

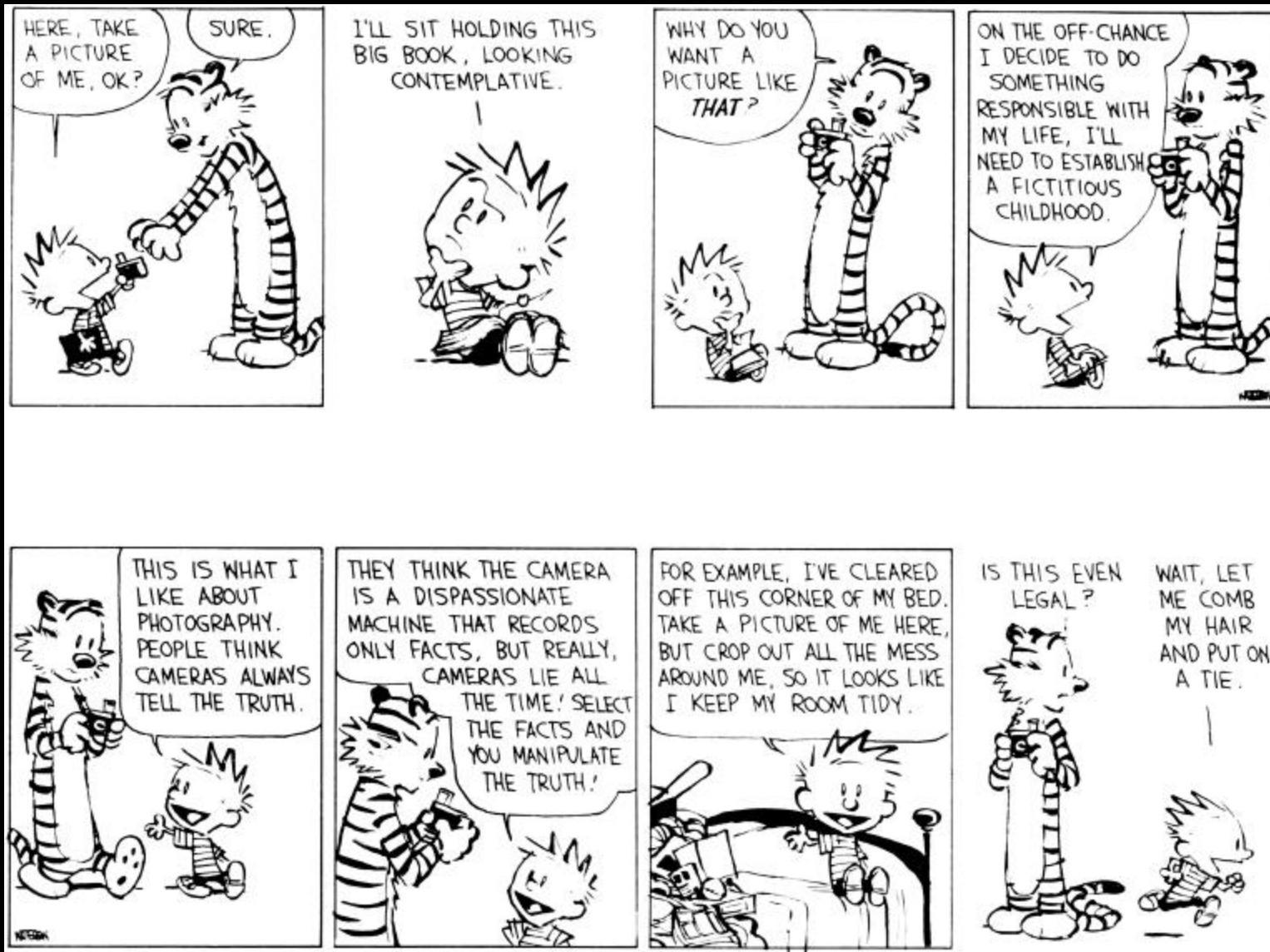
The Art and Science of Depiction

*There Is No
Passive Recording*

Frédo Durand and Julie Dorsey

MIT- Lab for Computer Science

There is no Passive Recording



Introduction

- The quest for realism
 - Since the Greeks
 - Renaissance
 - Photography
 - Computer Graphics
- The myth of the naked eye
- Is there a perfect realism?
- Degrees of freedom of photography

Overview

- Show all the controls of photography
- Raise issues, install doubt about realism
- We will revisit these points through the class

Plan

- Snapshot
- Perspective
- Speed and aperture
- Filter
- Lighting
- Processing and Print
- Make-up
- Retouching

- Discussion

Snapshot

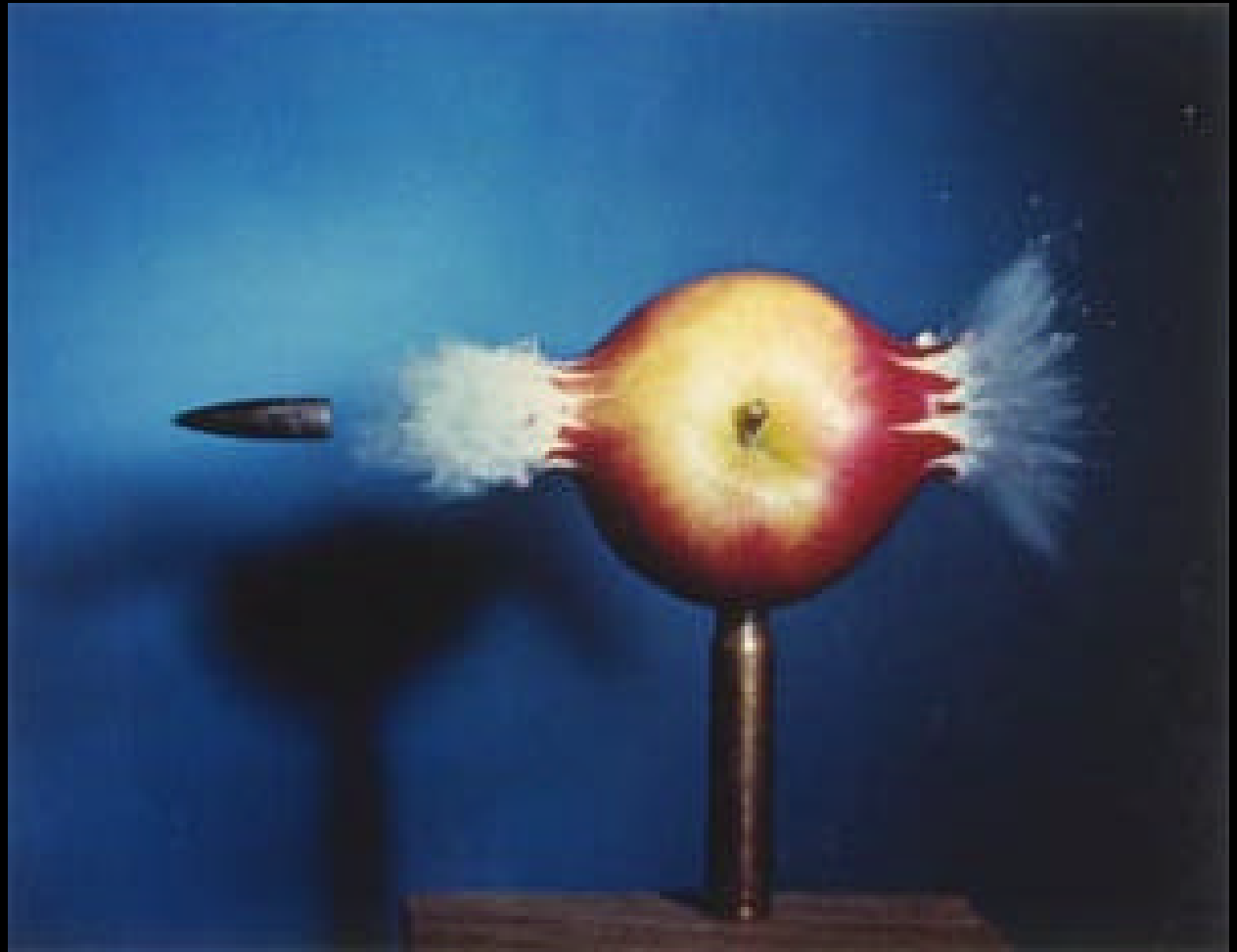
- The “decisive moment”
(Cartier Bresson)



There is no passive recording **Snapshot**-Perspective-Speed, aperture-Filter-Lighting-Processing & Print-Make up-Retouching

Snapshot

- Freeze the action
- Is it realistic?
- This is reality though



Viewpoint

- 2D composition



Photo
Peter Turner

Viewpoint

- High viewpoint



There is no passive recording

Viewpoint

- The choice of the viewpoint is not innocent



Viewpoint

- Same event
- Two radically different photographs



Special effects



There is no passive recording Snapshot-**Perspective**-Speed, aperture-Filter-Lighting-Processing & Print-Make up-Retouching

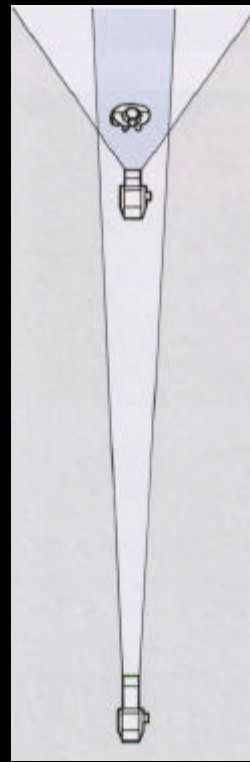
Plan

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Perspective vs. viewpoint

- Focal lens does NOT ONLY change subject size
- Same size by moving the viewpoint
- Different perspective (e.g. background)



Perspective vs. viewpoint

- Martin Scorsese, Good Fellas



Perspective vs. viewpoint

- Portrait: distortion with wide angle



Wide angle



Standard



Telephoto

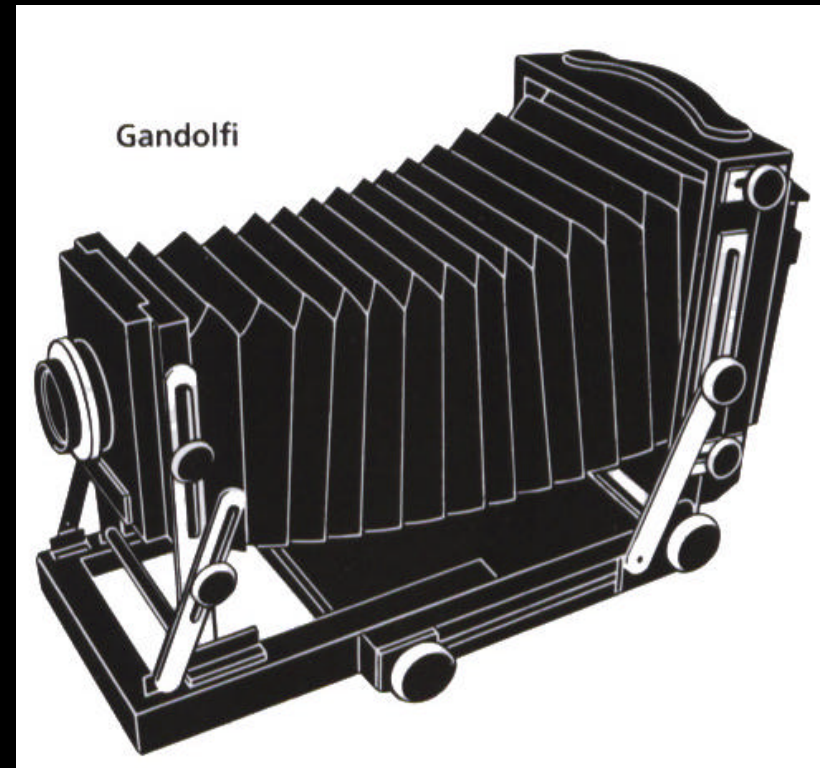
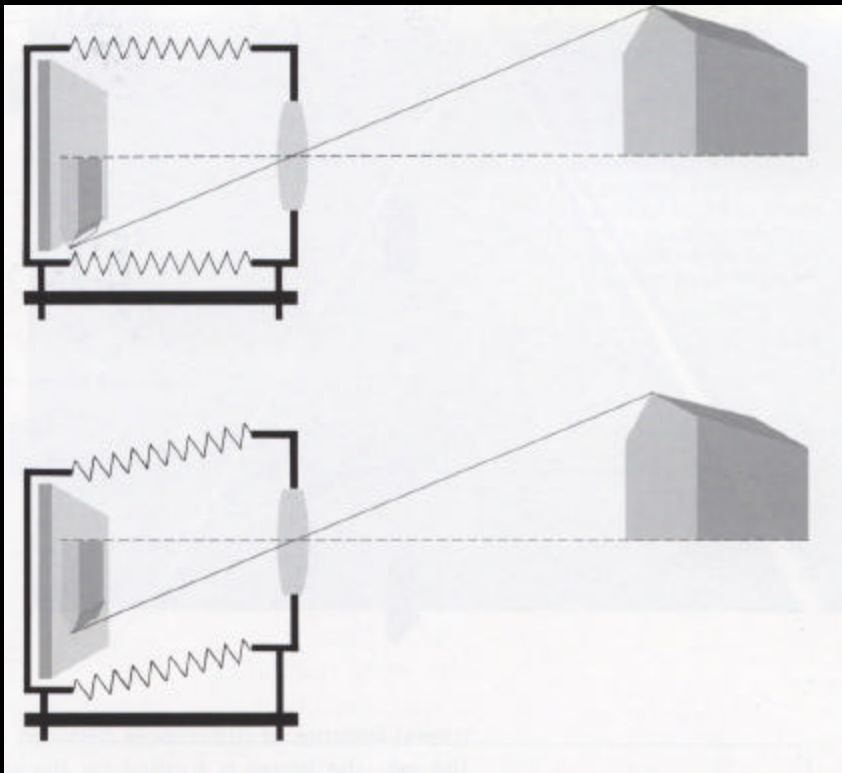
Architectural perspective

- Problem:
converging verticals
- Normal since we look upwards
- But disconcerting



Architectural perspective

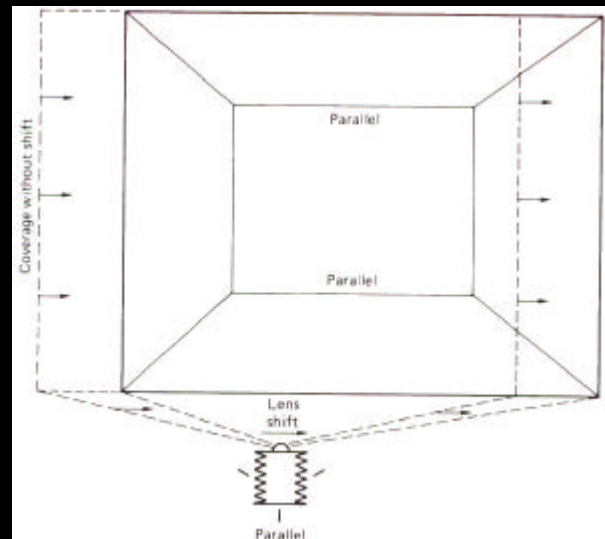
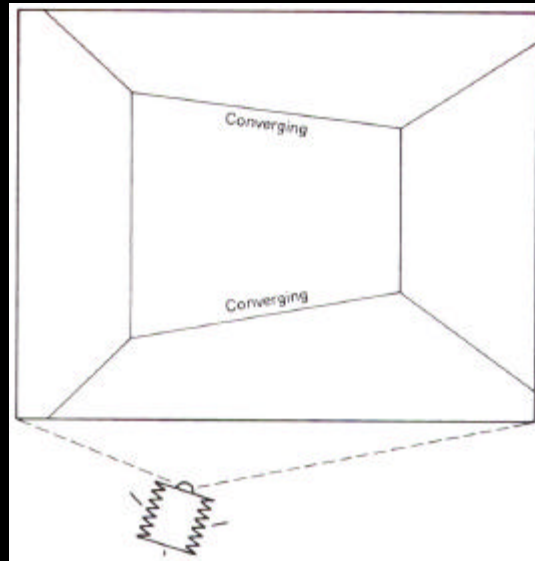
- Solution: view-camera
- Lens shifted with respect to film



