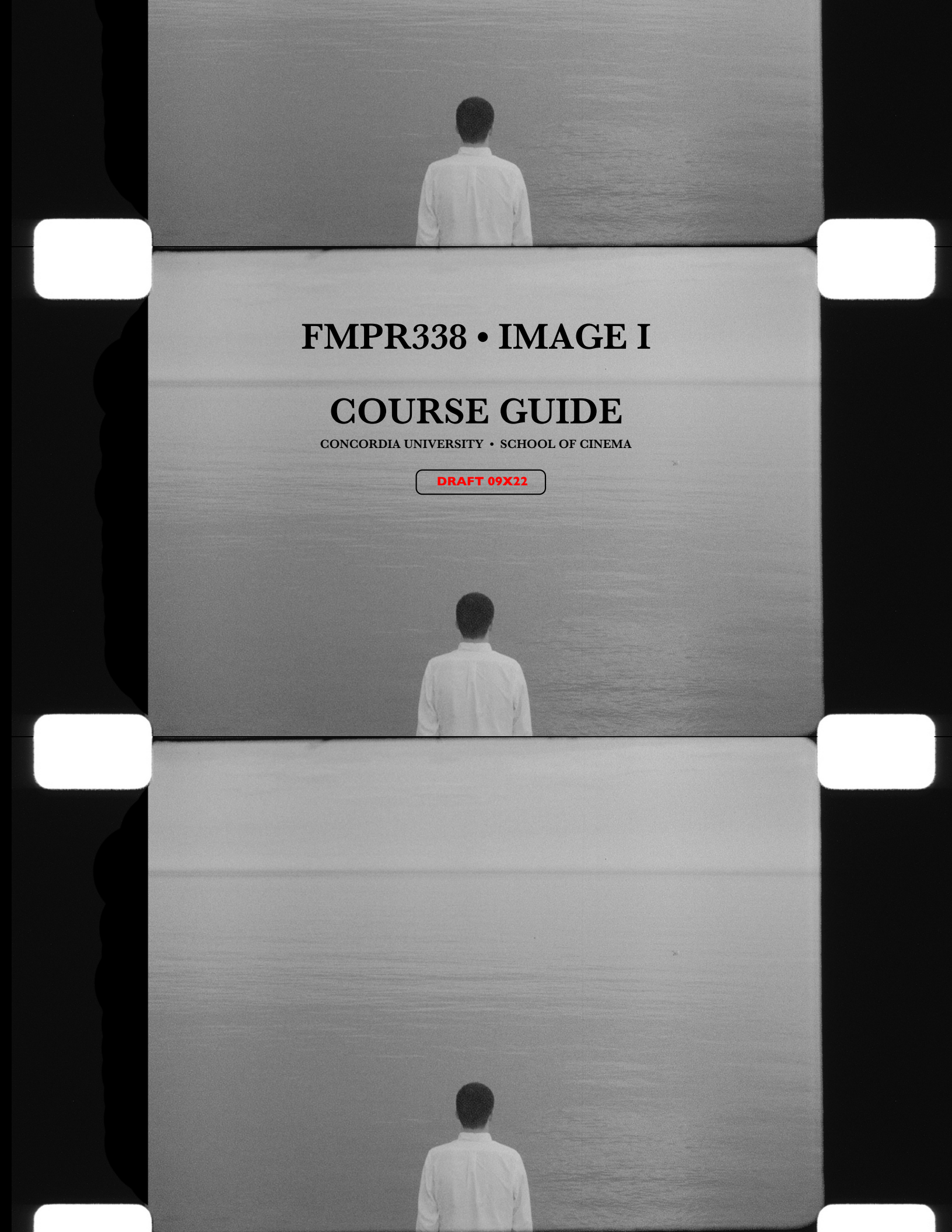




FMPR338 • IMAGE I

COURSE GUIDE

CONCORDIA UNIVERSITY • SCHOOL OF CINEMA

DRAFT 09X22

FMPR338 • IMAGE I

COURSE GUIDE

CONCORDIA UNIVERSITY • SCHOOL OF CINEMA

TABLE OF CONTENTS

INTRODUCTION	4
PREAMBLE — INTENTION	6
CHAPTER 1 — WHAT IS CINEMA MADE OF? IMAGE FORMAT	8
CHAPTER 2 — CAMERA THEORY PART I	42
CHAPTER 3 — CAMERA THEORY PART II	53
CHAPTER 4 — OPTICS	88
CHAPTER 5 — LIGHT & COLOUR	136
CHAPTER 6 — MEASURING LIGHT & EXPOSURE CONTROL	160
CHAPTER 7 — BUILDING THE IMAGE • LIGHTING STRATEGY & EQUIPMENT	204

FMPR338 • IMAGE I

COURSE GUIDE

CONCORDIA UNIVERSITY • SCHOOL OF CINEMA

TABLE OF CONTENTS

APPENDIX A — HISTORY	248
APPENDIX B — CREW SCHEMATIC	250
APPENDIX C — FMPR PRODUCTION GUIDE ‘WHO DOES WHAT’	252
APPENDIX D — TECH SCOUT NOTES SHEET & OVERHEAD SKETCH BLANKS	262
APPENDIX E — SAMPLE EQUIPMENT LIST	264
APPENDIX F — CHINA BALL INSTRUCTIONS	270
APPENDIX F — SCRIM DIAMETERS	271
REFERENCE — TEXTS & SITES (PRINT & ONLINE)	272

INTRODUCTION

The experience of seeing is the world made possible through one's eyes. This is something at once naturally simple and profoundly complex. We learn to assume that things exist in three-dimensional space. But a thing seen is only that—its image. And an image is nothing more and nothing less than energy bouncing off the surfaces of the world into our minds. Call this energy the Sun; call it light. Visual artists spend much time reminding themselves of this. The difference between what is inside and outside the mind is probably the oldest problem in philosophy—and one that we needn't get into. For those of us concerned with images the link between the outside world and one's mind—is light. Suffice it to say there are no images without light. Even the ones we 'see' in dreams are probably based on a repertoire of things observed with our eyes while awake.

