The Art and Science of Depiction

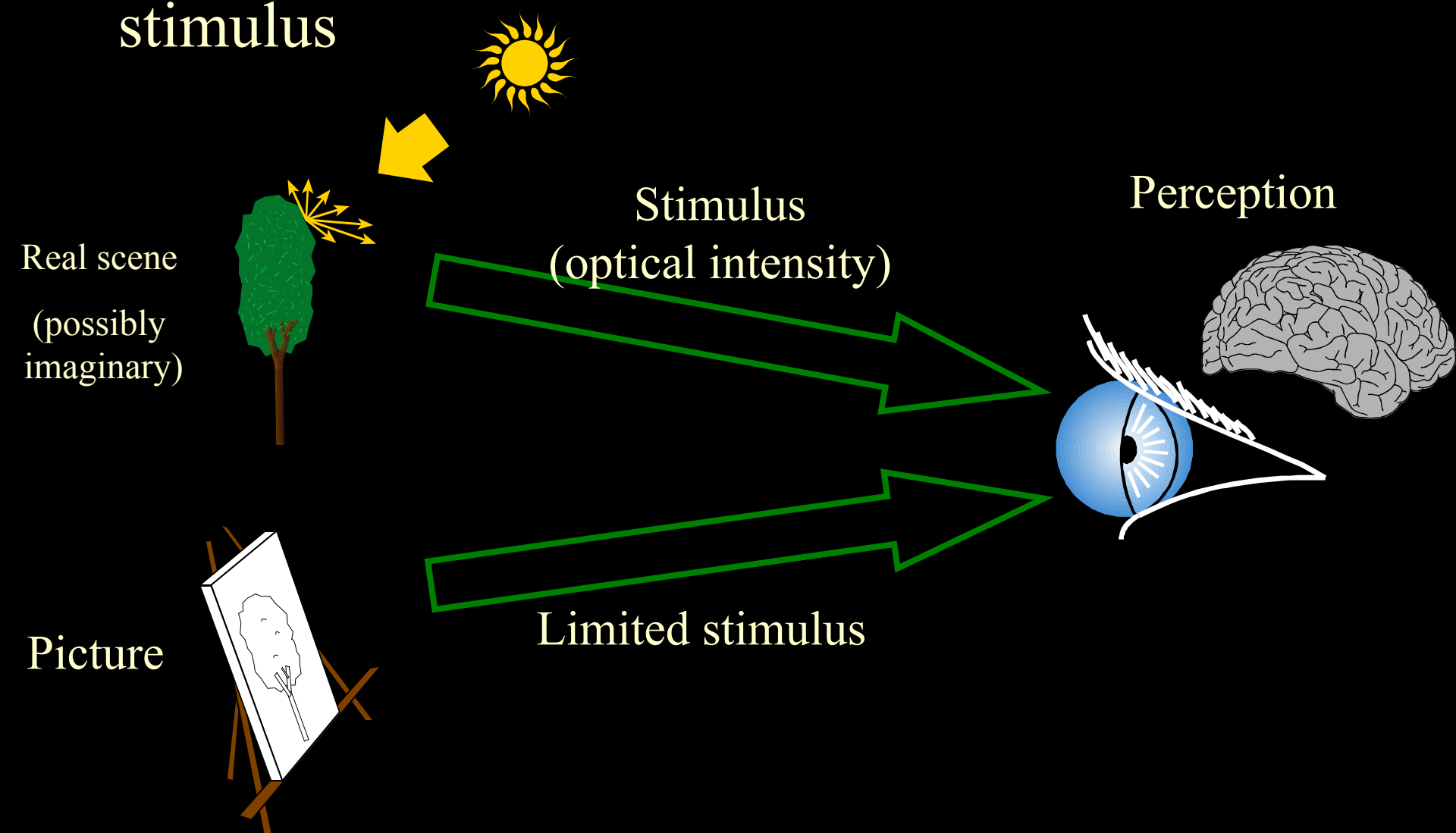
Limitations of the Medium, compensation or accentuation