There is no passive recording

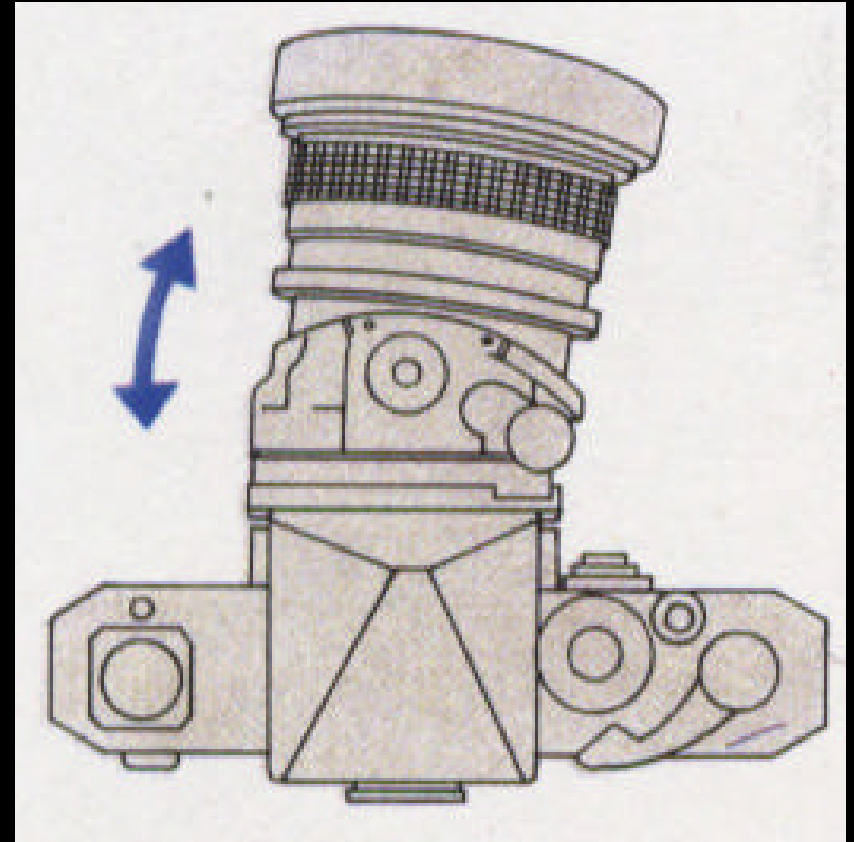
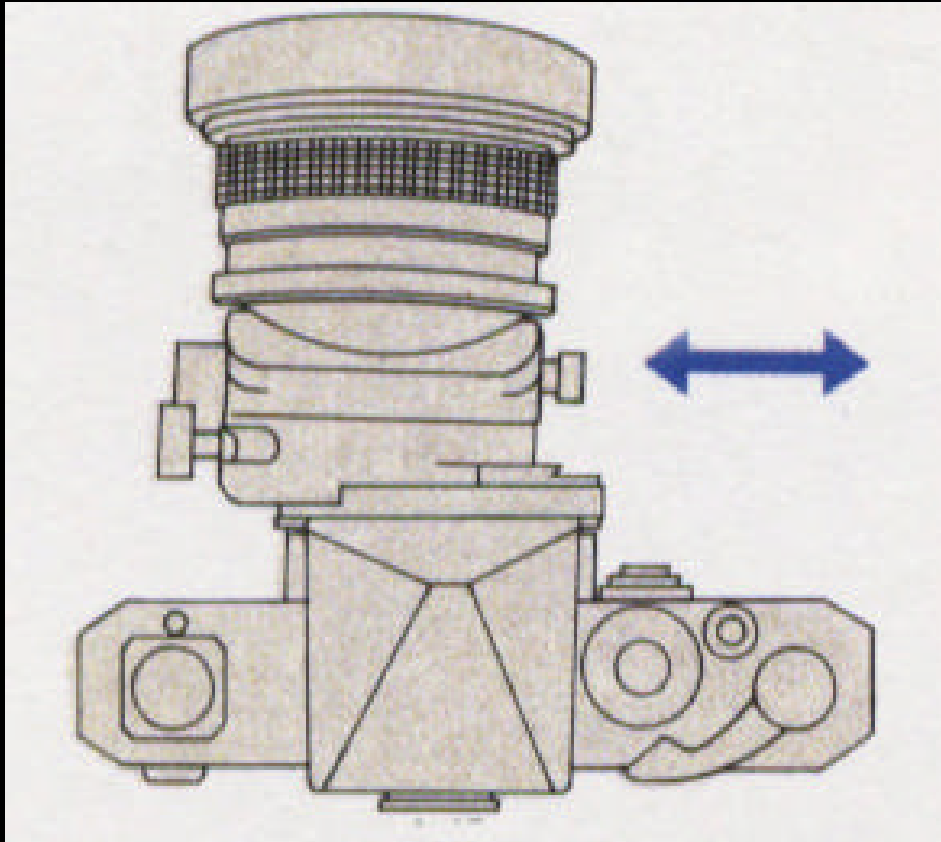
Snapshot-**Perspective**-Speed, aperture-Filter-Lighting-Processing & Print-Make up-Retouching

Architectural perspective



Architectural photography

- 35mm SLR version



There is no passive recording Snapshot-**Perspective**-Speed, aperture-Filter-Lighting-Processing & Print-Make up-Retouching

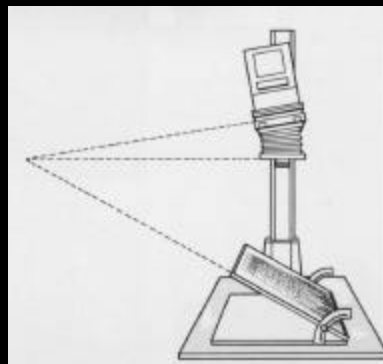
Digital perspective correction

- Photoshop, distort



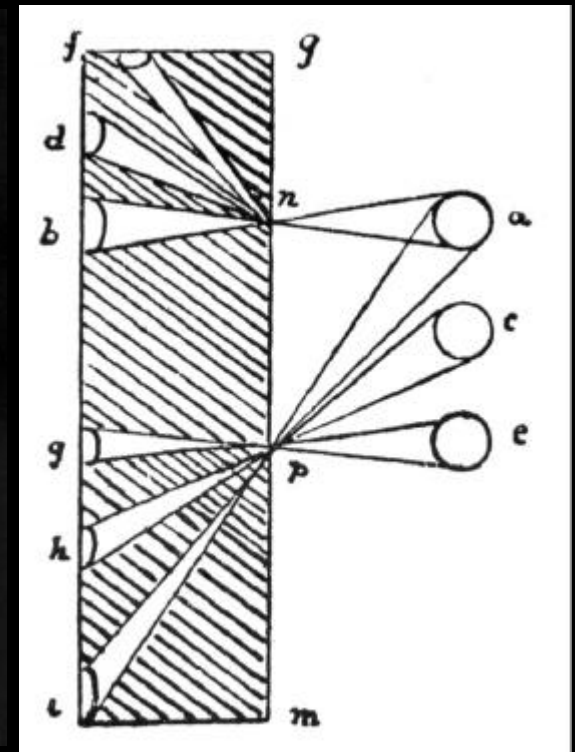
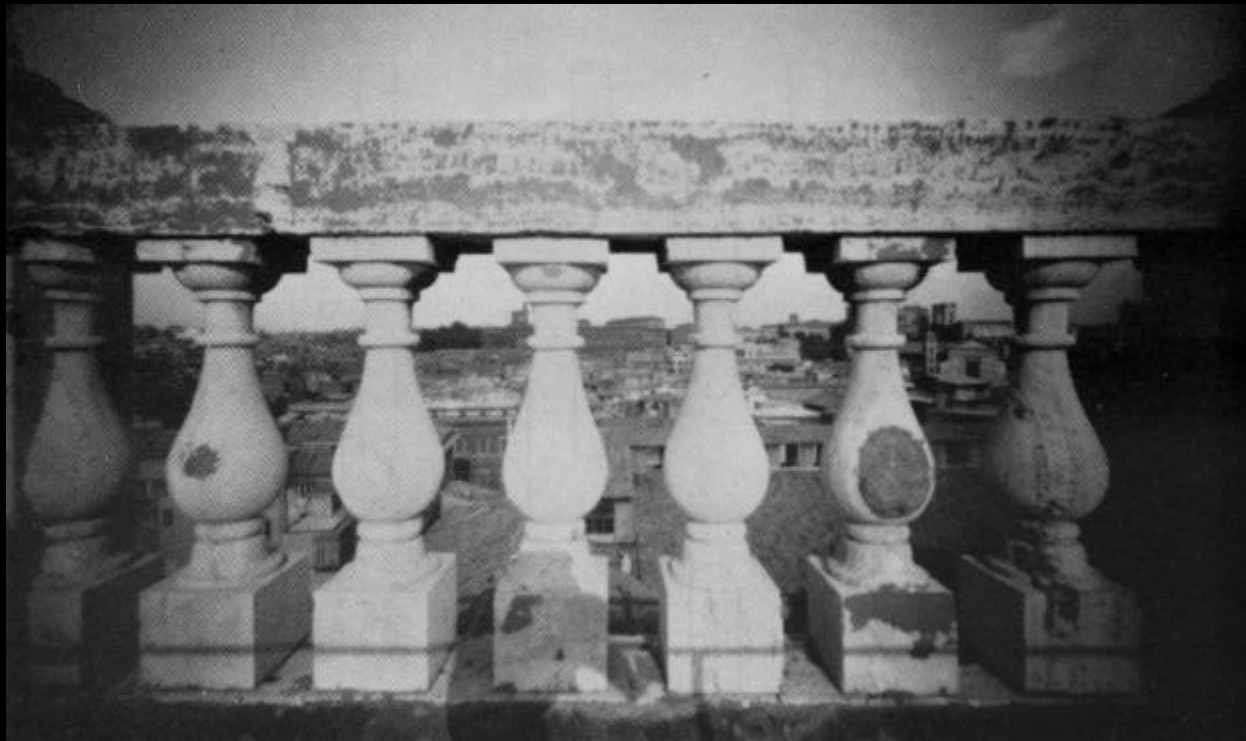
Digital perspective correction

- Photoshop, distort
- Can be done traditionally



Perspective distortion

- Exterior columns appear bigger
- The distortion is not due to lens flaws
- Problem pointed out by Da Vinci



Perspective distortion

- The sphere is projected as an ellipse



Perspective distortion

- The sphere is projected as an ellipse



Perspective distortion

- The photo of the photo looks distorted
- But the photo does not...



Special effect



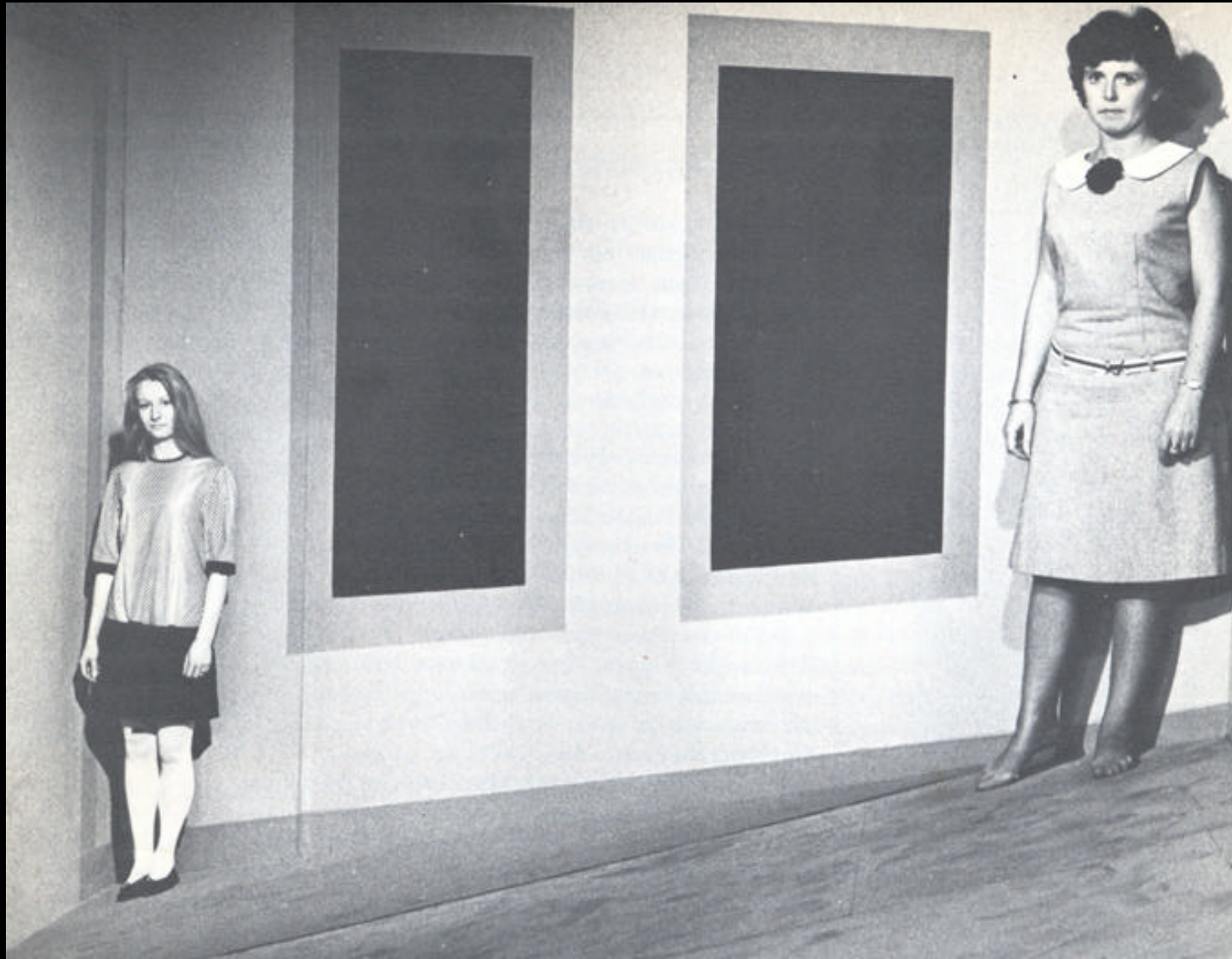
There is no passive recording Snapshot-**Perspective**-Speed, aperture-Filter-Lighting-Processing & Print-Make up-Retouching

Special effects



There is no passive recording Snapshot-**Perspective**-Speed, aperture-Filter-Lighting-Processing & Print-Make up-Retouching