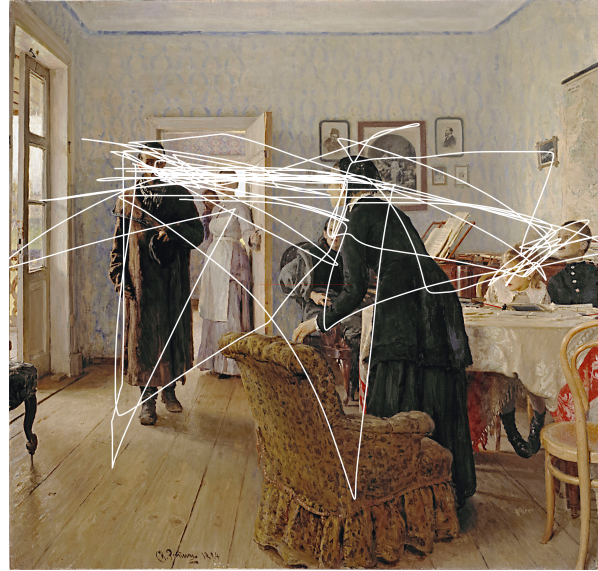
Believing is seeing. And the desire (perhaps the sacred compulsion) to recreate that which was beheld with one's own eyes (asleep or awake)—in all its apparent simplicity and mysterious power—has bewitched our kind at least since the days we dwelled near Chauvet and Altamira. To make a fleeting vision permanent, to summon reality and make it real again, this job was given to those who knew how to paint and the first permanent images were probably those made on cave-walls.

Over the millennia, a certain natural phenomenon must have been observed from time to time. When light enters an otherwise darkened space through a small opening—in Latin *apertura*—the world outside is very accurately projected on the opposite wall. It looks just like the real thing, only for some reason upside-down. First noted by philosophers in China and Greece in the 4th century BCE, it was over a thousand years later that the Arab physicist Hasan Ibn al-Haytham produced a mathematical explanation of what came to be known as the camera obscura or 'dark room' phenomenon.

And so, a camera is a room—the size of a small box as it turned out. And making permanent light's picture—fixing the imitation that appears on the inside of the room—became a quest that culminated in the invention of photography. The roots of the word are Greek: *phos* + *graphein*—light + scratch/carve/write. In Appendix A you will find a list presenting a few names and dates in the timeline of this great process in human innovation.



Abelardo Morell, [Camera Obscura](#), 1990, permission pending



After Alfred Yarbus' study of Repin's *The Unexpected*—eye movement tracking experiments

Since technology is so critical to image making it's important to consider the degree to which optical devices came to dominate our thinking about human vision. For in fact, how the world looks through a camera lens is not at all the way it looks through our eyes. Despite this difference the lens came to dictate how the world is visually perceived—in painting from as far back as the 16th century when lens optics were first used by artists—in photography and then in cinema.

One could say photography is what happened, cinema is what happens next. The technical roots of cinema are found in the photograph. The smallest functional unit of cinema is the frame. Frames are nothing more than photographs or stills. But like 'phonemes'—the smallest units of language—they might not tell you that much on their own. Photography represents a space—cinema moves through it. And it can only move through space by engaging with time.

One definition of cinema is 'light plus time'. And while time naturally plays its role in the photograph—a still image may even be experienced as a kind of cinema, an instant that demands to be read detail by detail, the eye tracing the surface—one embarks into cinematic time in a way not possible with photography.

The course is something more than an introduction to basic cinematography. It is about the choices available to the cinema artist and the tools used to make those choices. It is meant to introduce students to first principles and techniques with the aim of facilitating the development of essential technical knowledge that serves creative ends—the sacred (and profane) compulsion to make images. In other words, while technology is at the heart of the course, the desired outcome is for students to feel creatively liberated and confident in using the tools of cinema, acquiring the critical vocabulary and understanding to analyze work and to express an artistic vision through the common albeit specialized language of cinema production.

The amount of information that exists about cinema technology is enormous. One continues learning long after leaving school. This guide is intended to focus on essentials: as a starting point and a reference. Throughout the guide are links to examples of the applied techniques and the technologies discussed. In addition, please consult the appendices for more DRAFT 09X22 film production information, tools, apps, useful online resources and an extensive reading list for further study. Please consult the table of contents.

Michael Yaroshevsky

PREAMBLE: INTENTION

There are different paths to creating cinema. Some follow traditional processes from script to screen, others engage with a subject in a manner favouring more intuitive and unconventional methods. The aim of this course is to focus on specific technical parameters that any cineaste—and any student of cinema—would confront during a project.

By cineaste we mean ‘filmmaker’ (digital or otherwise) and in this course we assume that it is the person in charge of the image. Officially that’s the cinematographer (interpreting the director’s ideas with the help of a number of department heads); however, anyone who picks up a cinema making device is by default in the realm of the cinematographer and should approach the process with certain questions in mind.*

After reading a script or a treatment, or simply having the impulse to make something visible—we begin discussing the subject and responding to the characters and shape of the story—its time and ethos—or the nature of the thing that will be visualized.

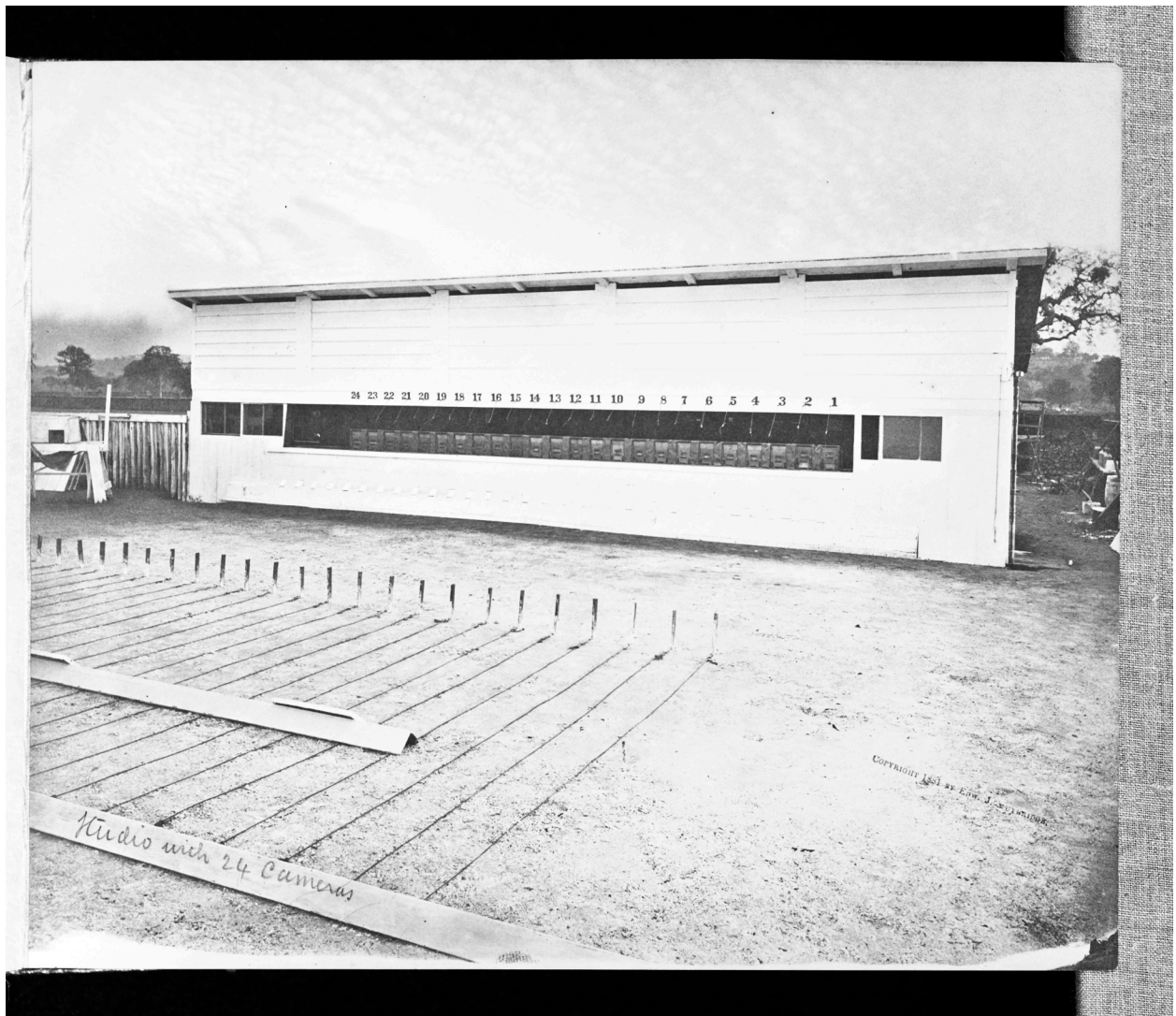
We begin intuitively and are faced with certain questions. The answers to these questions are controlled by poetics, intuition, ideals of artistic vision, practical circumstances and hard economic realities.