Fredo Durand

MIT- Lab for Computer Science

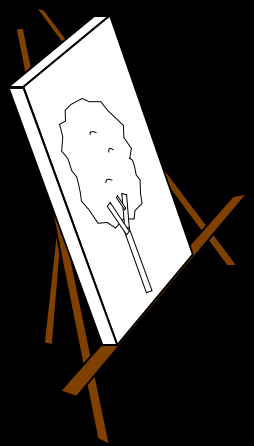
Limitations of the medium

- The medium cannot usually produce the same stimulus



Limitations of the medium

- The picture is flat
- The viewpoint is unique
- The image is finite, it has a frame
- The picture is static
- The contrast is limited
- The gamut (palette) is limited



Limitations of the medium

- Notion pioneered by H. von Helmholtz
  - Physicist and vision scientist (19th century)
- Crucial aspects of art are defined by limitations
  - E.g. composition, color palette

Millet

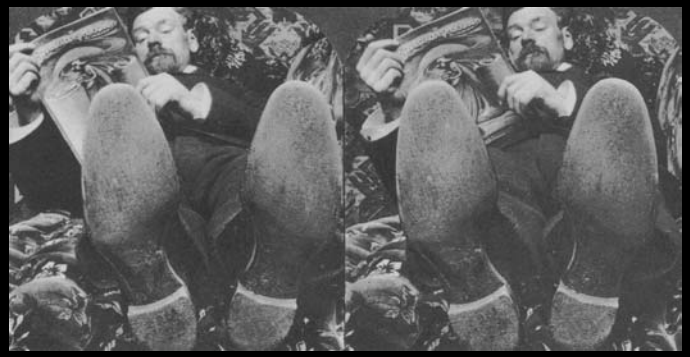
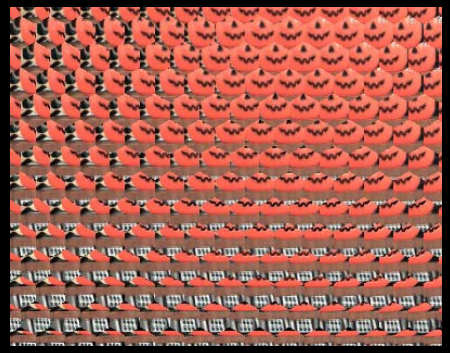
Weston

Strategies

- Elimination
  - Technological
- Compensation
  - Pictorial technique
- Accentuation
  - Because limitation can be good

Elimination of flatness

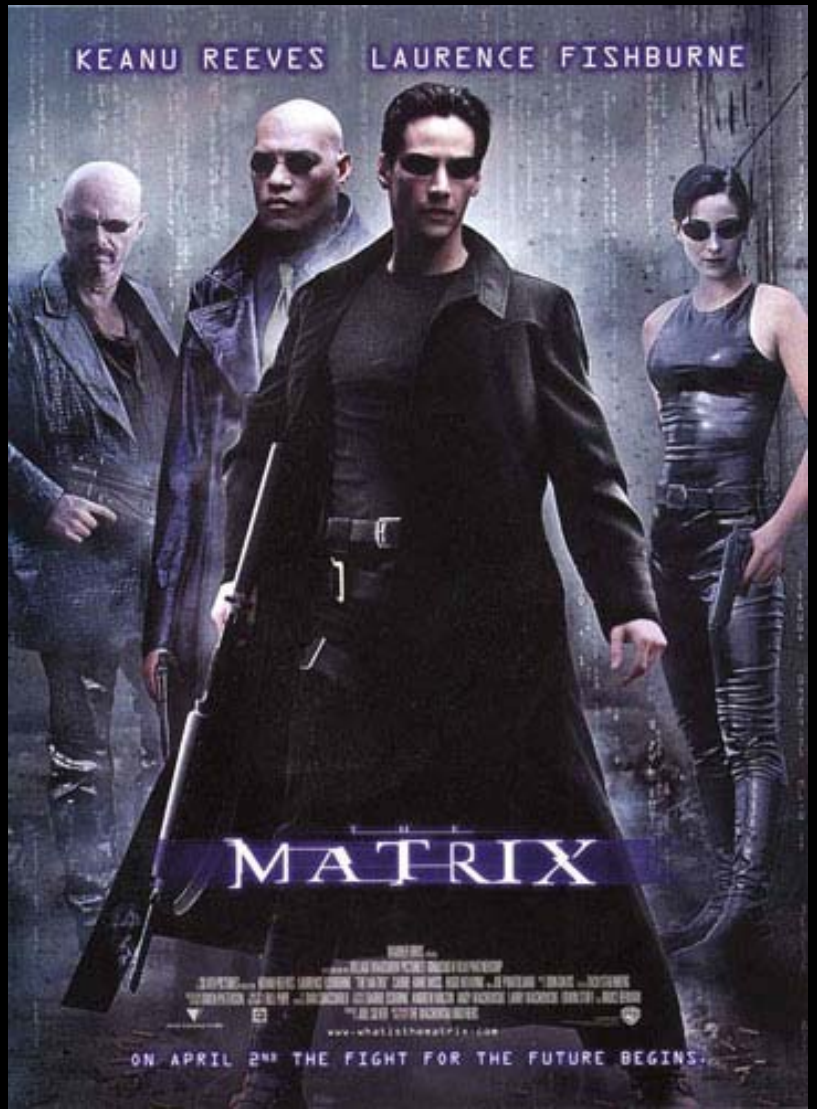
- e.g. Stereo images, head-mounted displays, holograms, autostereoscopic displays, sculpture