Special effect: Ames room



There is no passive recording Snapshot-**Perspective**-Speed, aperture-Filter-Lighting-Processing & Print-Make up-Retouching

Plan

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Exposure

- Reciprocity speed-aperture

Speed

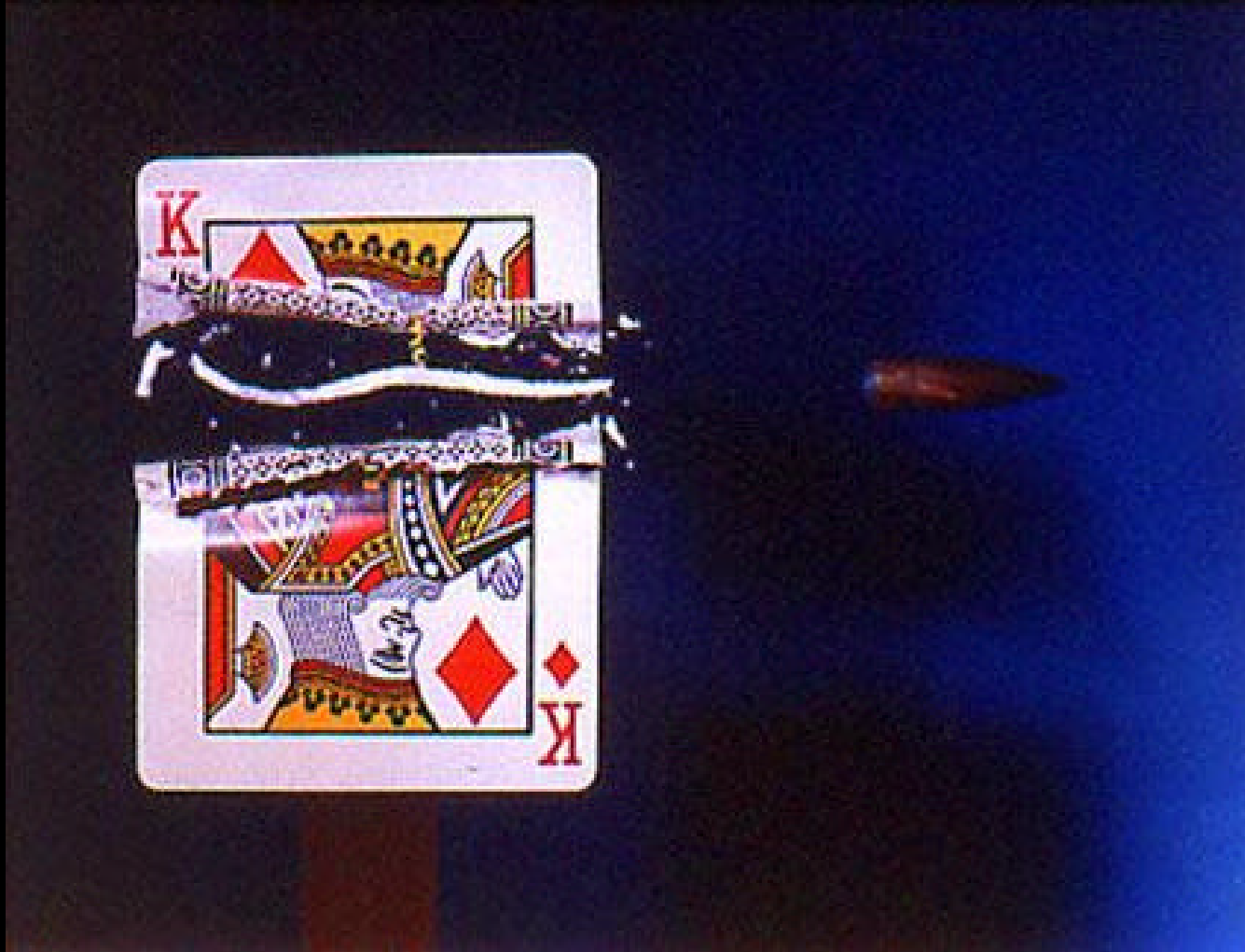
- Slow shutter, motion blur



There is no passive recording

Speed

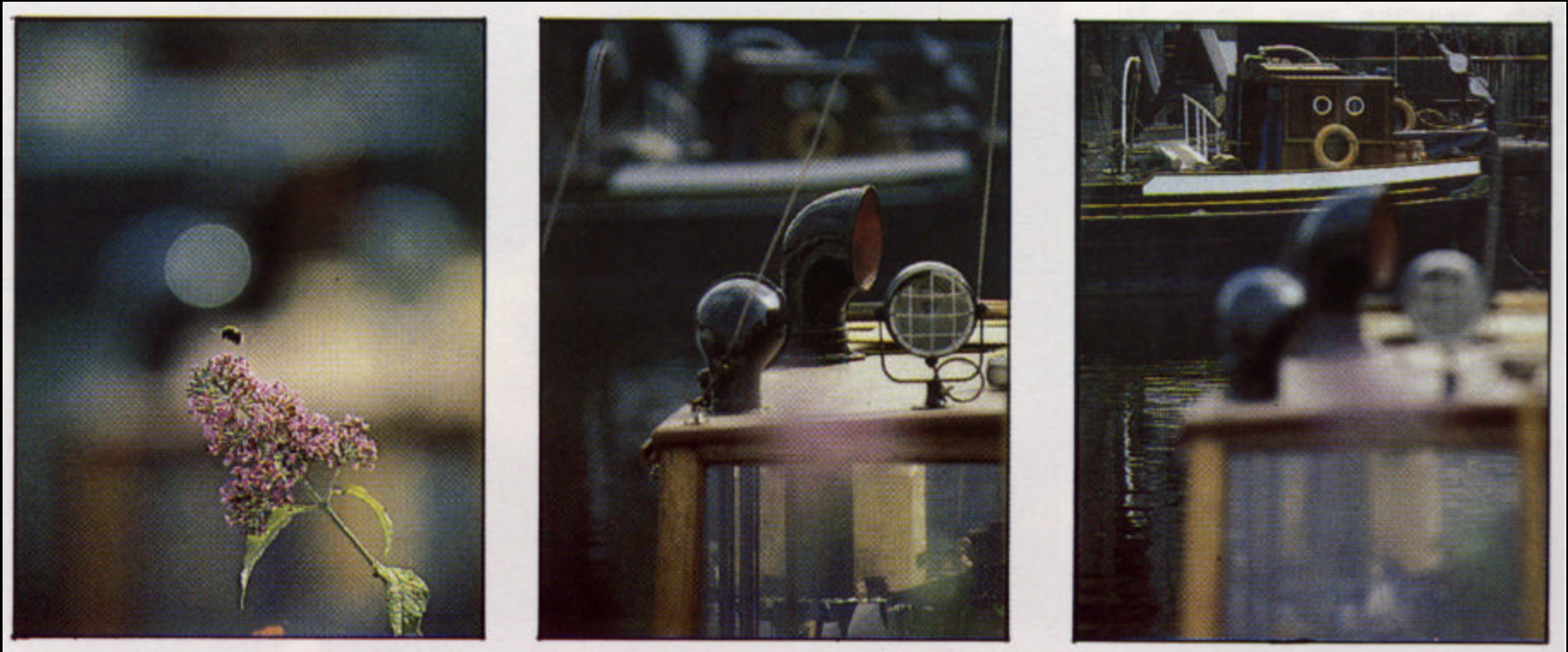
- Fast shutter, freeze motion



There is no passive recording

Depth of field

- Depends on aperture and lens
- Selective focus



Depth of field

- Complete focus
- Never happens for human vision



Depth of field

- Selective focus
- In reality, we would be able to shift focus
- This is refused to us
- The photographer rules



Plan

- Snapshot
- Perspective
- Speed, aperture
- **Filter**
- Lighting
- Processing and Print
- Make-up
- Retouching

- Discussion

Filter

- Diffusion
- Focus the attention



Gradient Filter

- The sky is too bright



Gradient Filter

- The sky is too bright
 - Gradient filter for the top of the photo



Gradient Filter

- The sky is too bright
 - Gradient filter for the top of the photo
- The house is too dark



Gradient Filter

- The sky is too bright
 - Gradient filter for the top of the photo
- The house is too dark
 - Gradient filter for the bottom of the photo



Stardust filter

- Emphasize the brightness of the flare



Polarizing filter

- Control reflection
- Depending on orientation



Polarizing filter

- Control reflection
- Darken sky
- Depending on orientation



Haze filtering

- Haze is bluish



No filter

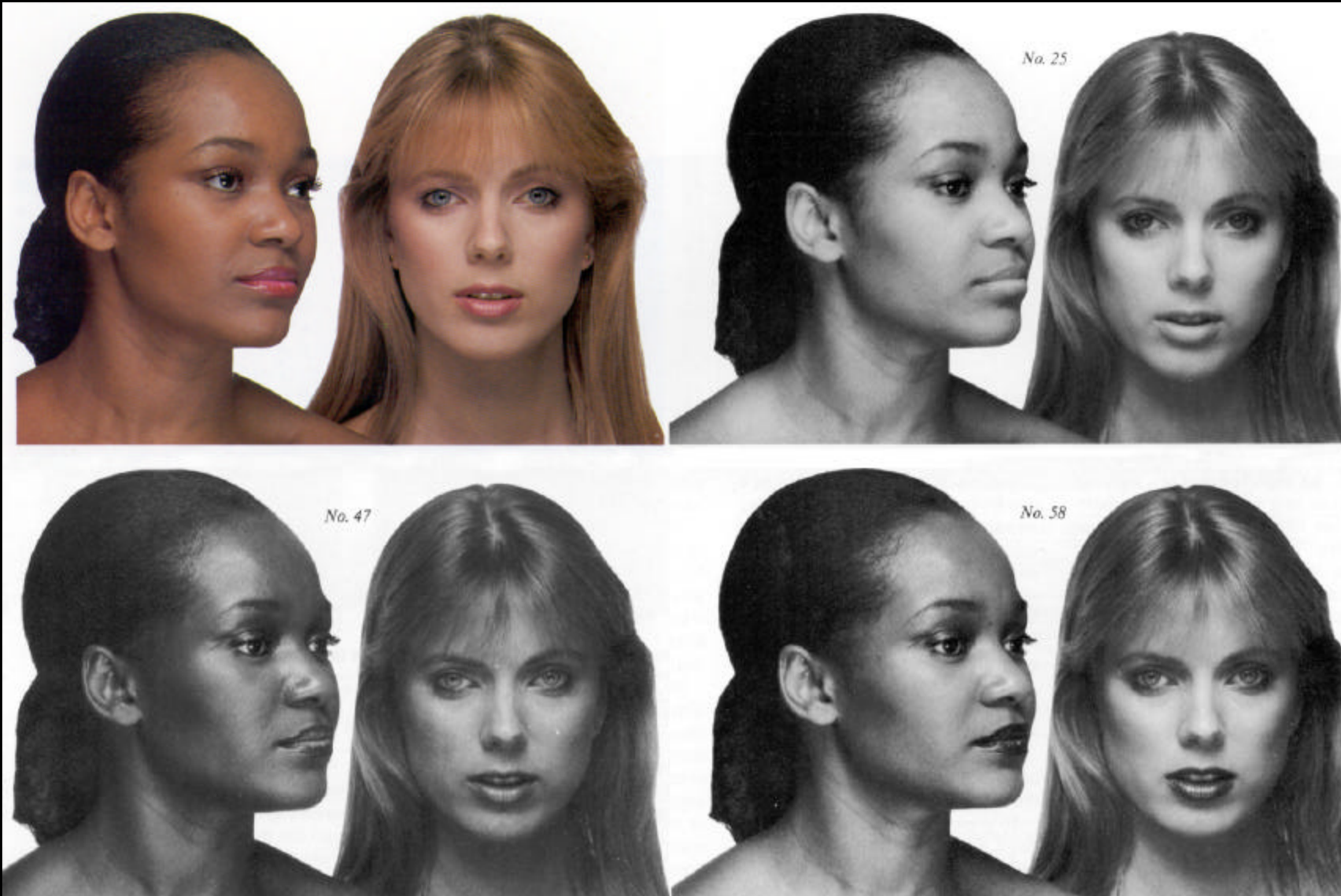


Blue filter



Red filter

Filter for black and white



Plan

- Snapshot
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- Filter
- **Lighting**
- Processing and Print
- Make-up
- Retouching

- Discussion

Photography Lighting

- Provide enough light
- Fill-in shadows
- Model the shape
- Reveal texture
- Install ambiance

Available light

- Not always possible
 - Not enough light
- Selection
 - Sunset, sunrise, overcast skies
- Orientation with respect to the subject

Time of Day

- 8 am



Time of Day

- 10 am



Time of Day

- 12:30 pm



Time of Day

- 2:30 pm



Time of Day

- 3:30 pm



Time of Day

- 4:30 pm

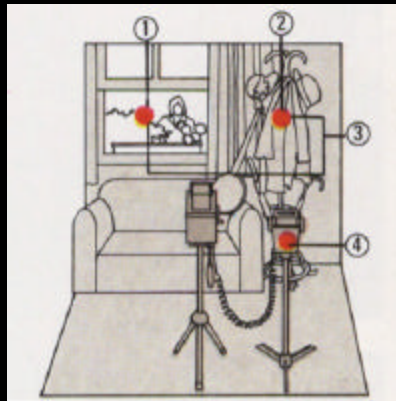


Time of Day

- 4:30 pm



Dynamic range



There is no passive recording

Snapshot-Perspective-Speed, aperture-Filter-**Lighting**-Processing & Print-Make up-Retouching

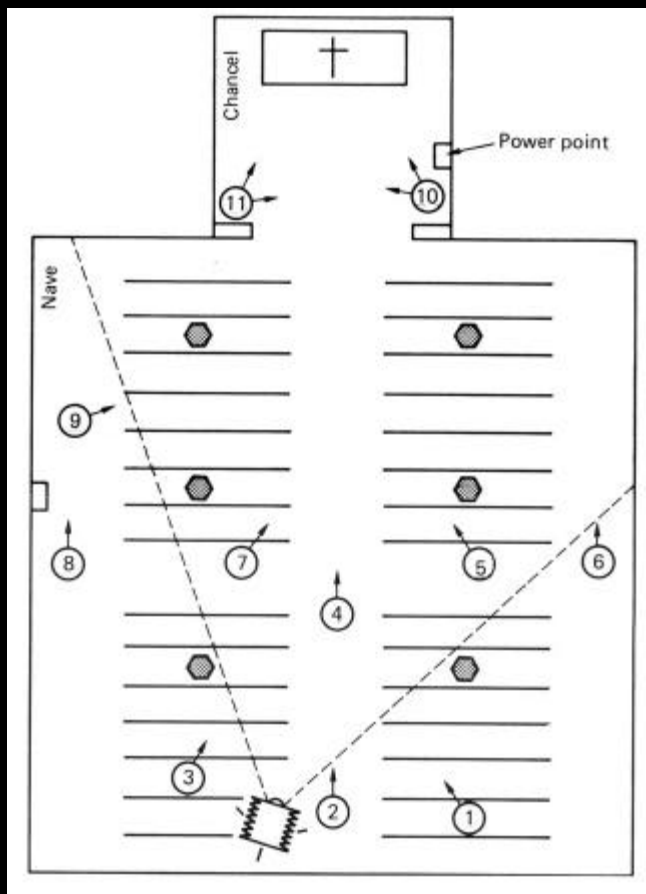
Fill-in



There is no passive recording

Snapshot-Perspective-Speed, aperture-Filter-**Lighting**-Processing & Print-Make up-Retouching