IS THERE AN IDEAL MEDIUM? (Digital? Film? Analogue Video? Zootrope?)
 IS THERE AN IDEAL IMAGE FORMAT? (Which aspect ratio?)
 WILL THE CAMERA BE MOVING? HOW WILL IT BE MOVING?
 WILL THERE BE CHANGES IN FRAME-RATE OR OTHER ESSENTIAL EFFECTS?
 WHAT IS THE RESOLUTION FORMAT? (SD, HD, 2K, 4K, 8K...?)
 WHAT CAMERA IS BEST SUITED FOR THE PROJECT?
 WHERE & HOW WILL THE WORK BE SHOWN?
 WHAT IS THE DATA FORMAT? CODEC, CONTAINER, DATA RATE, BIT-DEPTH, ETC.
 WHICH ISO WILL BE USED?
 WHAT IS THE PREFERRED F-STOP?
 HOW WILL THE LIGHTING EVOLVE THROUGHOUT THE WORK?
 WHAT IS THE COLOUR PALETTE & DOES IT CHANGE THROUGHOUT THE WORK?
 IS THERE AN IDEAL LEVEL OF CONTRAST & SATURATION?
 WHAT ARE THE BEST REFERENCES TO USE IN ORDER TO COMMUNICATE THE VISION?
 WHAT LIGHTING EQUIPMENT WILL BE NEEDED?
 WHAT GRIPPING EQUIPMENT WILL BE NEEDED?
 WHAT ARE THE DELIVERABLES?

*One may not bother with any of the above and simply grab the nearest motion-picture device, press the button and go. This is not altogether a bad idea, though there is an old saying attributed to Pasteur: *La chance ne sourit qu’aux esprits bien préparés*.¹ One should never let technology get in the way of creative flow, but to be creatively free, one needs to understand the available tools.

There are many decisions to be taken in the production of cinema—this guide aims to help make a few of them.

¹ “Chance favours the prepared mind”.

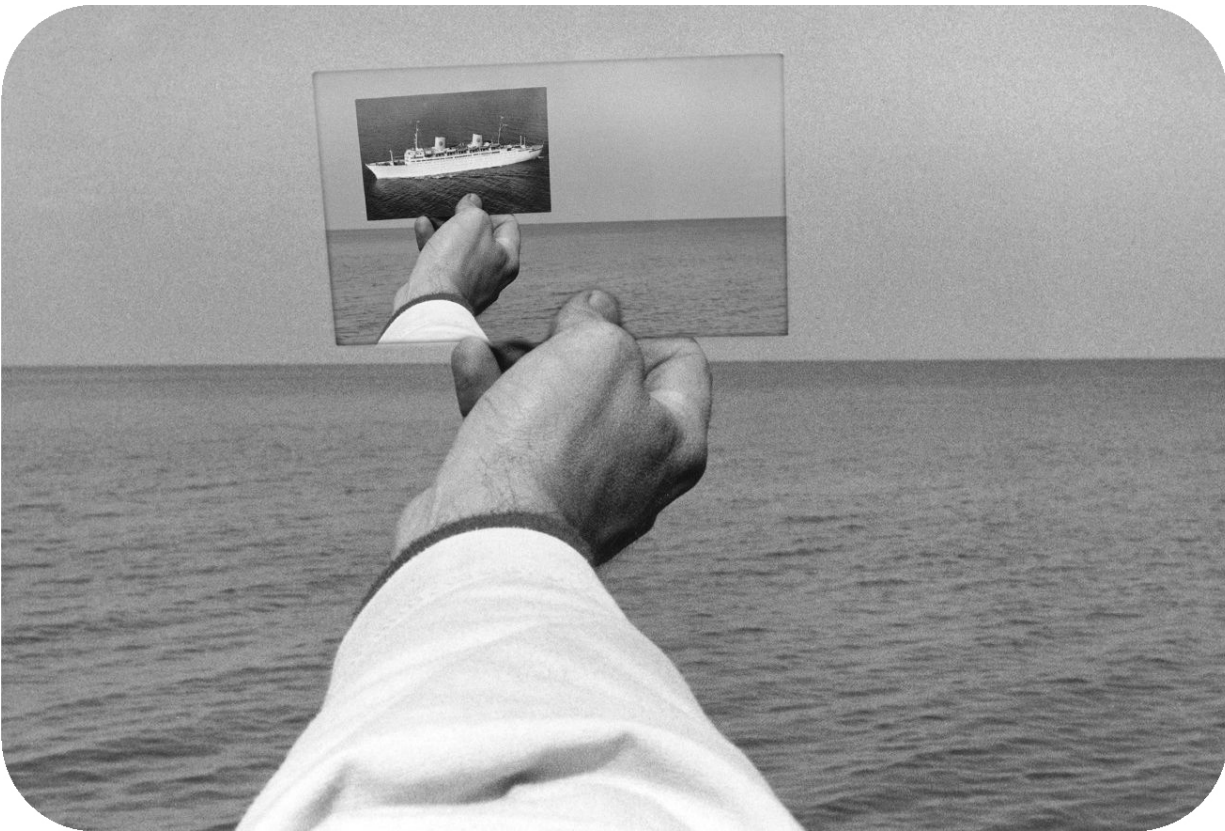


Eadweard J. Muybridge, Studio with 24 Cameras, 1881
Digital Image courtesy of Getty Open Content

CHAPTER 1

WHAT IS CINEMA MADE OF?

