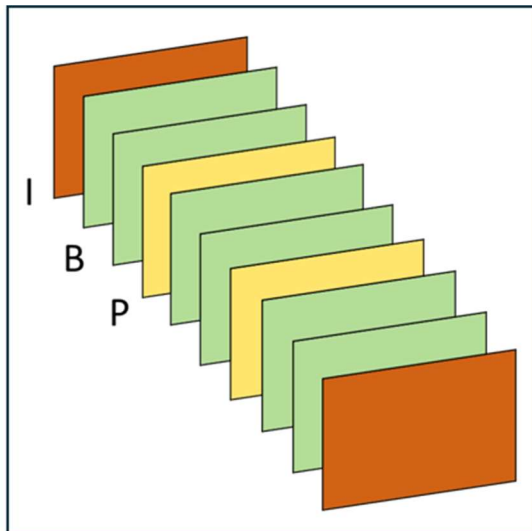
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4:2:0



For every two Y pixels, there is one Cb and one Cr pixel on the top line and no new Cb and Cr on the bottom line. All four Y pixels (2 lines) share the same Cb and Cr.

Group of pictures (GOP – for video)



A **IPB** structure of video frames in a sequence to reduce file size.

I frame: A complete standalone image.

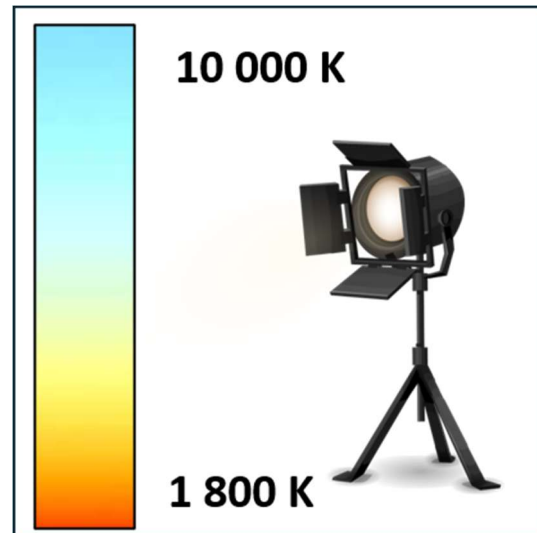
B Frame: Looks at the changes since the previous I-frame or P-frame, to save.

P Frame: Looks at both past and future frames to figure out what changed.

High Dynamic Range (HDR)

A technology used in photography and videography to present a much higher level of brightness (which we do not use, in our type of production)

What is white?



The white “quality” (or value) of a light source is measured in the Kelvin (K) metrics.

If the camera is not properly adjusted: Lower Kelvin values (as 2,800K) would look yellowish.

Higher Kelvin values (as 5,600K and up) look blueish.

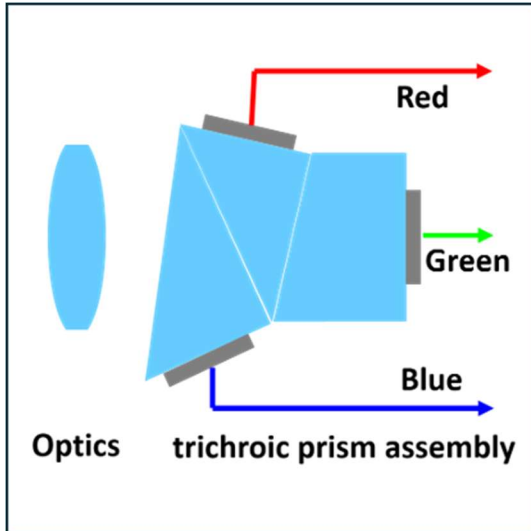
This is why; white balance has to be done properly so that white objects appear pure white and other colours look natural. This can be done manually or automatically (AWB) by the camera.