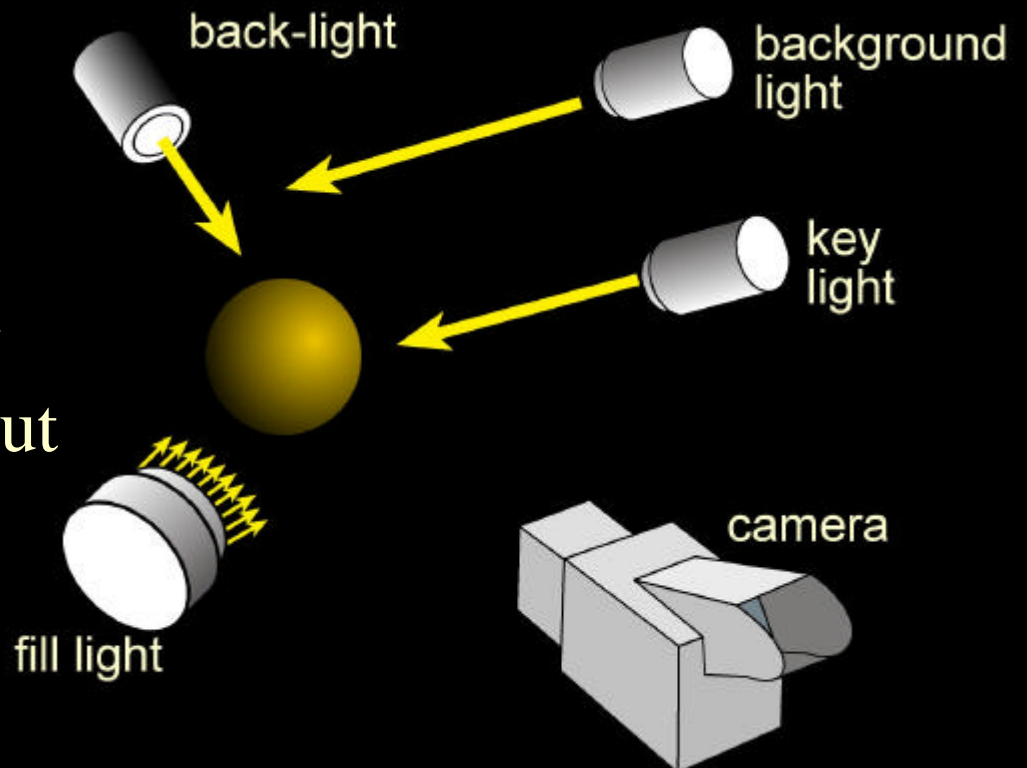
Painting With Light



There is no passive recording Snapshot-Perspective-Speed, aperture-Filter-**Lighting**-Processing & Print-Make up-Retouching

Three Point Lighting

- Key light
 - Main and visible lighting
- Fill light
 - Fill-in shadows
- Back light
 - Emphasize silhouette
 - Make subject stand out
- Independent lighting



Portrait Lighting



There is no passive recording

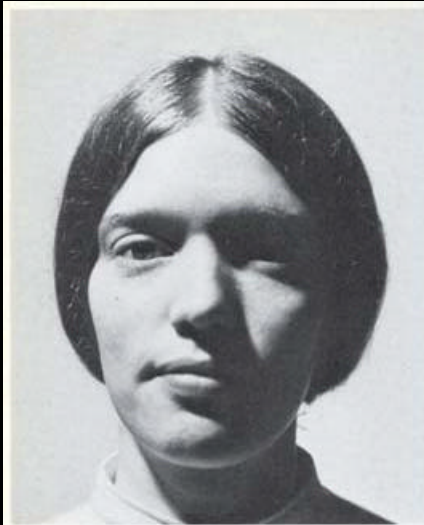
Snapshot-Perspective-Speed, aperture-Filter-**Lighting**-Processing & Print-Make up-Retouching

Portrait lighting

- Strong back light



Portrait lighting



Main light



Fill-in light



Accent light



Background light



There is no passive recording

Snapshot-Perspective-Speed, aperture-Filter-**Lighting**-Processing & Print-Make up-Retouching

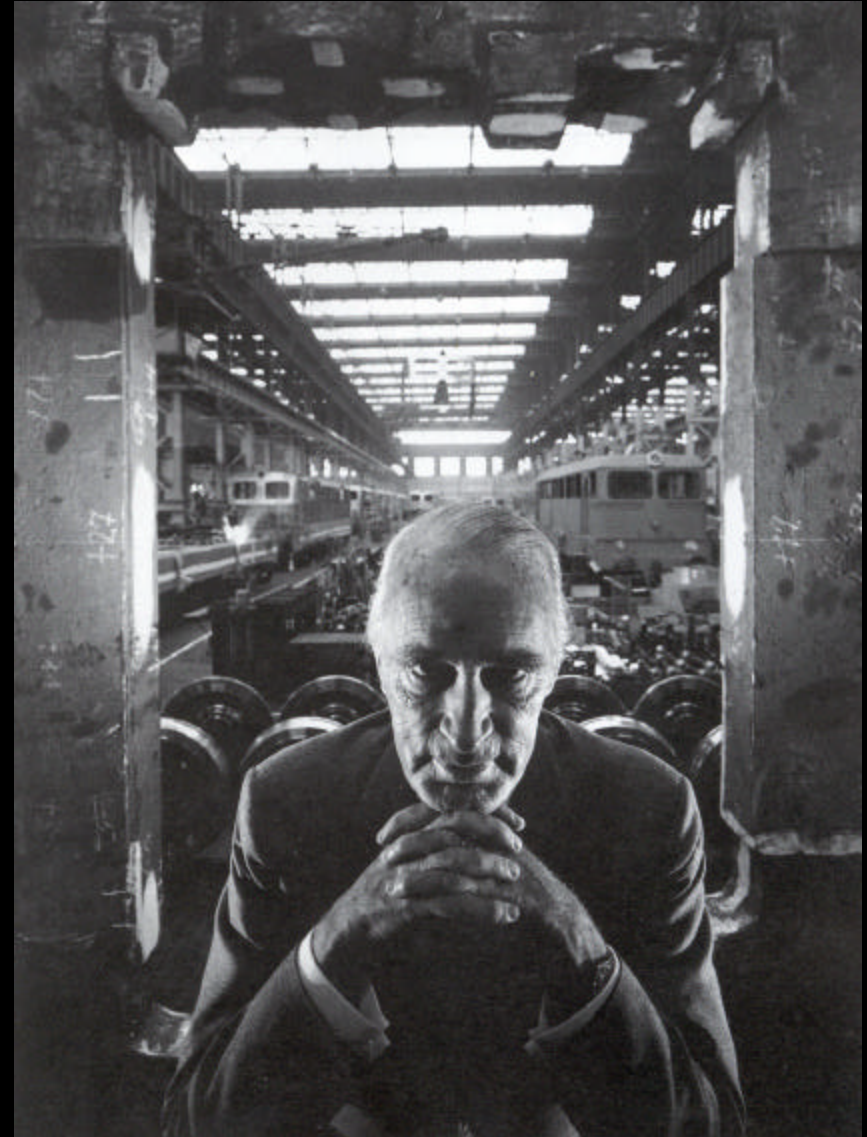
Counter-example

- The Godfather



Counter example

- Alfred Krupp photographed in 1963 by Arnold Newman
- Because Krupp had benefited from the nazis
- Un-friendly lighting



Plan

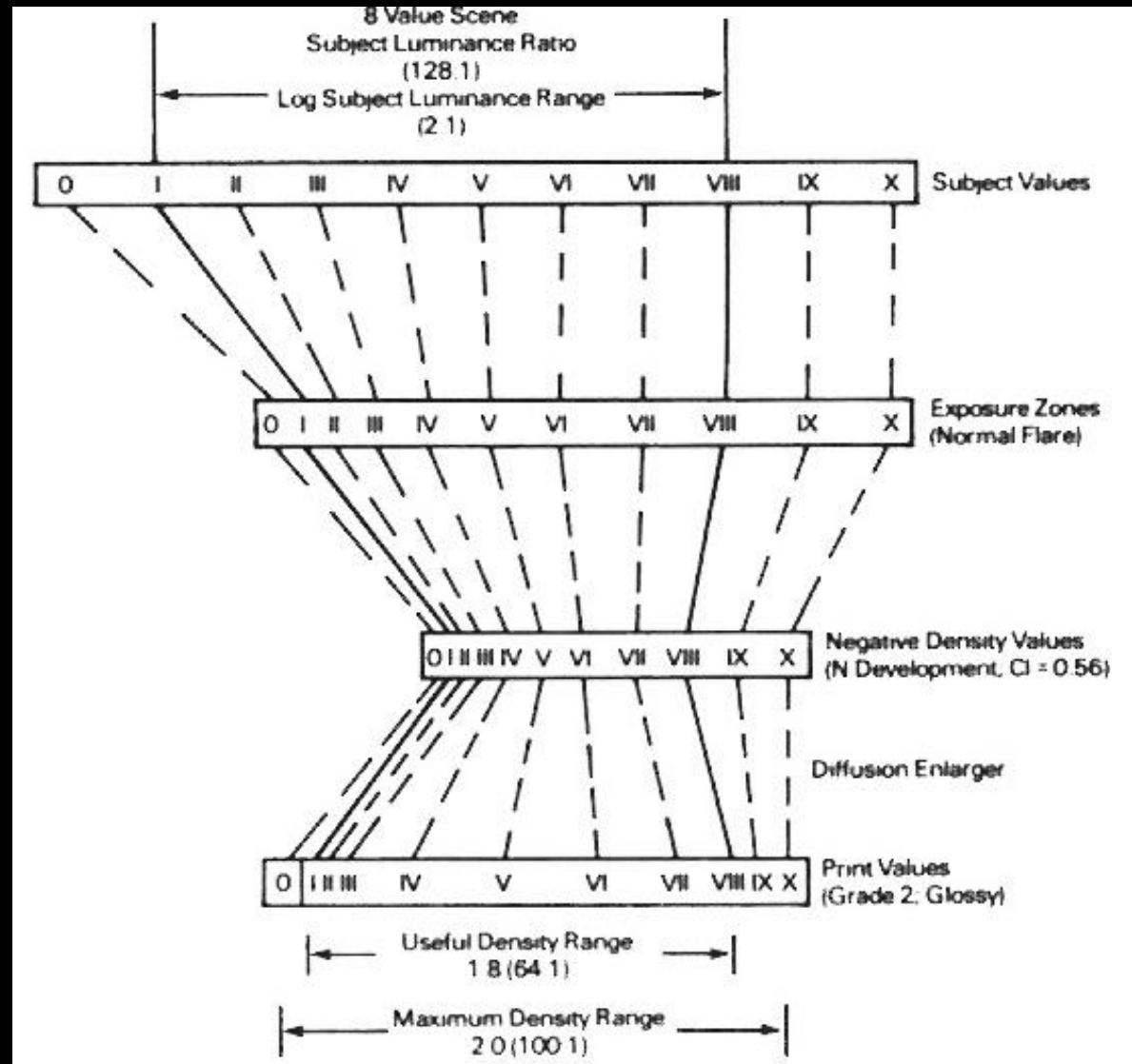
- Snapshot
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- Discussion

Processing and printing

- Limitation of contrast
 - Typically 1 to 300
 - Reality often exhibits 1 to 10,000

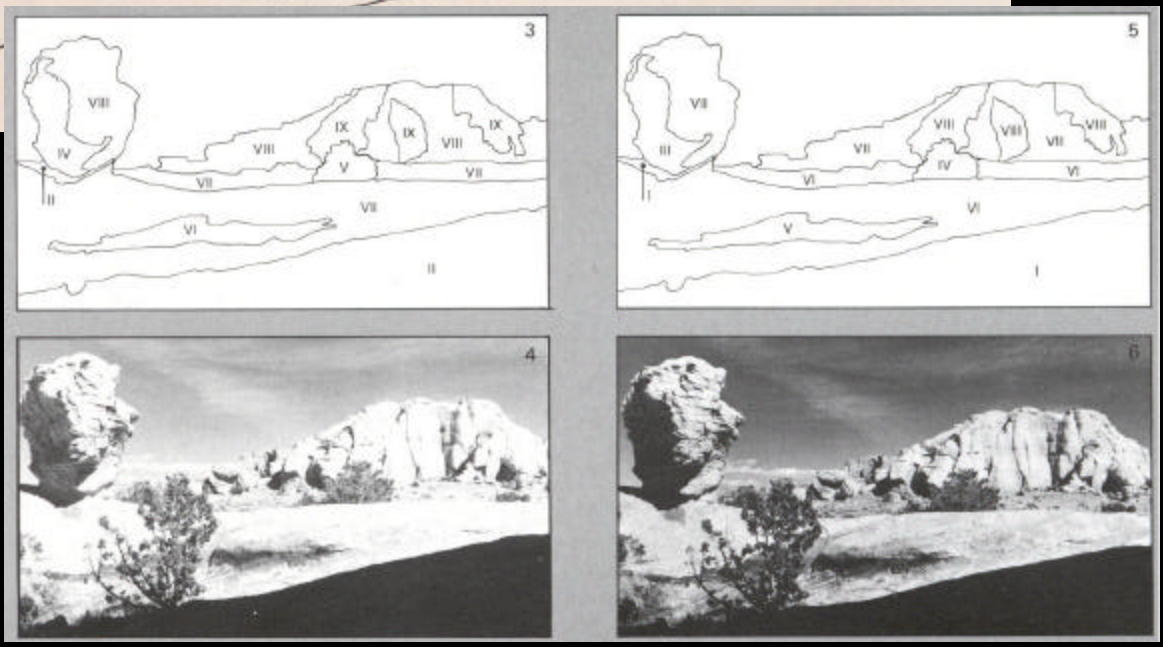
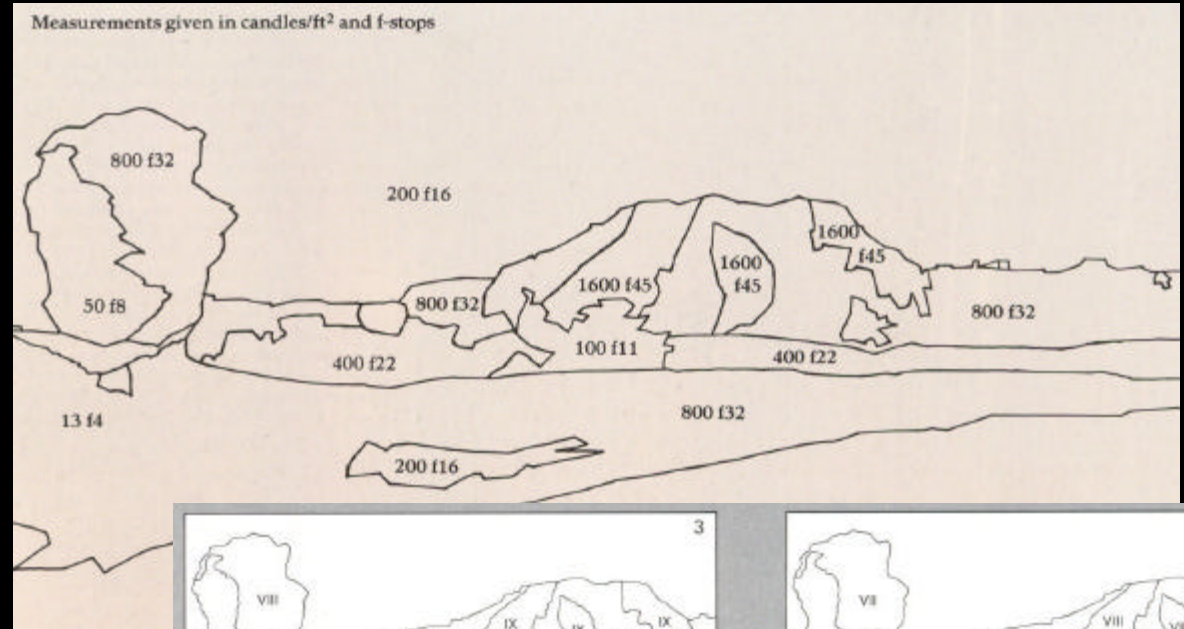
Tone Reproduction