FORMAT



An adaptation of an image by Kenneth Josephson

“Formal values have an inherent emotional, symbolic and moral weight.”
Jed Perl

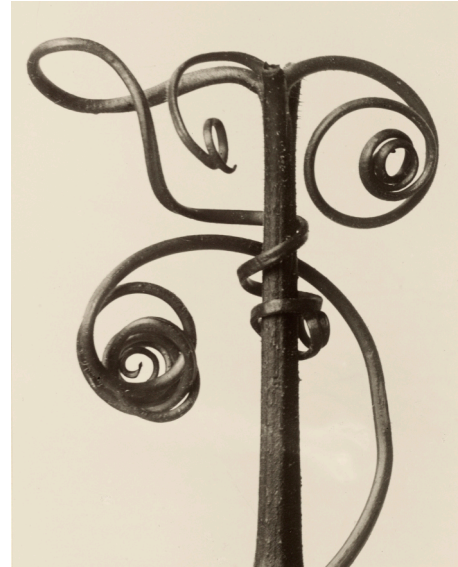
“Art is not only about something; it is something.”
Susan Sontag

“Style is inherent in process.”
Chuck Close

ASPECT RATIO OF FRAMES & SENSORS—WINDOWS ON THE WORLD

Everything visible has dimension —or an aspect ratio.

Francis Frith, Among the Pyramids of Gizeh, albumen silver print, 1857



Karl Blossfeldt, Cucurbita, gelatin silver print, 1928

Images courtesy of Getty Open Content



Bourges Cathedral, Image courtesy of Getty Open Content

For reasons interesting to consider the cinema frame is almost always rectilinear. In other words, it has an inherently squarish shape. Our understanding of structure is deeply rooted in the age-old principle of the post and lintel. And the connection between architecture and images is fascinating. One has to appreciate that the first image surfaces were linked to the spaces they occupied, be that ceremonial walls, masks, vessels-containers, or surfaces in sacred buildings.

Most pictures are rectilinear—as are most windows. The first and most important thing to consider about either are the dimensions. For the image-frame we define this as a ratio of its height to its width. A square has a 1:1 ratio—it's as high as it is wide. A rectangle that is one and a half times as wide as it is high, e.g., 36mm x 24mm, would have an aspect ratio of 1:1.5.

We filmmakers would just say “one point five”.

What choice does the cineaste have in selecting their ‘window on the world’? Like many things in cinema, these are governed by standards and conventions. The common aspect ratios in cinema are as follows:

1.33—1.37—1.66—1.78—1.85—1.9—2.4

Viewing Assignment:

Video Essay by Joost Broeren & Sander Spies
<https://vimeo.com/140062696>

DO FORMAL VALUES HAVE ANY VALUE?

Why choose one aspect ratio over another?

Why choose any 'formal' value over another?

Mostly it's artistic intuition and vision. These two key forces are then confronted by merciless circumstances—one is obliged to work with what is at hand, what production deems expedient, or what distributors impose. Let's assume there is an ideal form for the subject. Are there criteria?

On its own, any formal value of a work is an empty container. The format is where framing occurs and framing is like tuning in music—it needs to be exact. The frame format—like all the 'formal' parameters of a cinema-work, e.g., field-of-view, depth-of-field, subject presence/mass, balance of screen space, balance of stasis/dynamism, contrast, hue, saturation, etc.—is like an envelope. Every artistic process is ultimately about the creator making a choice—a process of selection. These choices sometimes come about unconsciously, sometimes accidentally—the children of intuition and circumstance. Nevertheless, deciding on what the most-appropriate (the most 'just') format suitable for that which you wish to visualize is one of the first decisions to make. It's another age-old question in aesthetics: at what point does the content of the work begin erasing its formal structure? How can content exist without a formal structure? Is one more ideal than another?



1.33



1.37



1.66



1.78



1.85



2.4

FORMATS IN TRADITIONAL ANALOGUE PHOTOGRAPHY

Before examining the fundamentals of image format we should note that in analogue photography there are a number of existing 'legacy' formats that are still in use. It's useful to know their names and shapes.

The most common are 135, 120 and Large Format photography.

"135" is the official name of the familiar 35mm stills format. Each photo-frame is 36mm wide x 24mm high. If we divide 36 by 24 we get an aspect ratio of 1.5 Further on, we'll see that it's an important size/format for contemporary digital cinema.



Stanley Kubrick, self-portrait, 1954 (Phaidon, rights pending)

"120" is the official name of medium format stills. (6cm x 6cm) (1:1)



Vivian Maier, self-portrait, 1954 (Maier/Maloof Collection, rights pending)

Large format photography is anything larger than 4 x 5 inches (shown here not to scale)



Shawn Augustson, 4x5 self-portrait, (courtesy of the artist)

Images not to relative scale

ANALOGUE FORMATS IN CINEMA

There are still the following formats being used in film production:

Super 8mm
16mm
35mm
65mm

Digital sensors are often advertised as being “Super 35”. What does this mean?