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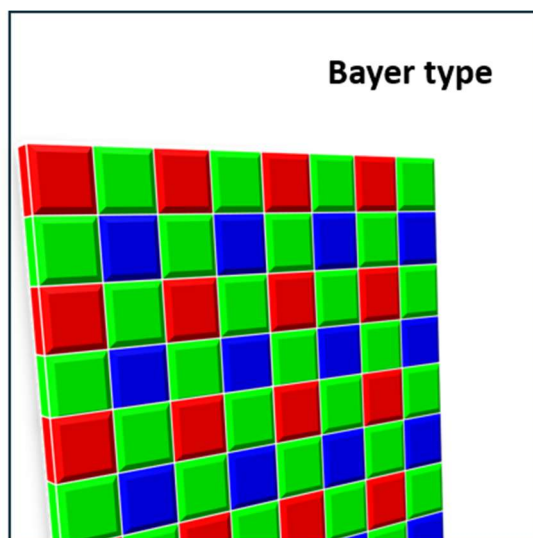
The camera sensor

The sensor has no pixels. It has photosites, capturing light and converting it them into an electrical signal.

There are 2 types of sensor systems.



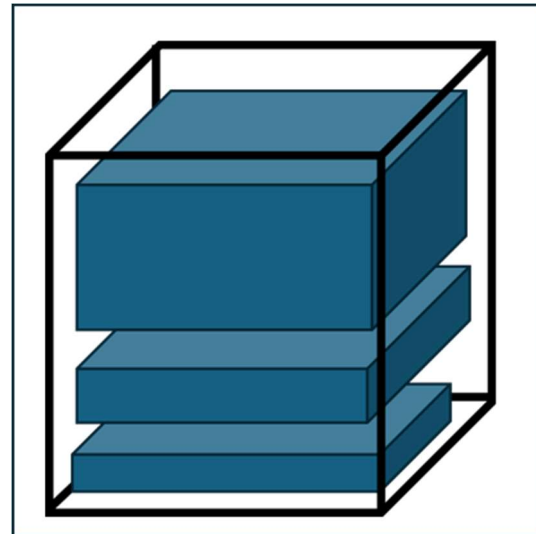
A 3 CMOS sensor (3 colours) system (as in high-end professional camcorders)



And a single sensor which we have in our mobile phones and mirrorless cameras. Four photosites (1 red, 1 blue and 2 green) are needed to produce a pixel.

Video container and codec

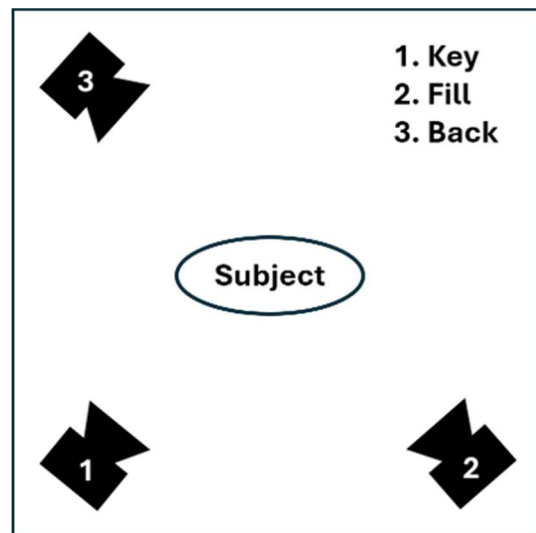
Contrary to audio and photos, video files cannot exist alone. They have to be in a container, with or without audio and metadata. The container of my mobile phone and camera is MP4.



Inside that container I have the H.264/AVC encoded video and AAC encoded audio (48 kHz, 16 bits).

1, 2, 3 light setup

This illustration is a 3-point lighting



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In this typical studio setup:

Light 1 (Key) Providing the main illumination, it is placed at a 45-degree angle to one side of the camera and slightly above the subject.

Light 2 (Fill) This lower intensity light softens shadows created by the key light.

Light 3 (Back) To separate the subject from the background and adding depth.

In our type of production, we mainly use:

Natural light and existing house lights

In situations like news reporting, we often have no choice but to work with whatever lighting there is, and the results are usually acceptable if the white balance is done correctly.

On camera light

At a short distance, for a medium close-up shot, in low light condition, this will give an acceptable result.

One light (only)

(for documentary “stand-up” work)

When possible, in low light condition, I would use a single light on a stand at a 45-degree angle to one side of the camera and slightly above the subject. For medium long shot to medium close-up shot.

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In the service of our Lord,

Pierre

Pierre Robidoux

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“... how can they believe in the one
of whom they have not heard...”

Romans 10:14