The Zone System

The Zones

- 0** Solid black; the same as - the film rebate
- I** Nearly black; just different from Zone 0
- II** The first hint of texture
- III** Textured shadow; the first recognizable shadow detail
- IV** Average shadow value on Caucasian skin, foliage and buildings
- V** Middle grey: the pivot value; light foliage, dark skin
- VI** Caucasian skin, textured light grey; shadow on snow
- VII** Light skin; bright areas with texture, such as snow in low sunlight
- VIII** Highest zone with any texture
- IX** Pure untextured white

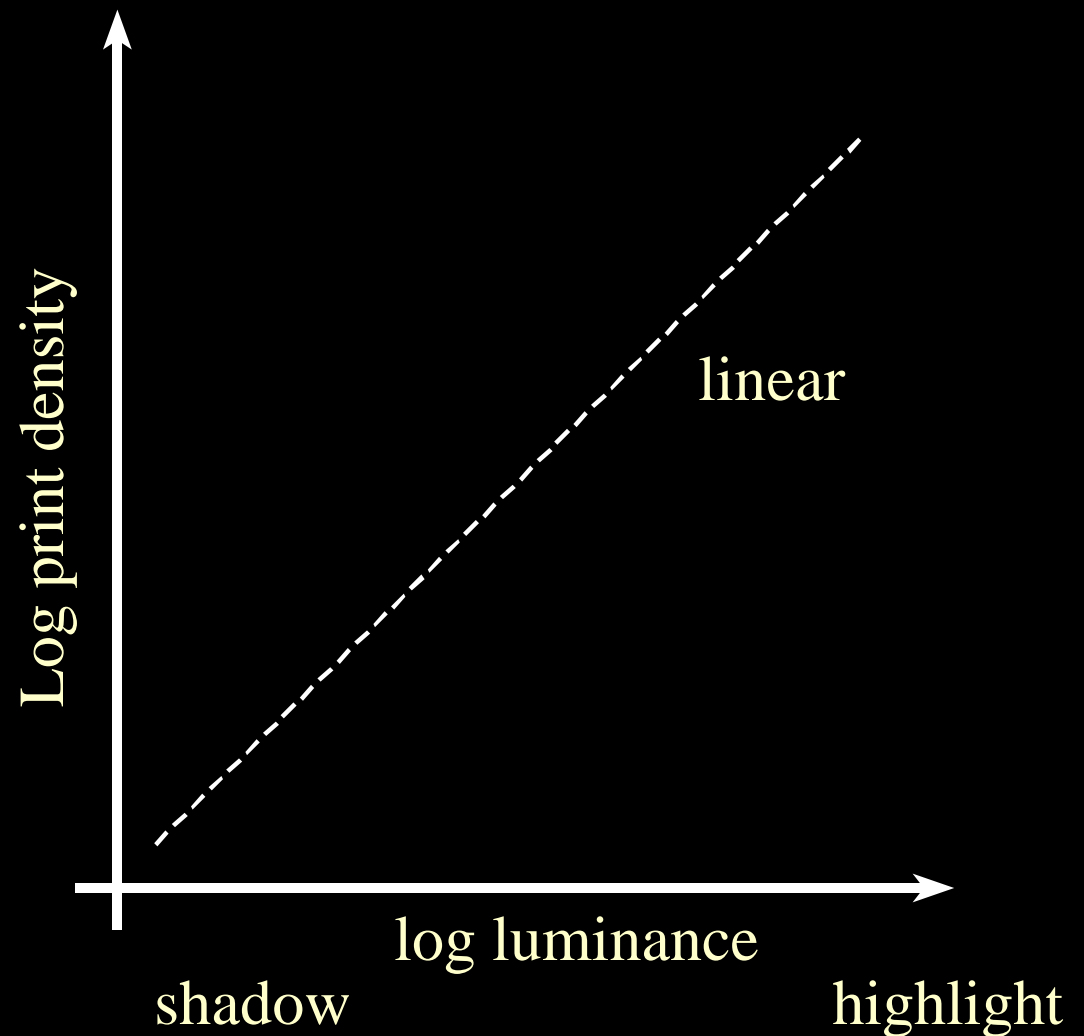


There is no passive recording

Snapshot-Perspective-Speed, aperture-Filter-Lighting-**Processing & Print**-Make up-Retouching

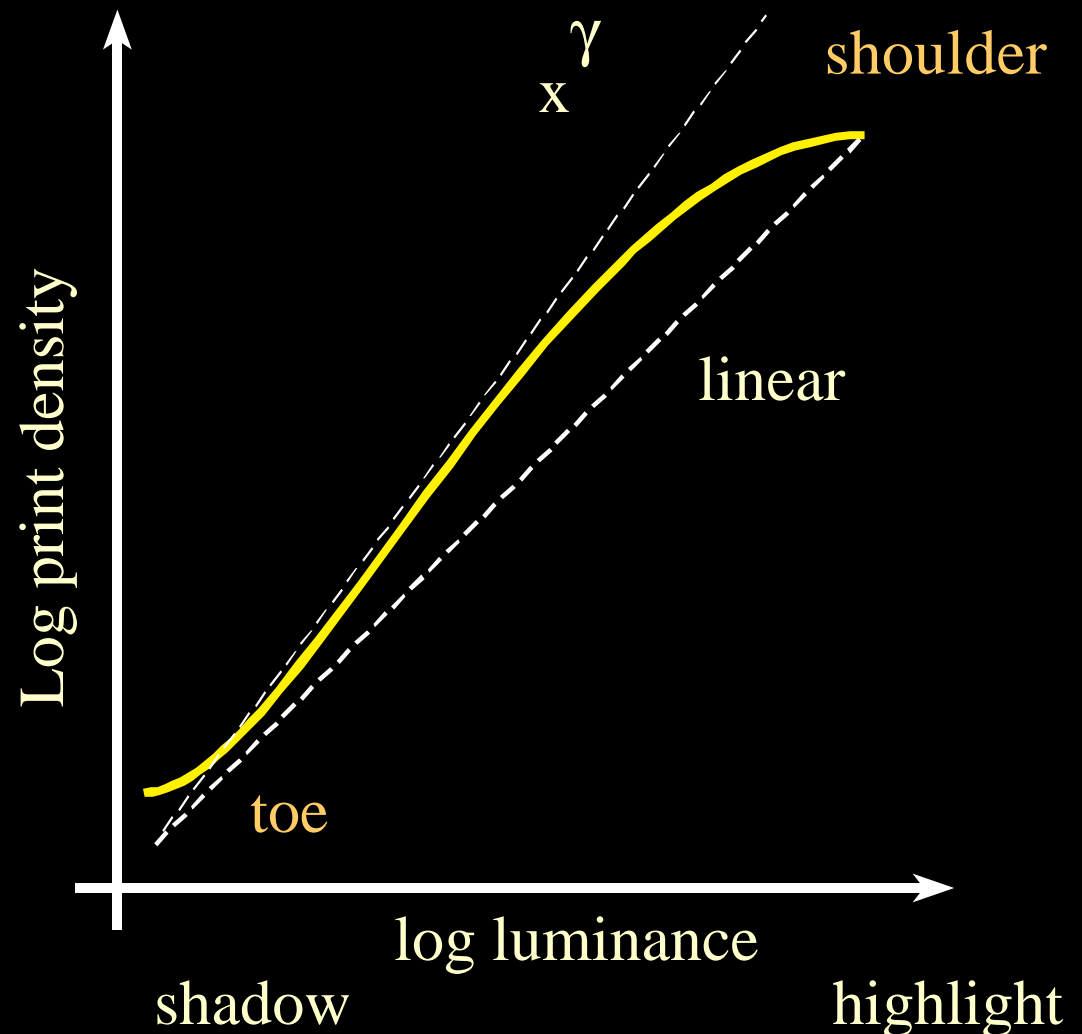
Tone Reproduction

- Not linear



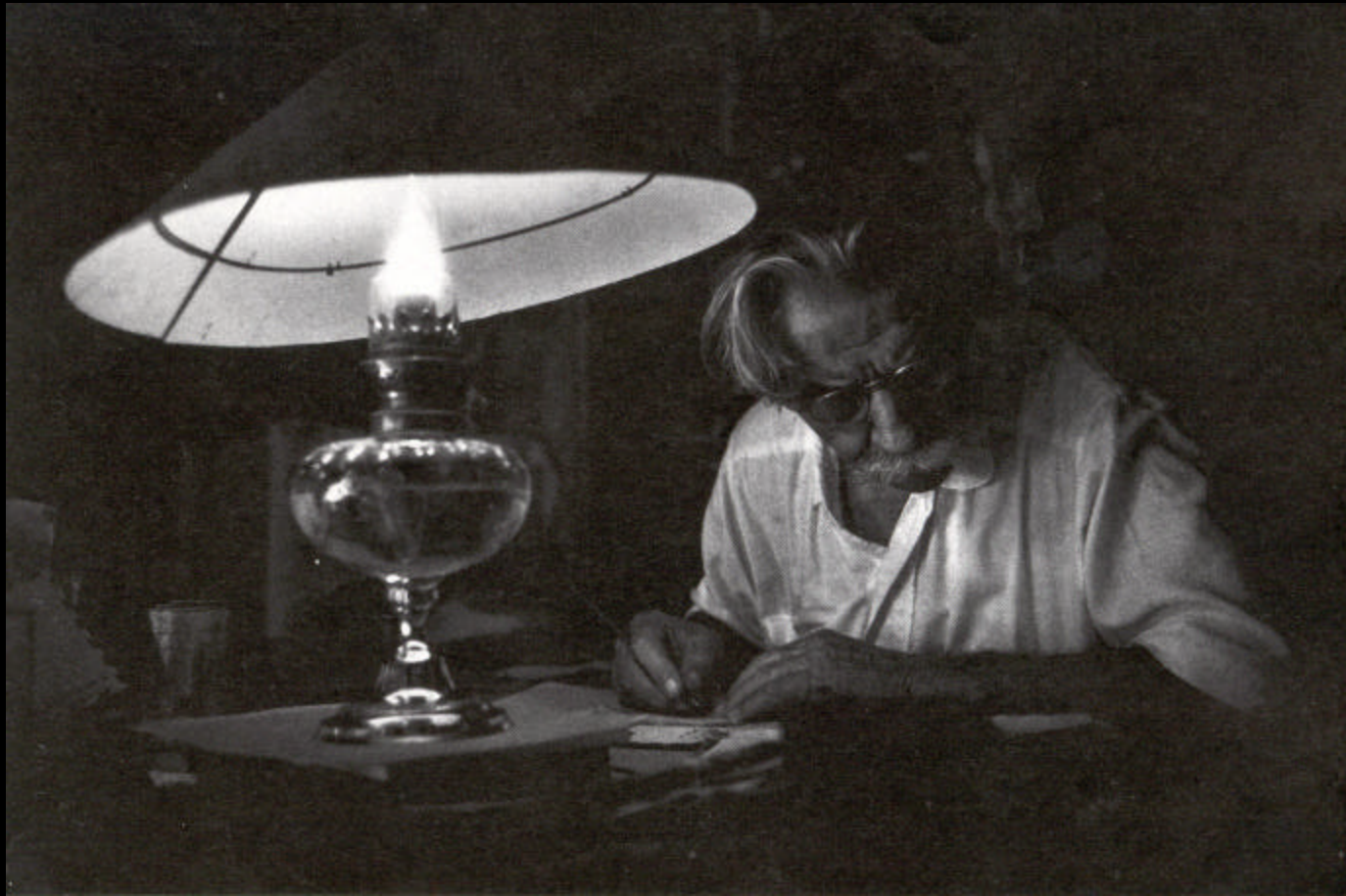
Tone Reproduction

- Not linear
- Gamma correction



The Print

- W. Eugene Smith photo of Albert Schweitzer
- 5 days to print!



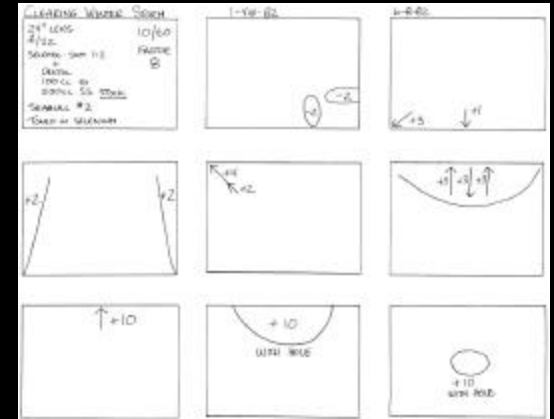
Dodging and Burning

- During the print
- Locally darken or lighten
- Use masks to expose some parts less
- Has to be done for each print!