Canon CINEMA EOS CAMERA LINEUP

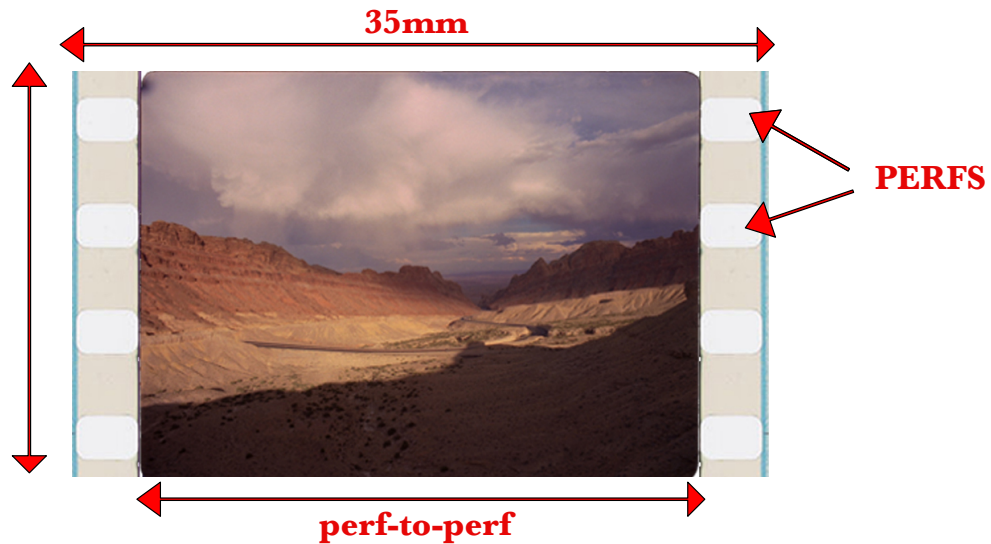
	EOS-1D ^{CS}	EOS C100	EOS C300	EOS C500
Sensor Size / Area Utilized	Full frame 24x36mm (HD), APS-H (4K), S35 (HD)	Super-35mm	Super-35mm	Super-35mm
Lens Mount	EF	EF	EF or PL	EF or PL
Recording Capabilities	Video / Canon Log	Video / Canon Log	Video / Canon Log	Video, Log, RAW
Internal Recording Resolution	Full HD, 4K	Full HD	Full HD	Full HD
Internal Codec	4K: Motion JPEG (8-bit, 4:2:2) HD: H.264 (8-bit 4:2:0)	AVCHD (24Mbps 4:2:0)	Canon XF (50Mbps 4:2:2)	Canon XF (50Mbps 4:2:2)
Max Progressive FPS	24fps (4K) 60fps (1920 x 1080)	30fps (1280 x 720) 30fps (1920 x 1080)	60fps (1280 x 720) 30fps (1920 x 1080)	60fps (4K RAW) 120fps (4K Half-RAW, 2K YCbCr)
Output Resolution	Full HD (8-bit 4:2:2)	Full HD (8-bit 4:2:2)	Full HD (8-bit 4:2:2)	HD / 2K (12-bit RGB 4:4:4) HD / 2K (10-bit RGB 4:4:4) HD / 2K (10-bit YCbCr 4:2:2) 4K RAW (DCI or Quad HD)
HD Outputs	HDMI	HDMI	SDI, HDMI	Dual 3G SDI, Dual HD-SDI, HDMI
TC In / Out	Embedded via HDMI	Embedded via HDMI	Yes, User Switchable In / Out	Yes, In & Out
Media	Two Compact Flash Cards	Two SDHC or SDXC	Two Compact Flash Cards	Two Compact Flash Cards
Battery	LP-E4	Canon BP	Canon BP	Canon BP
Weight	TBA	2.2 lbs	3.2 lbs	4 lbs
List Price	\$15,000	\$7,999	\$20,000	\$30,000
Primary Applications	Indie Features, B Camera	Documentaries, Run & Gun	Documentaries, Indie Features, Run & Gun	Features, VFX, 3D

www.abelcine.com

WHAT IS SO SUPER ABOUT SUPER 35?

The standard size of motion picture film was patented by Edison in 1892; it has been used ever since.

Despite a multitude of competing technologies during the first years of cinema's existence it was decided that a standard movie-frame would be 35mm wide and 4-perforations high.



Frames however are not 'hidden' in the film every 4 perforations. There are in fact no frames on a strip of film—it's one continuous surface of light sensitive emulsion. The size and shape of a frame is determined exclusively by a film camera's GATE. A lens focusses images into the gate. The gate delineates the shape of the frame on the "in-camera" negative. The maximum space that may be used to create an image on the standard 35mm film frame is the area between the perforations (or "perfs"). That is why this format is called *4-perf Super 35 (S35)* (this is presented more fully below).¹

It's useful to realize that photographic film used in a traditional stills camera (135 still format) is virtually identical to motion-picture 35mm film.² Also, that along with landing on the moon and microchips, it's among the most impressive feats of engineering. On the surface of film are light sensitive layers of chemistry known as "EMULSION", 1/1000th the thickness of a human hair. The emulsion is coated onto transparent plastic filmstock. The critical component of emulsion is silver.

Follow-up Reading:

FILM STRUCTURE

<https://www.kodak.com/content/products-brochures/Film/kodak-essential-reference-guide-for-filmmakers.pdf> (pp 29-32)

FILM TYPES & FORMATS

<https://www.kodak.com/content/products-brochures/Film/kodak-essential-reference-guide-for-filmmakers.pdf> (pp 36-44)

Viewing Assignment:

The IMAX of the 1890s

<https://www.youtube.com/watch?v=BBNwiPgknn8>

¹ Most digital sensors that are advertised as Super 35 are based on a film format size of only 3-perforations high (3-perf S35).

² In fact, cinematographers have been known to take about a 6 foot piece of filmstock and load it into a stills camera for testing (6 feet being about 36 exposures). The only difference is that (1) stills film travels horizontally with the perforations at the top and bottom (some cinema-cameras do, too, but most expose the film vertically with the perfs side to side) and (2) cinema film has one additional layer of chemistry called 'Remjet' which is a black backing that needs to be removed before processing.

THE GATE

The gate is the window between the world and a strip of light-sensitive film. We still refer to the gate in digital cameras—the sensor can be thought of as occupying the space of the gate.

A series of *35mm in-camera film gates* with different aspect ratios for ‘hard-matting’ the negative in a particular format.

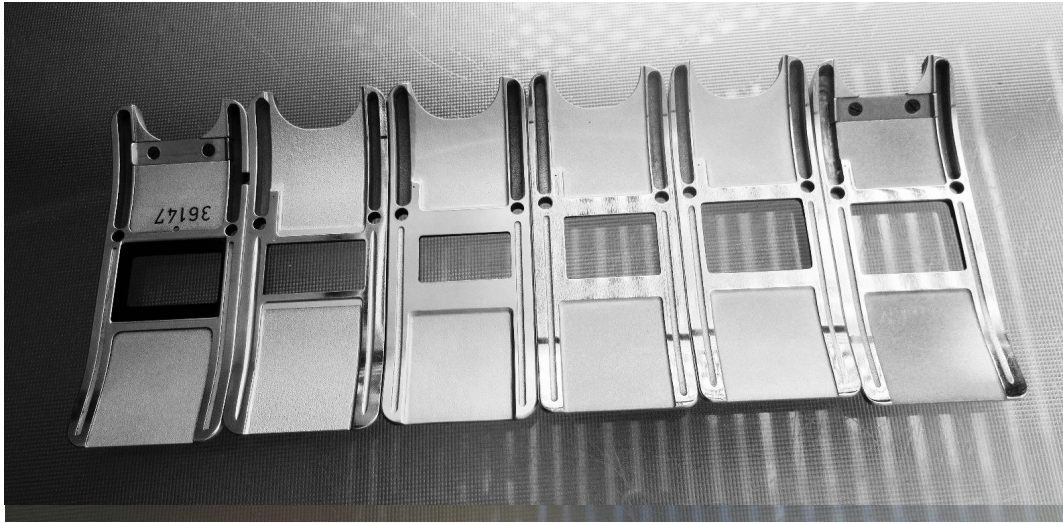


Image courtesy of Asherphoto2007

A series of *35mm projection gates*—inserted by a projectionist during the traditional screening of a film print—if the print was not ‘hard-matted’ to a specific aspect ratio.



THE EXPOSED FRAME—THE NEGATIVE

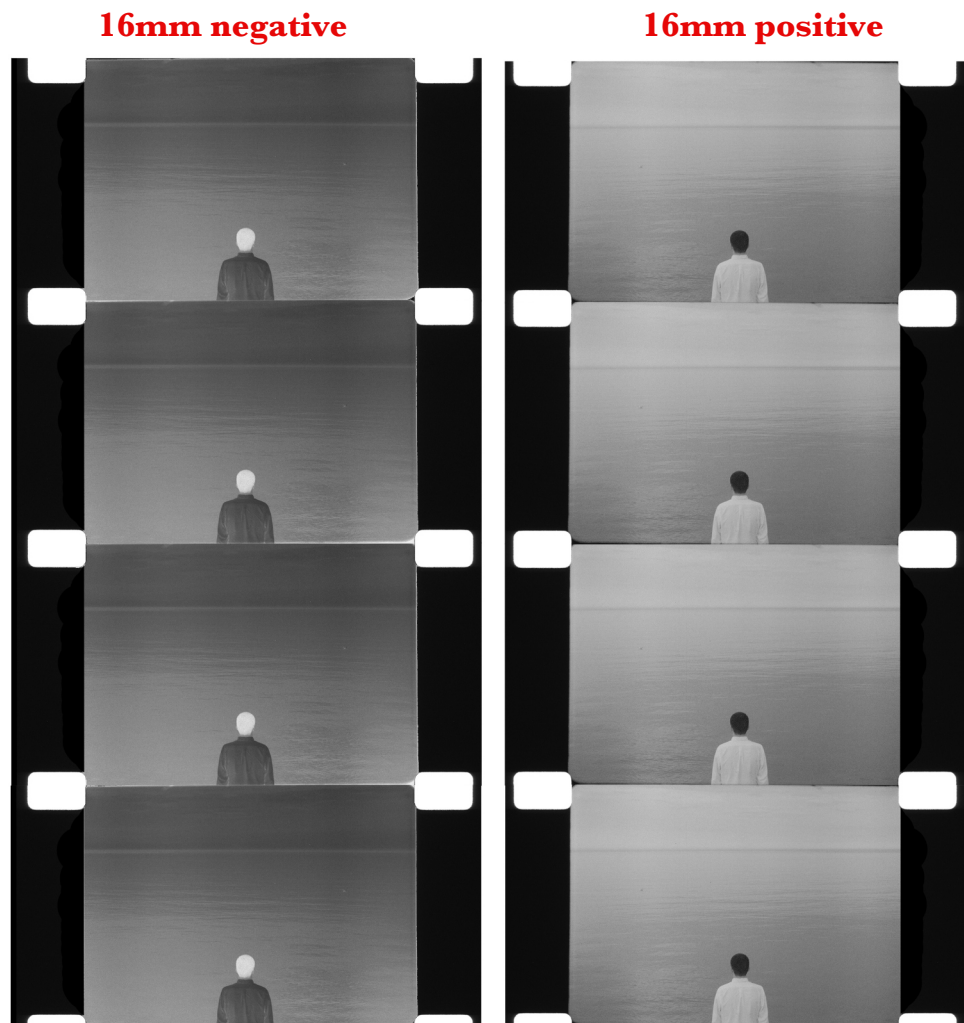
For the digital filmmaker, it's useful to have a understanding of the basic principle of the photochemical negative and positive.

To take a relatively simplified example of black and white photochemistry, once light energy bounces off the world and passes through a camera's gate, it strikes the emulsion and produces an "EXPOSED FRAME". Once the emulsion is developed and processed through a series of chemical baths in a laboratory, a "NEGATIVE IMAGE" is formed on the frame. This image is literally made of silver metal in extraordinarily fine layers. It is a negative image on the principle that wherever light was present metallic silver was fixed. Wherever there was no light striking the emulsion there would be no accumulation of silver. In fact, an area of darkness or black in a scene reflects no light into the lens/gate, so the area on the negative frame would be transparent plastic film (such as the back of the man's head in the image below).

To make the image resemble the normal contrast pattern (on the right) of the scene one would "re-photograph" the negative through a machine called a Printer.

A "PRINT"—is a negative of a negative, or "Positive".

And a POSITIVE PRINT is that which was traditionally viewed through a projector in a movie theatre.



1.33

4-PERF SUPER 35mm has an aspect ratio of 1.33. It is also known as Full Gate.

Given that it was the format of the Silent Film era, it's sometimes still called Silent Aperture.

Its concentrated quadrilateral envelope has made it a favourite format of contemporary filmmakers. The “Super” indicates that the gate is allowing the maximum space on the filmstock to be used from perf-to-perf.



Xavier Dolan: *Laurence Anyways*

Andrea Arnold: *Fish Tank*

Gus Van Sant: *Elephant*

1.37

ACADEMY APERTURE (1.37 or 4:3)

With the advent of synchronous sound, the standard picture area on a frame had to be adjusted to accommodate the optical sound area running along the filmstrip (the area into which SUPER 35 records image information). In 1932, the Academy of Motion Picture Arts and Sciences (AMPAS) decided on the 1.37 aspect ratio to accommodate the sound strip area—and this format is still called “Academy” today.



Hitchcock: *The Wrong Man*

Bergman: *Persona*

Ron Rice: *The Flower Thief*

Wes Andersen: *The Grand Budapest Hotel* (1930s scenes)

3-PERF SUPER 35mm (1.78 or 16:9)

As it turns out, shooting Super 35mm (perf-to-perf) but forming the frames only 3 perforations high (instead of the usual 4) means having an aspect ratio 1.78. This is the familiar 16:9 (divide 16 by 9 and you get 1.78).¹ Shooting in 3-PERF SUPER 35 has an economic advantage in a production using filmstock.