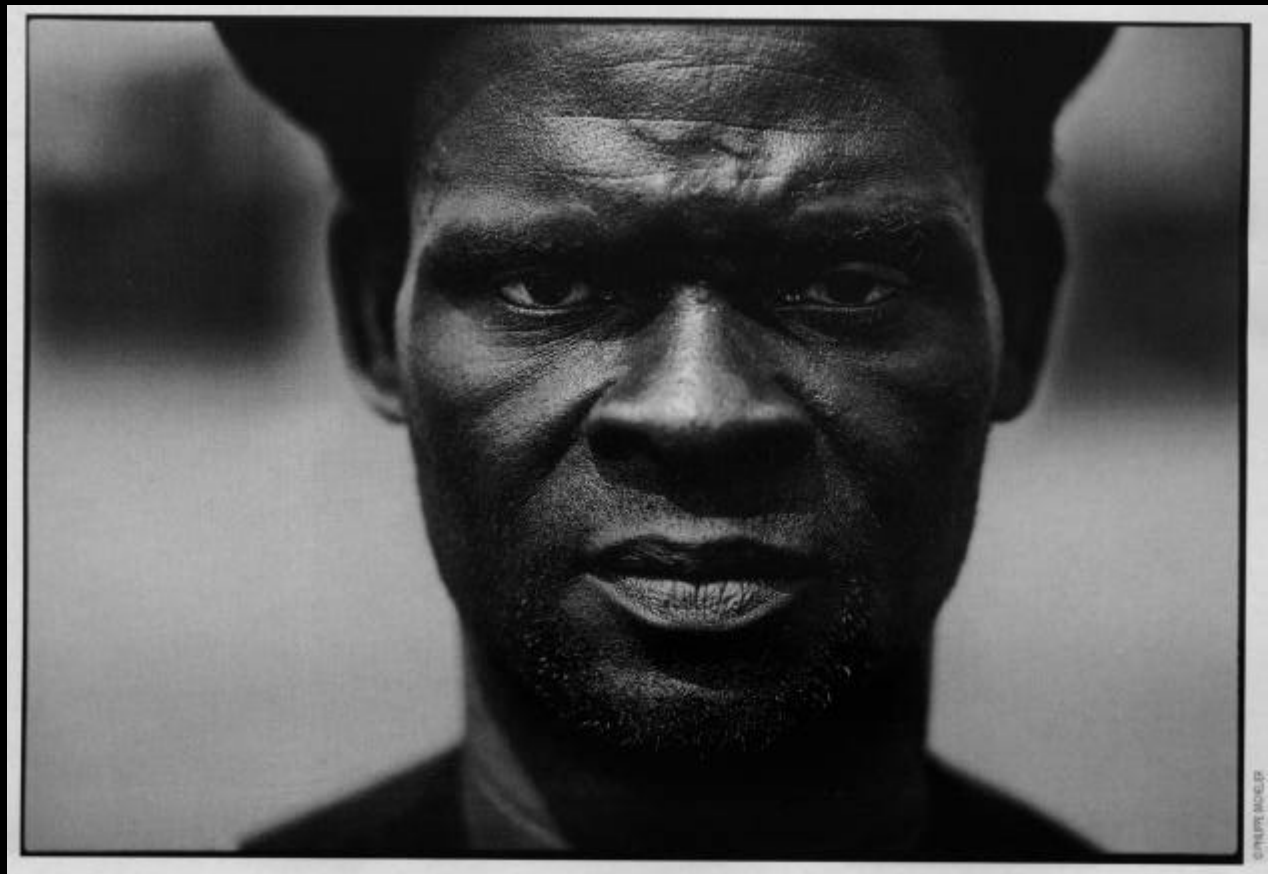


Dodging and Burning

- Clearing Winter Storm



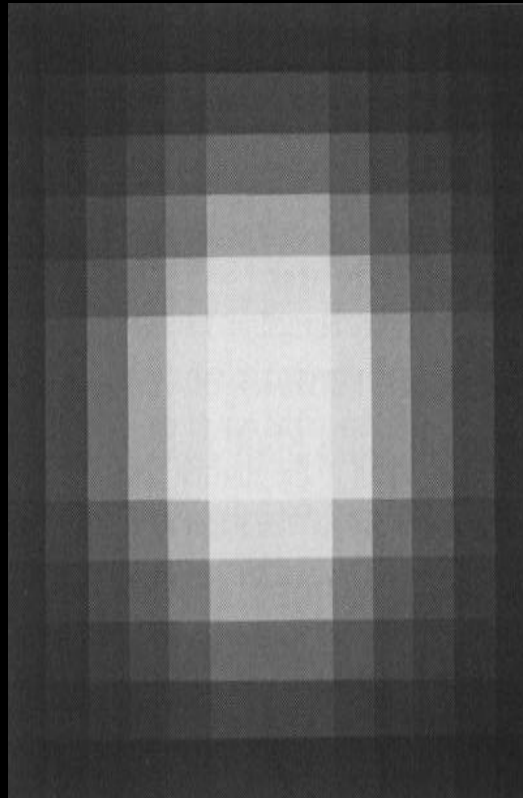
Dodging and Burning



There is no passive recording Snapshot-Perspective-Speed, aperture-Filter-Lighting-**Processing & Print**-Make up-Retouching

Edge burning

- Darken the edges
- Focus the attention, make the photo dynamic



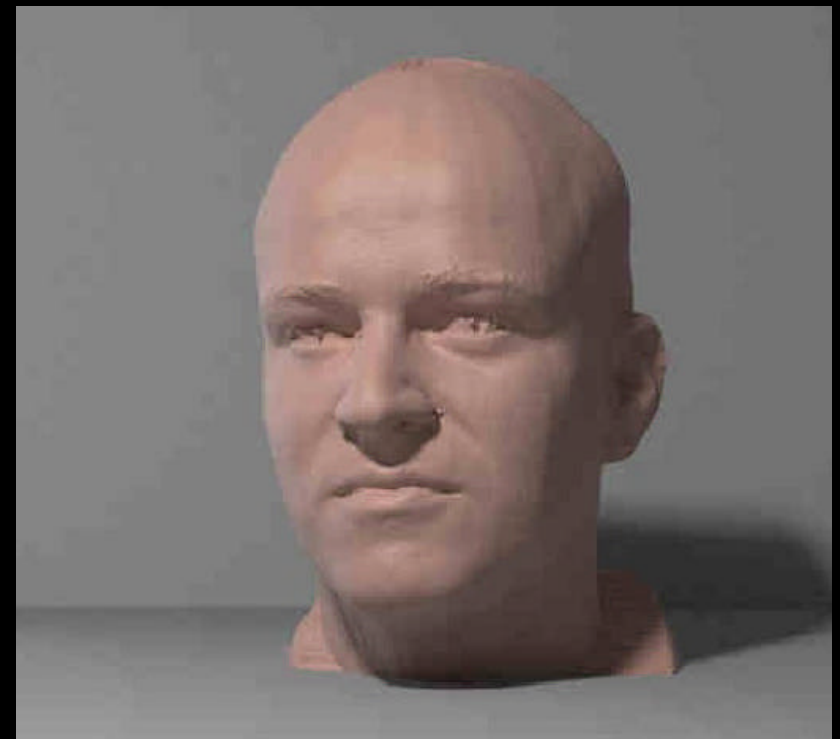
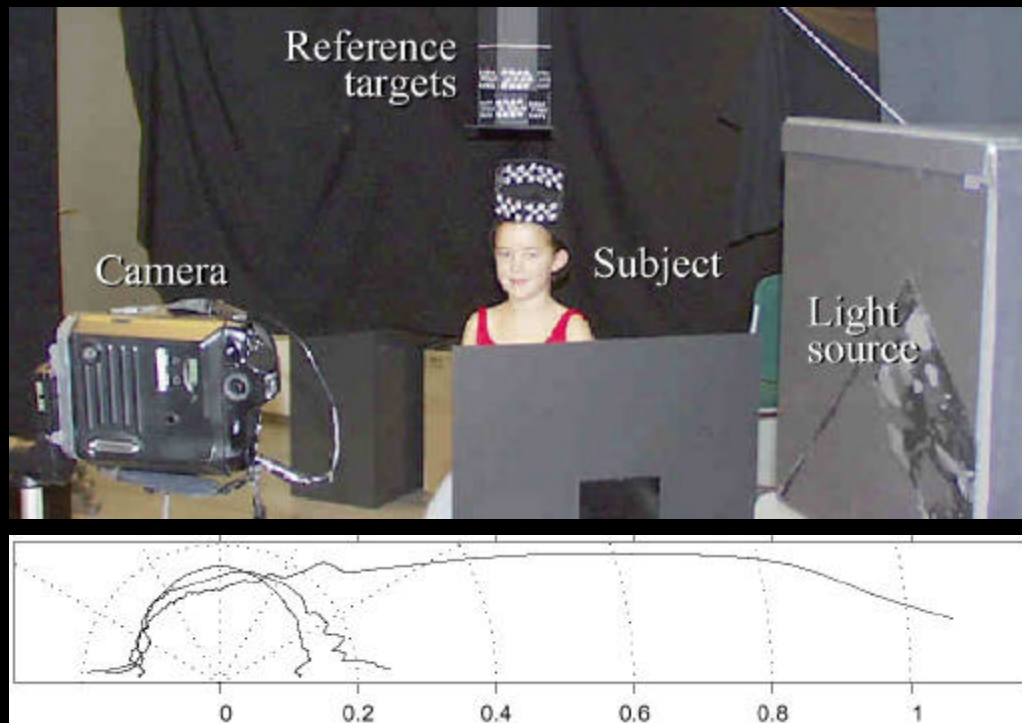
Plan

- Snapshot
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- **Make-up**
- Retouching

- Discussion

Facial problems in CGI

- E.g. Toy Story humans look bad
- Measurement of human reflectance



Measurement of human skin reflectance at Cornell University

Make-up

- Scars, monsters, etc.
- “Creative” make-up
 - Fancy!
- Corrective make-up
 - Hide wrinkles, etc
 - Balance the face
 - Not limited to the face!
- Make-up for pictures
 - Avoid highlights

Shading and highlighting



There is no passive recording

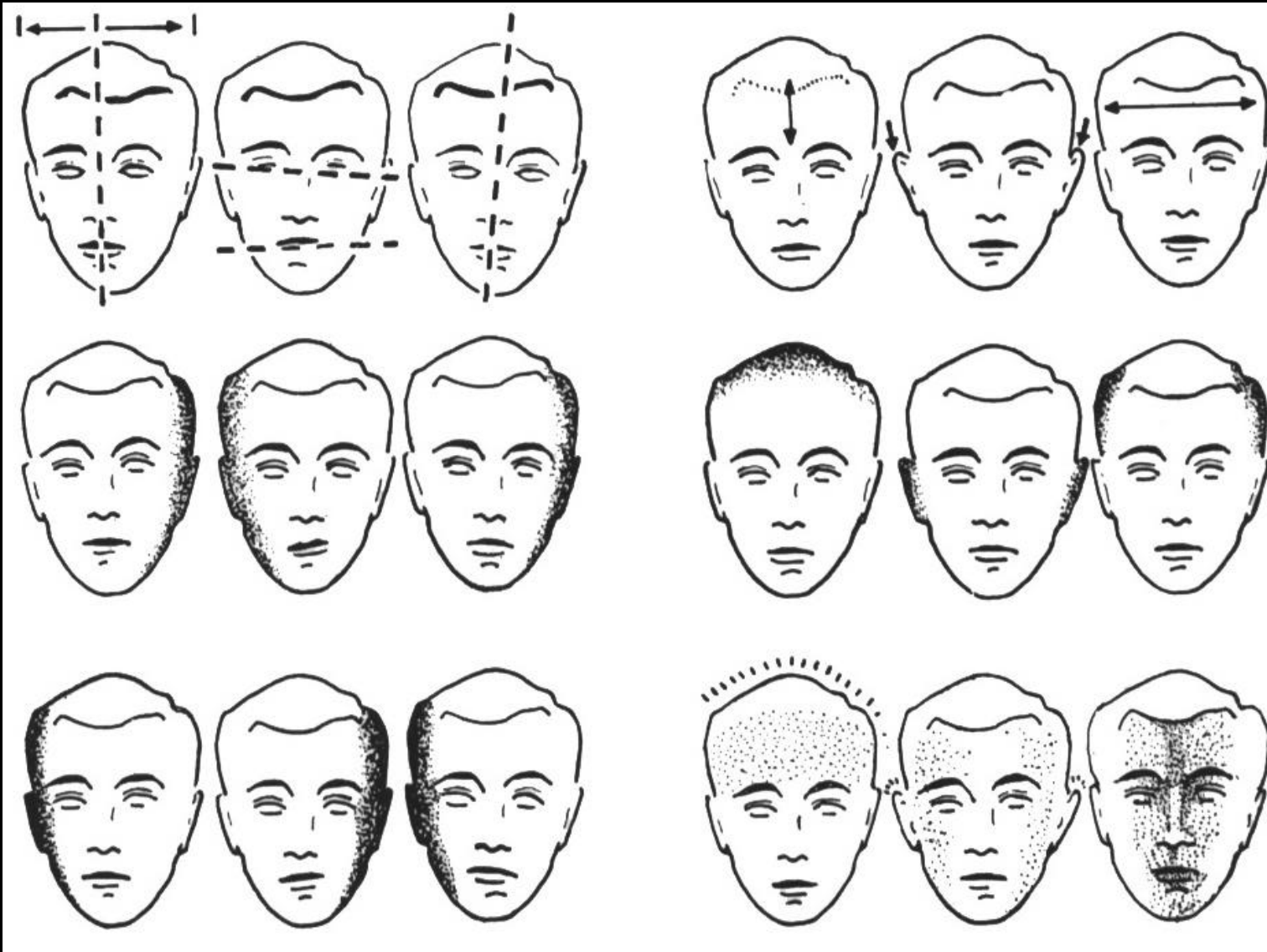
Snapshot-Perspective-Speed, aperture-Filter-Lighting-Processing & Print-**Make up**-Retouching

Corrective Make Up

- Depending on the shape of the face



Corrective lighting



An example



There is no passive recording Snapshot-Perspective-Speed, aperture-Filter-Lighting-Processing & Print-**Make up**-Retouching

Is it fair?



There is no passive recording

Snapshot-Perspective-Speed, aperture-Filter-Lighting-Processing & Print-**Make up**-Retouching

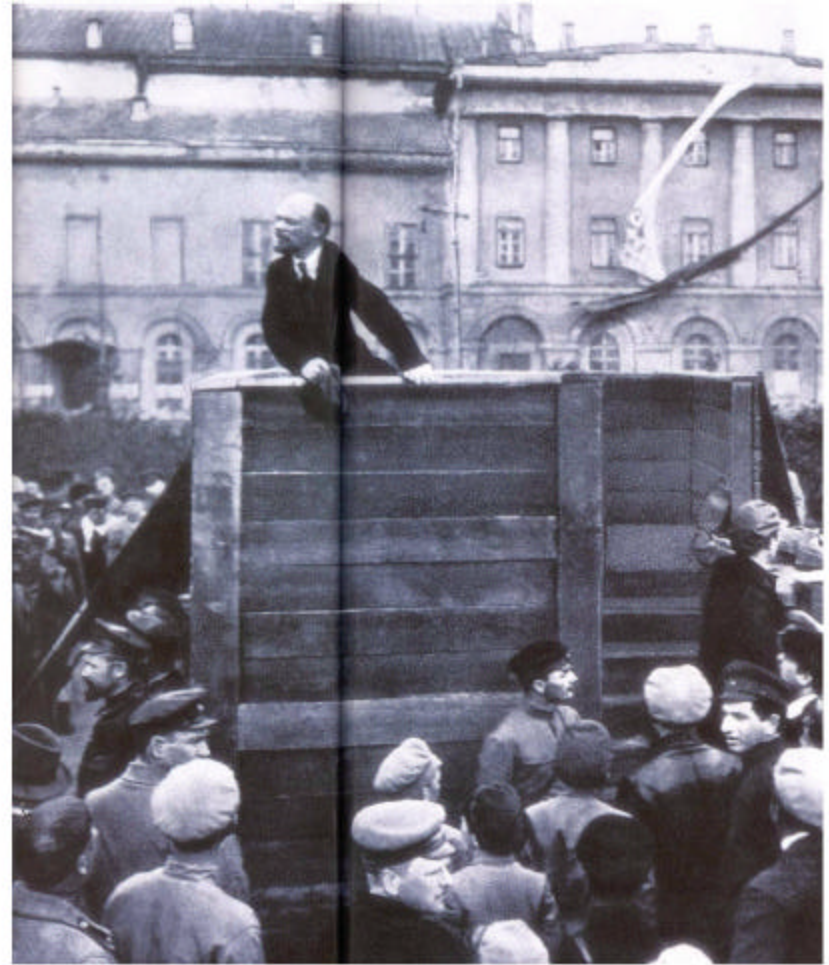
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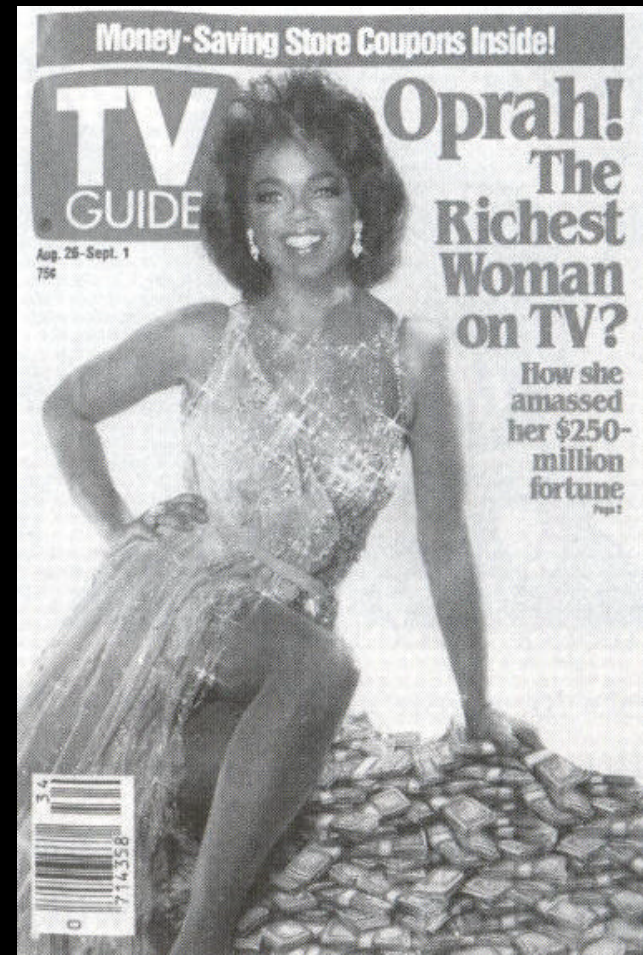
Retouching

- Politics...