Due to the aspect ratio being the same as HDTV 16:9— it's the format of many digital cameras and the reason why they are advertised as having a "Super 35" sensor.



Mad Men (S 1-4)

True Detective (S1)

Two and a Half Men (TV Series)

The Coen Brothers: *Hail, Caesar* (1.78 native framed for 1.85)

2-PERF 35mm "TECHNISCOPE" (2.33/2.4)

Now imagine making the 35mm frame only 2-perfs high. This provides a wide rectangular frame that looks like a 'Scope' film but without the necessity of using anamorphic optics (see below). First used in the 1960s this cost-saving format is still available on certain film cameras. Also known as "Poor Man's Cinemascope".



Leone : *The Good, The Bad and the Ugly*

Jodorowsky: *The Holy Mountain*

Godard: *Pierrot le Fou*

Steve McQueen: *Hunger*

¹Anticipating the advent of HDTV in people's homes, 16:9 was a format developed by a member of the Society of Motion Picture & Television Engineers (SMPTE). It is the geometric mean of Academy 1.37 and 2.4 (anamorphic widescreen or Scope—see below). This meant having a format for screening films of different aspect ratios on television and having the best compromise for the inevitable cropping of the original image.

1.66

FLAT-WIDESCREEN 35mm EUROPEAN STANDARD (1.66)

Widescreen images made with regular 'spherical' lenses. This format is achieved by masking the frame with a 'projection gate' during the showing of the film. Or by hard-matting the format on the print itself (as in the example shown). Note that the operator would 'compose' the image for a 1.66 frame. She would see the limits of the 1.66 format by using frame-guides on the ground-glass in the camera's viewfinder (see page 33). This ground-glass could be changed depending on what format the operator was framing.

Stevens: *Shane*

Barbara Loden: *Wanda*

Stanley Kubrick: *Barry Lyndon*

Bergman: *Fanny and Alexander*

Noah Baumbach: *Marriage Story*



1.85

FLAT-WIDESCREEN 35mm AMERICAN STANDARD (1.85)

One of the most common and preferred formats of the greatest age of cinema—the 1970s. As with 1.66, it is achieved by cropping the Academy image during post-production or projection. In the example below the print has been ‘hard-matted’ to the 1.85 aspect ratio.

Scorsese: *Taxi Driver*; *Raging Bull*; *Goodfellas*

Coppola: *Godfather*

Lumet: *Serpico*



SCOPE

ANAMORPHIC WIDESCREEN —(2.4) COMMONLY KNOWN AS CINEMASCOPE (OR “SCOPE”).

In the early 1950s, in order to compete with the popularity of television, film studios dusted off a forgotten lens technology that had been around since the early days of cinema and offered the movie-going public the spectacle of a truly wide-screen image nearly two and half time as wide as it was tall. True cinemascope, a process that uses anamorphic optics (as opposed to Techniscope using regular spherical optics and just cropping the image) has had a great resurgence over the last decade and today it seems to be the format of arguably every other feature film produced. Anamorphic uses the full height of the 35mm frame and is slightly bigger than the Academy frame.



Anamorphic optically squeezes the image during filming.
This will be covered in-depth during CHAPTER 5 Optics.



8-PERF VISTA-VISION (HORIZONTAL 35mm)
 (1.5—from which other aspect ratios may be extracted).)

Film normally travels vertically through a camera. Certain cameras allow film to travel horizontally. Initially this was done to produce a larger negative that would then undergo optical processes for traditional special effects. Sometimes referred to as “Lazy 8”. The VistaVision frame is essentially identical to a 135 format 35mm still frame.

Hitchcock:

Vertigo

To Catch a Thief

North by Northwest

were all shot in VistaVision 1.5 and finished as 1.85.

In digital cinema, this format is being adapted by camera manufacturers that are producing “LARGE FORMAT” digital sensors which are essentially the size of the 135 stills format.



A VistaVision camera

SUPER 16mm & REGULAR 16mm

Super 16mm (1.66)

Regular 16mm has an Academy format (1.37)

Introduced by Kodak in 1923, 16mm remains a format that is relatively less expensive than 35mm.

**SUPER 16mm
(1 perf or “1R”)**



**REGULAR 16mm
(1 perf or “1R”)**

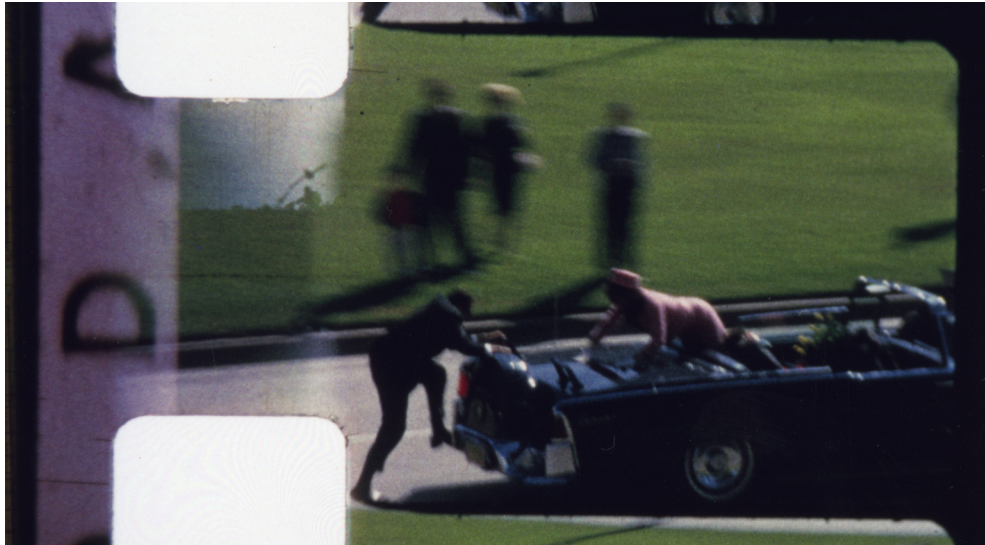


**REGULAR 16mm
(2 perf or “2R”)**



Regular 8mm (1.33)
Introduced in 1935.

v



Zapruder Film © 1967 (Renewed 1995) The Sixth Floor Museum at Dealey Plaza (used with permission)

Super 8mm (1.33)
Introduced 1965



HD (1.78/16:9)

1.78 is the most common standard for web-distribution and television broadcast. Many series originate on film with operators framing for 1.78.