Fakery

- Nessy
- Oprah



Touch-up: too dark face



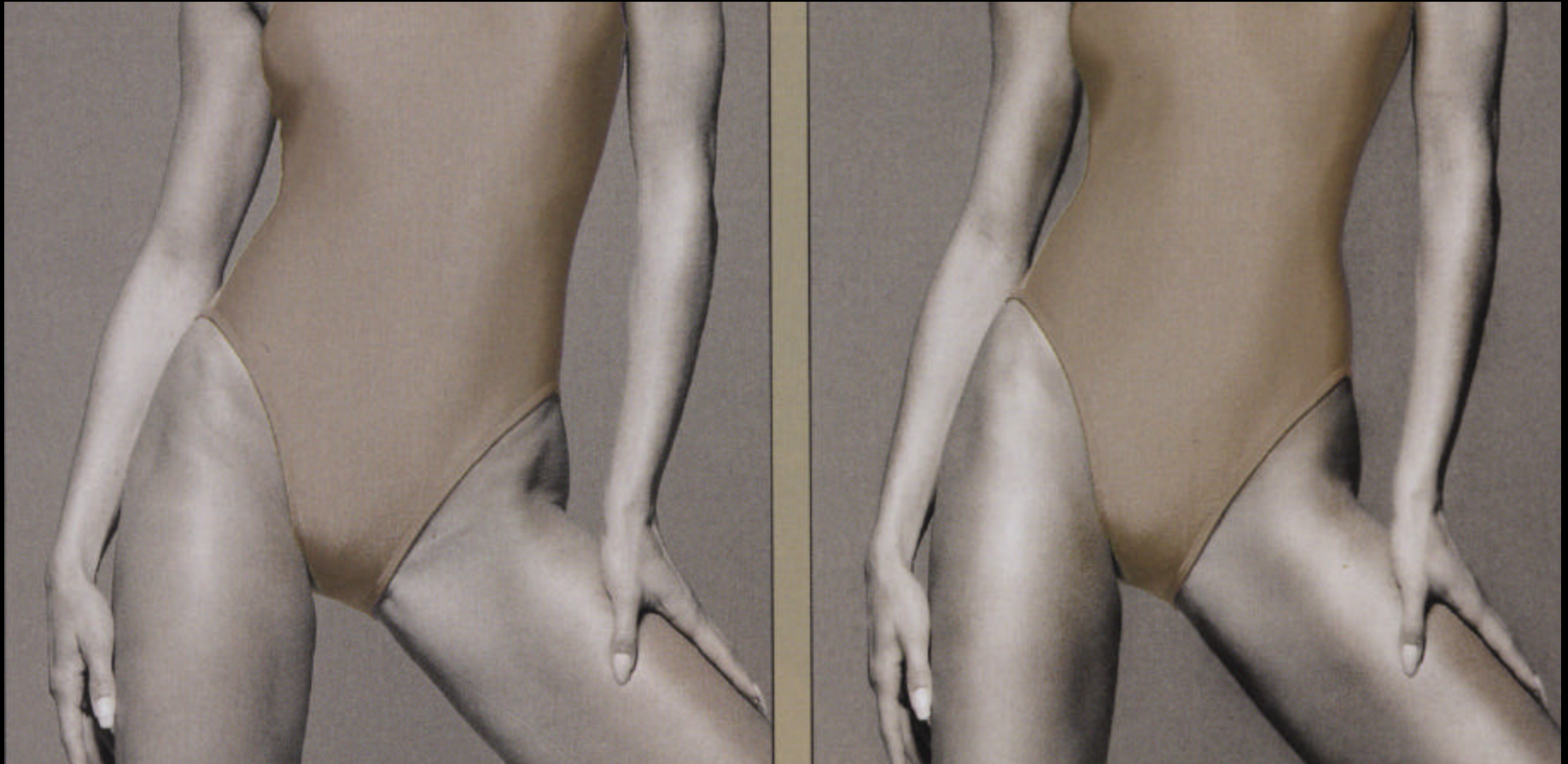
Touch-up: silhouette



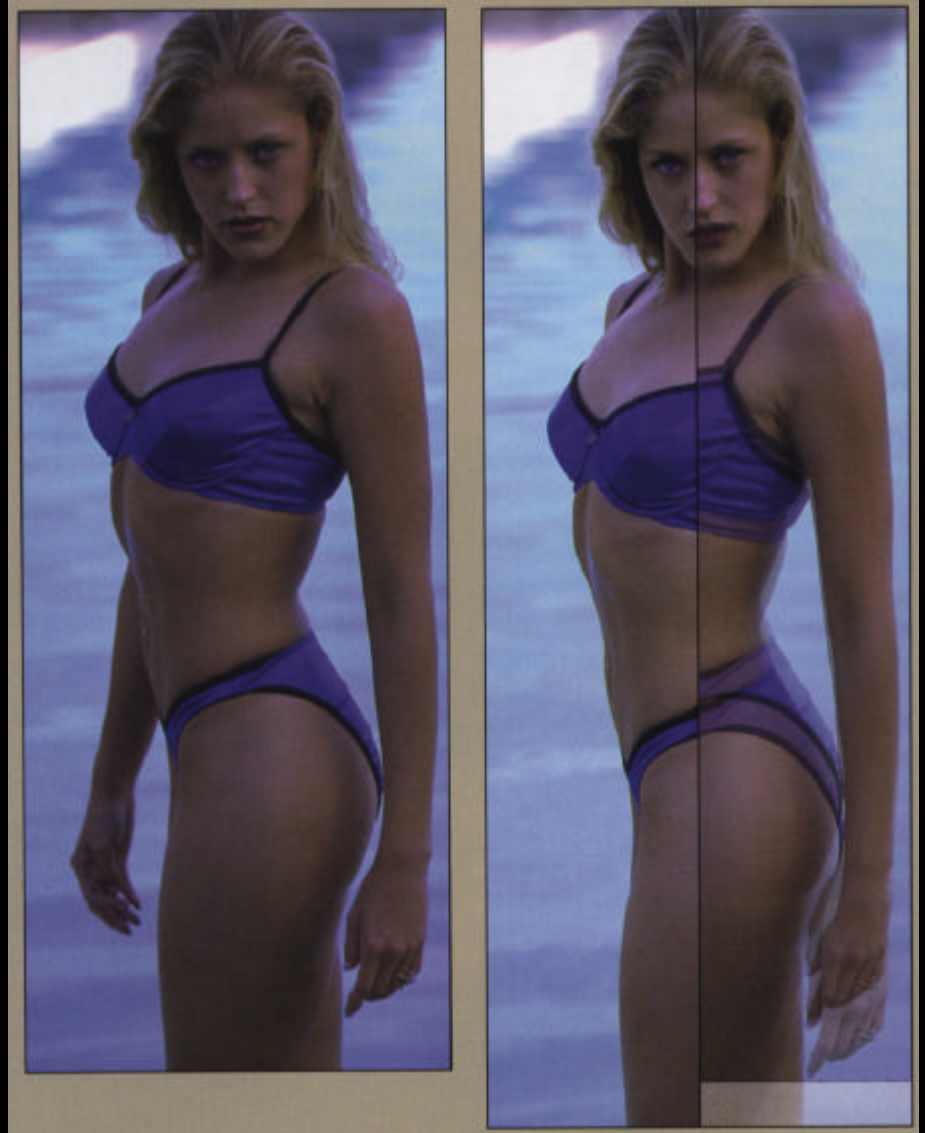
There is no passive recording

Snapshot-Perspective-Speed, aperture-Filter-Lighting-Processing & Print-Make up-**Retouching**

Touch-up: undesirable lines



Touch-up: stretch and arm



Deforming lens

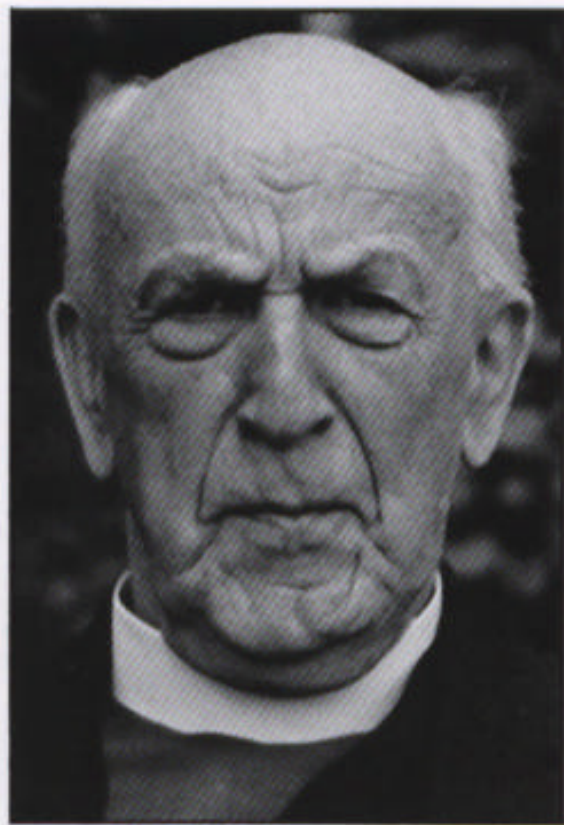
- Deform one part of the frame
- Stretched arm and legs



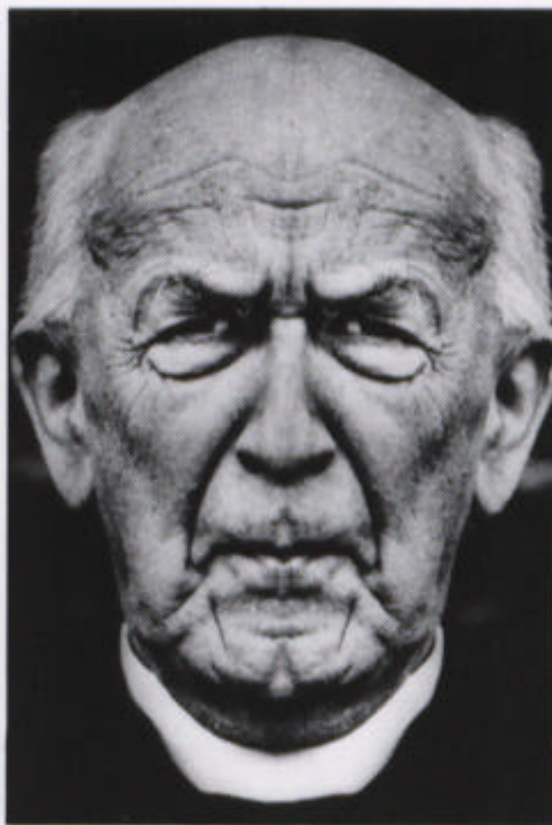
Touch-up: symmetry



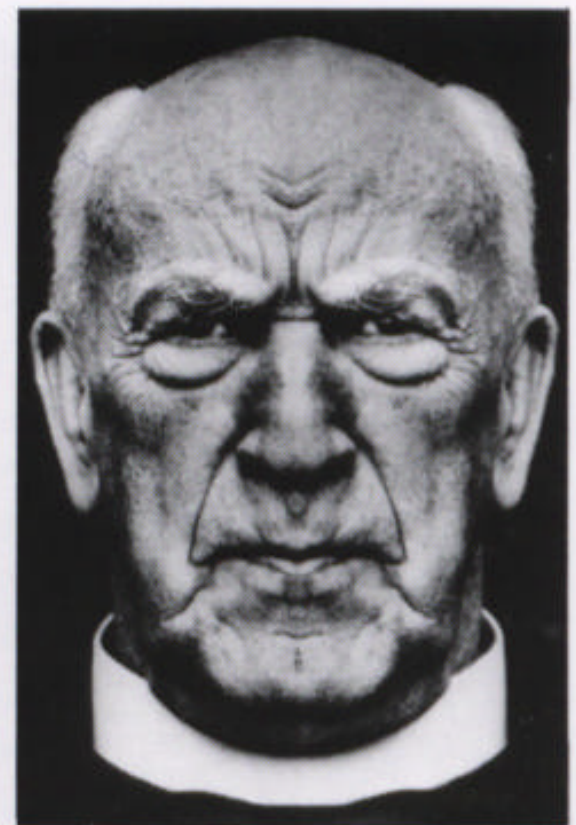
Symmetry



Original portrait



Two right halves



Two left halves

Personal gallery



There is no passive recording

Snapshot-Perspective-Speed, aperture-Filter-Lighting-Processing & Print-Make up-**Retouching**

Personal gallery



There is no passive recording

Snapshot-Perspective-Speed, aperture-Filter-Lighting-Processing & Print-Make up-**Retouching**

Personal gallery



There is no passive recording

Snapshot-Perspective-Speed, aperture-Filter-Lighting-Processing & Print-Make up-**Retouching**

Personal gallery



There is no passive recording

Snapshot-Perspective-Speed, aperture-Filter-Lighting-Processing & Print-Make up-**Retouching**

Photo-montage



There is no passive recording Snapshot-Perspective-Speed, aperture-Filter-Lighting-Processing & Print-Make up-**Retouching**

Photo-montage



There is no passive recording

Snapshot-Perspective-Speed, aperture-Filter-Lighting-Processing & Print-Make up-**Retouching**

Photo-montage



There is no passive recording

Snapshot-Perspective-Speed, aperture-Filter-Lighting-Processing & Print-Make up-**Retouching**

Plan

- Snapshot
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- Make-up
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- Discussion

Discussion

- What are we trying to control?

What are we trying to control?

- Perspective, composition
 - Viewpoint
 - Lens
 - View-camera, stretch, undistort
- Tones
 - Filter
 - Lighting
 - Processing and print
 - Make-up
 - Retouch
- Selection

Discussion

- Different ways to achieve an effect
- The end justifies the means
 - The final picture is the only criterion

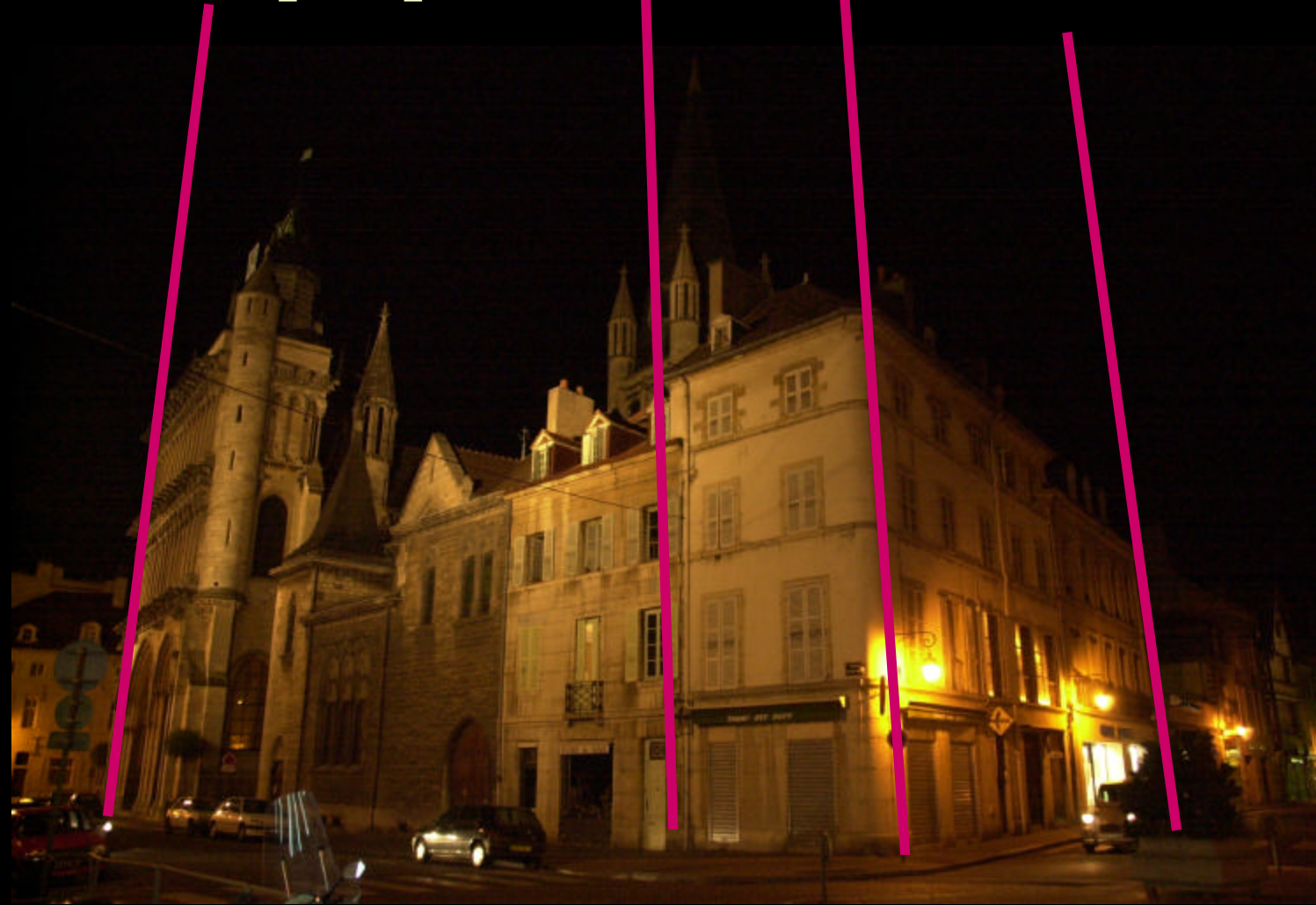
Assignment



There is no passive recording

Assignment

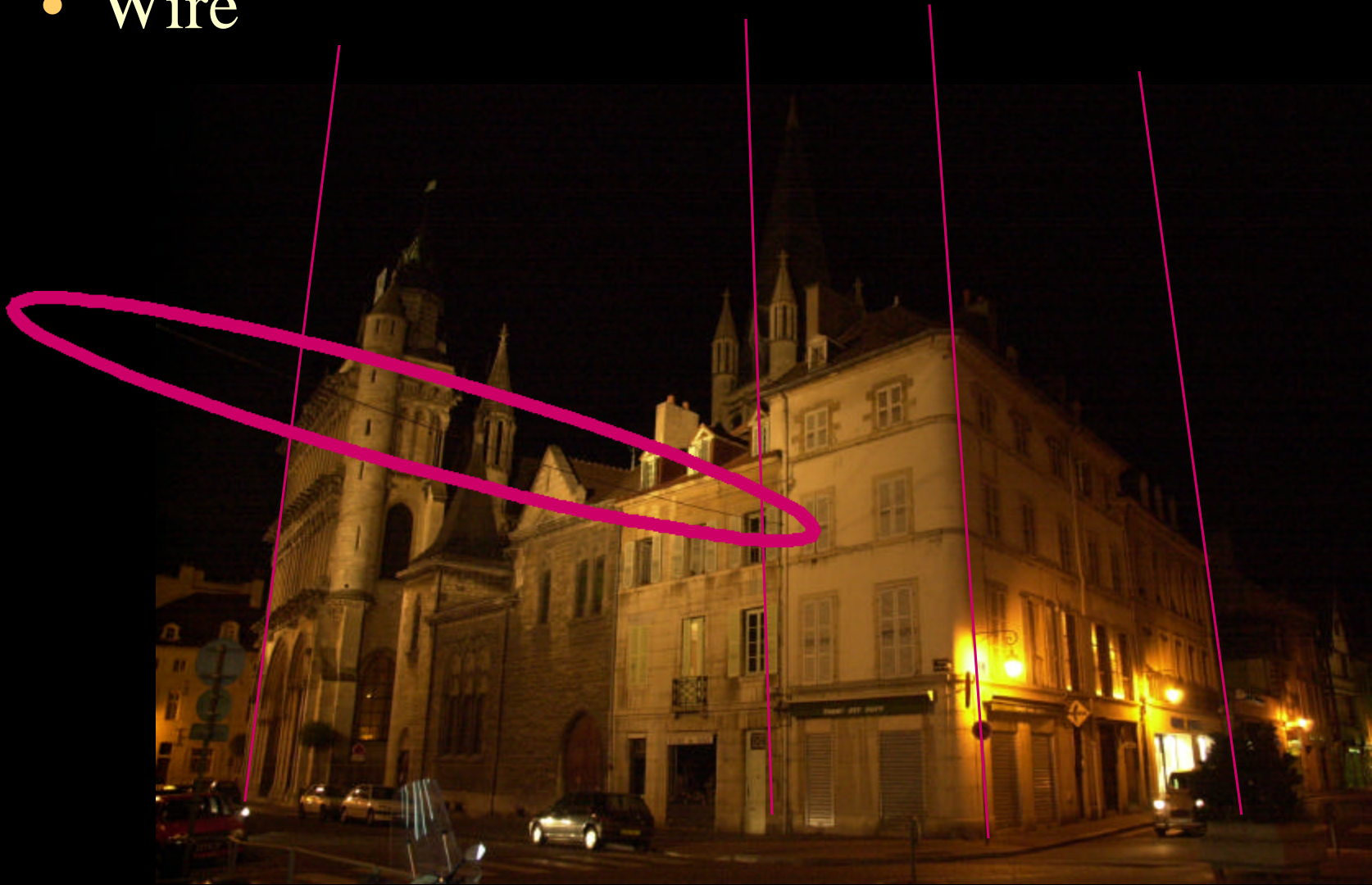
- Un-distort perspective: distort



There is no passive recording

Assignment

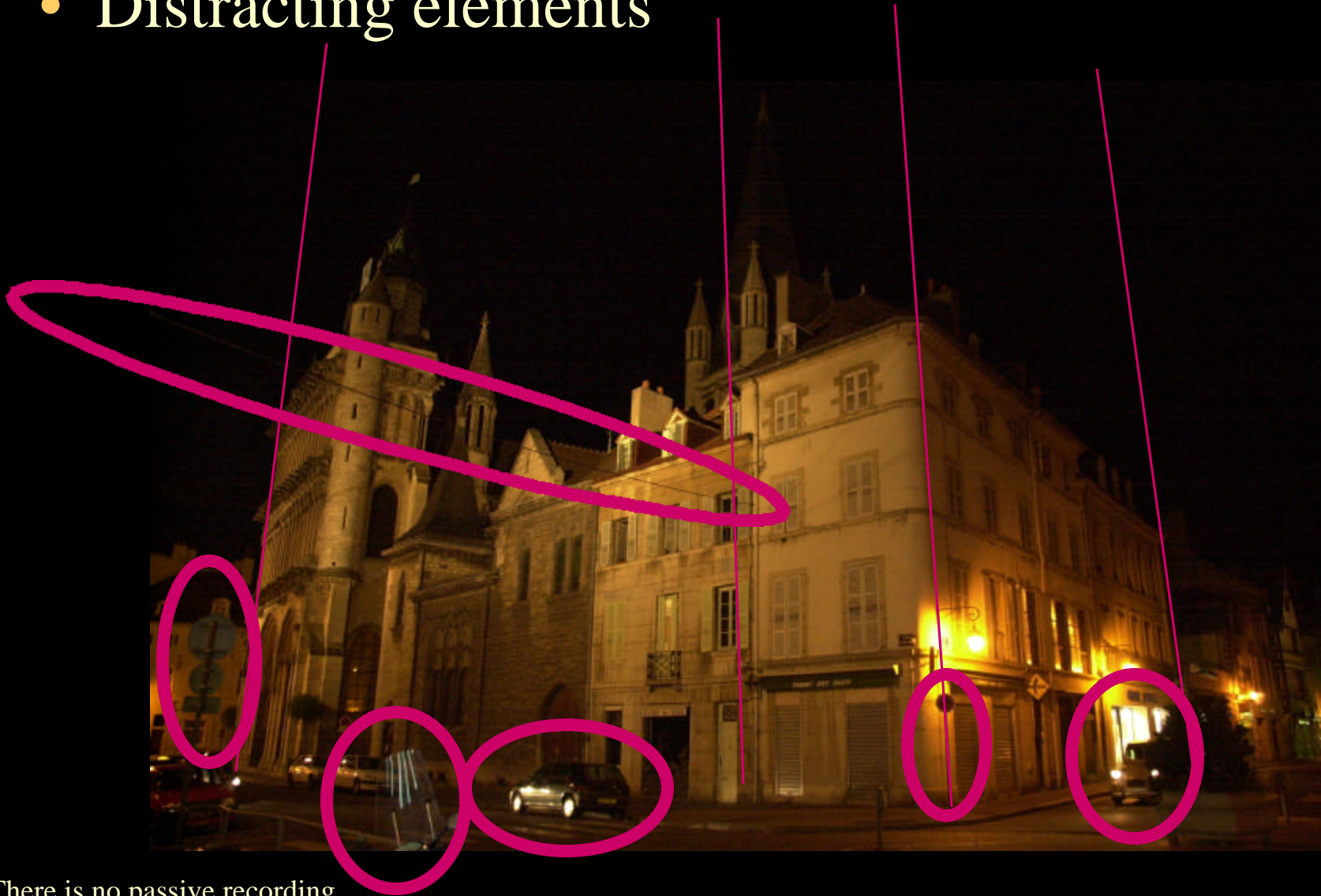
- Wire



There is no passive recording

Assignment

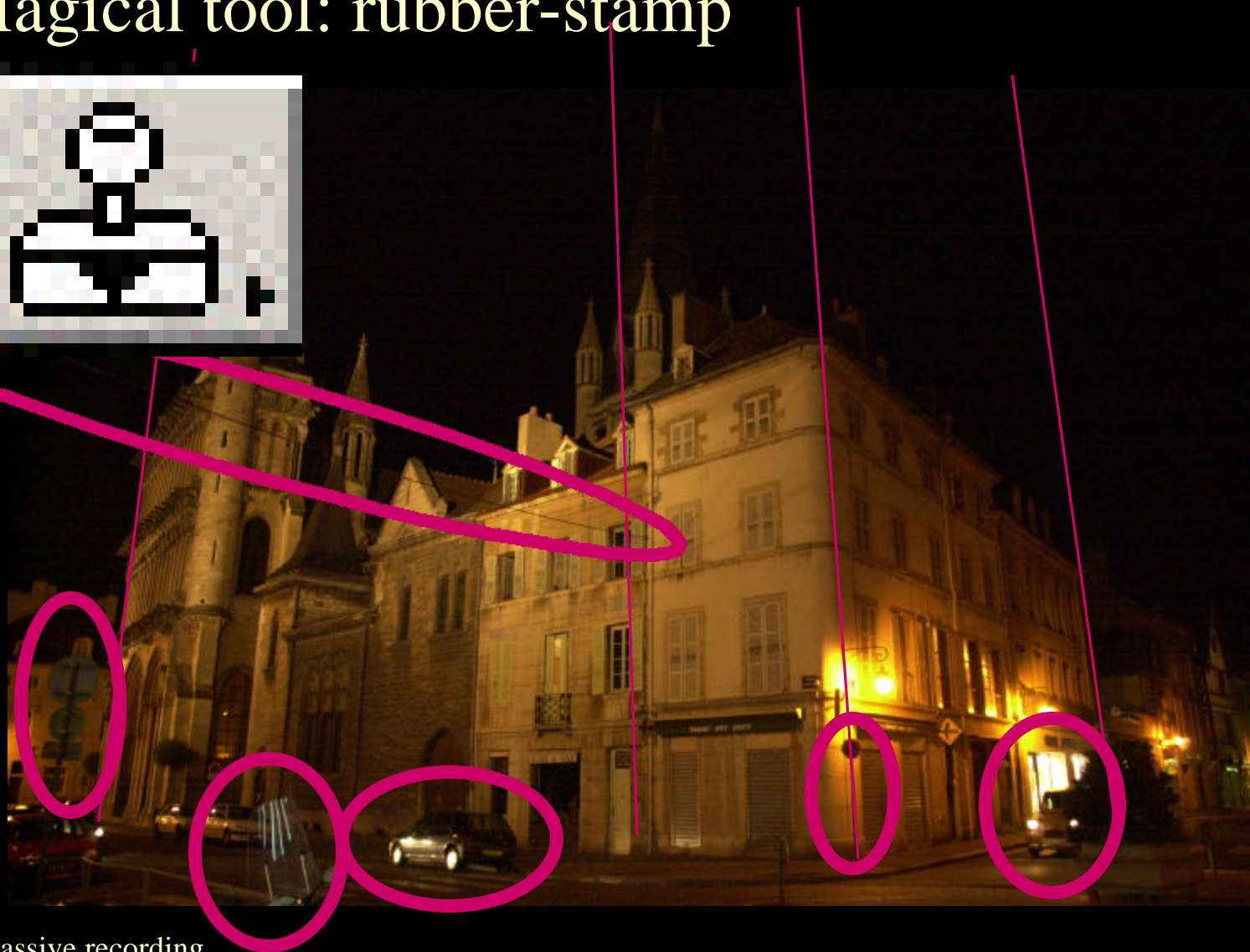
- Distracting elements



There is no passive recording

Assignment: rubber-stamp

- Magical tool: rubber-stamp



There is no passive recording

Assignment

- Before



There is no passive recording

Assignment

- After



There is no passive recording