TV SERIES:

Orange is the New Black
 Breaking Bad
 Big Little Lies

OTHER FORMATS

The history of film formats is a long one and there are others to investigate.

65mm

(5-PERF) (2.20)

Often referred to as 70mm (the negative is in fact 65mm wide but when printed the additional soundtrack area increased the width by 2.5mm on each side, hence 70mm).

with numerous variations:

MGM 65 (2.76)

Ultrapanavision 70 (2.20) — resurrected by Quentin Tarantino for the production of *Hateful Eight*

Lean: *Lawrence of Arabia*

Anderson: *The Master* (shot in 65mm (2.20)—framed for 1.85)

IMAX

(15-PERF) (1.44)

65mm that runs horizontally through the camera—cf. to 35mm VistaVision/

Nolan: *Dunkirk*

NON-STANDARD FORMATS

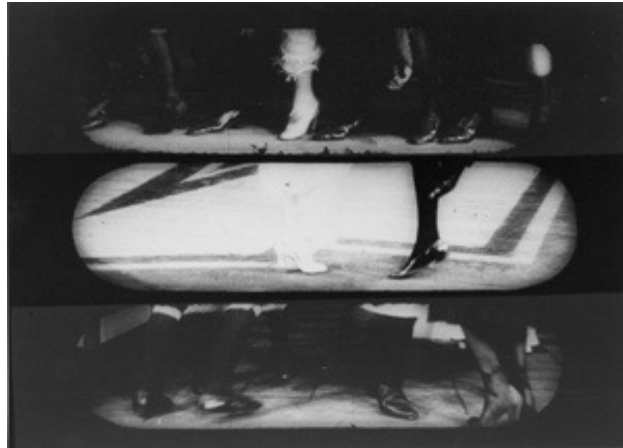
Lubitsch: *Die Austernprinzessin* (sequences with unusual optical formats)

Abel Gance: *Napoléon* (3 x 1.33 = 4:1)

Xavier Dolan: *Mommy* (1:1—Square format mixed)

Tacita Dean : *Film Tate Installation* (vertical anamorphic & custom formats)

Robert Eggers: *The Lighthouse* (1.19)



Die Austernprinzessin, dir. Ernst Lubitsch; dp: Theodor Sparkuhl (1919),



The Lighthouse, dir. Robert Eggers; dp. Jarin Blaschke, 2019



Film (installation projection), dir. Tacita Dean; dp. John Adderley, 2011

DIGITAL PROJECTION STANDARDS

As we'll see later in the course, the aspect ratios of films projected digitally follow a set of standards imposed by the [Digital Cinema Initiatives \(DCI\)](#).

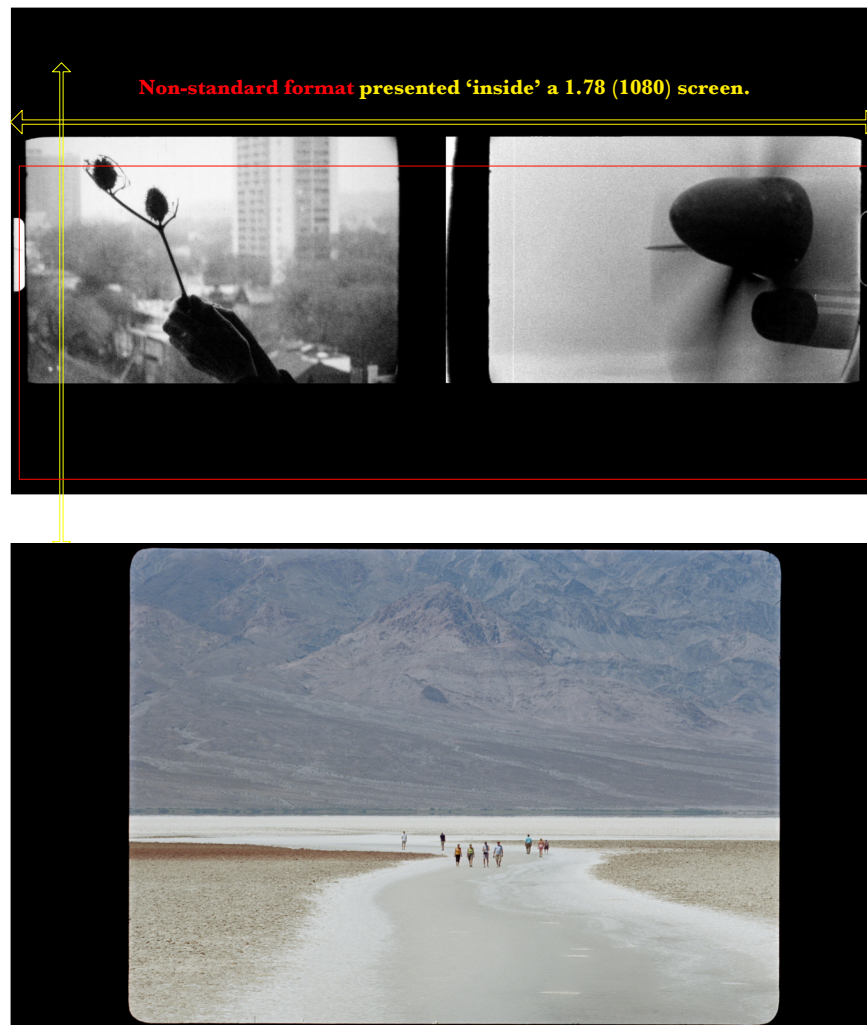
The aspect ratios deemed acceptable are as follows:

- 1.78 HD (HD DCP 1920 x 1080)
- 1.85 Flat widescreen (a 2K DCP Finishing Standard: 1998 x 1080)
- 2.4 Scope (a 2K DCP Finishing Standard: 2048 x 858)
- 1.9 Full Container (a 2K DCP Finishing Standard 2048 x 1080)

These apply to both 2K and 4K projection systems.

NON-STANDARD ASPECT RATIOS

Any other aspect ratios must be 'nested' within one of the standards—in which case there will be either letter-boxing (blackened out screen above and below the image) or pillar-boxing (blackened out screen on the sides of the image).



ASPECT RATIO & CREATIVE INTENT

When viewing a film one should always question whether the originally intended aspect ratio—and the creator's visual intentions—are being respected.

Stills from Welles' *Touch of Evil* (1958).

Original in 1.37 & reformatted for 1.85



From Kyle Westphal: [Invasion of the Aspect Ratios](#), *Chicago Film Society*