Compensation of flatness

- Enhancement of occluding silhouettes, aerial perspective, etc.
- Some cues are missing
  - Here stereo, parallax
- Compensated through other channels
  - Occlusion



Occlusion

- Titian

Occlusion

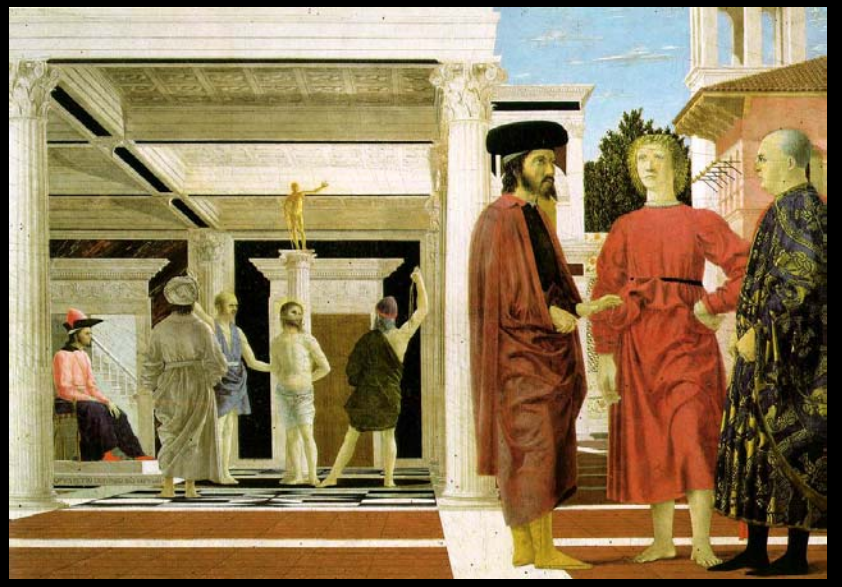
No filter

Blue filter

Red filter

Other compensations of flatness

- Accentuate pictorial cues
  - Aerial perspective
  - Convergence of parallels
  - Relative sizes of objects
  - Texture gradient
  - Shading and shadows
  - Position wrt horizon



Accentuation of flatness

- Here, occlusion boundaries are blurred
  - To enhance the 2D composition

Monet

Special effects: relate different depths

The limitation is good

- Relate objects at different depths
- But still have a 3D impression thanks to compensation

Dissonance

- Magritte

These strategies are general

- Elimination
  - Technological, extend the medium
- Compensation
  - Through different channels
  - Allow to juggle between accentuation & elimination
- Accentuation
  - Because limitations can be a plus

These strategies are general

- For most media
  - Limitation can be more or less pronounced
- Are also relevant if the medium is NOT limited!
  - In order to increase effects

Plan

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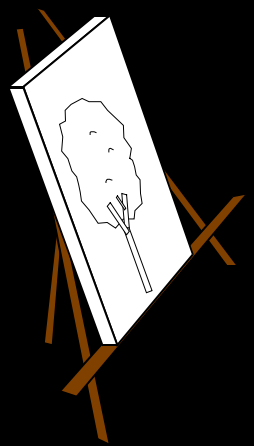
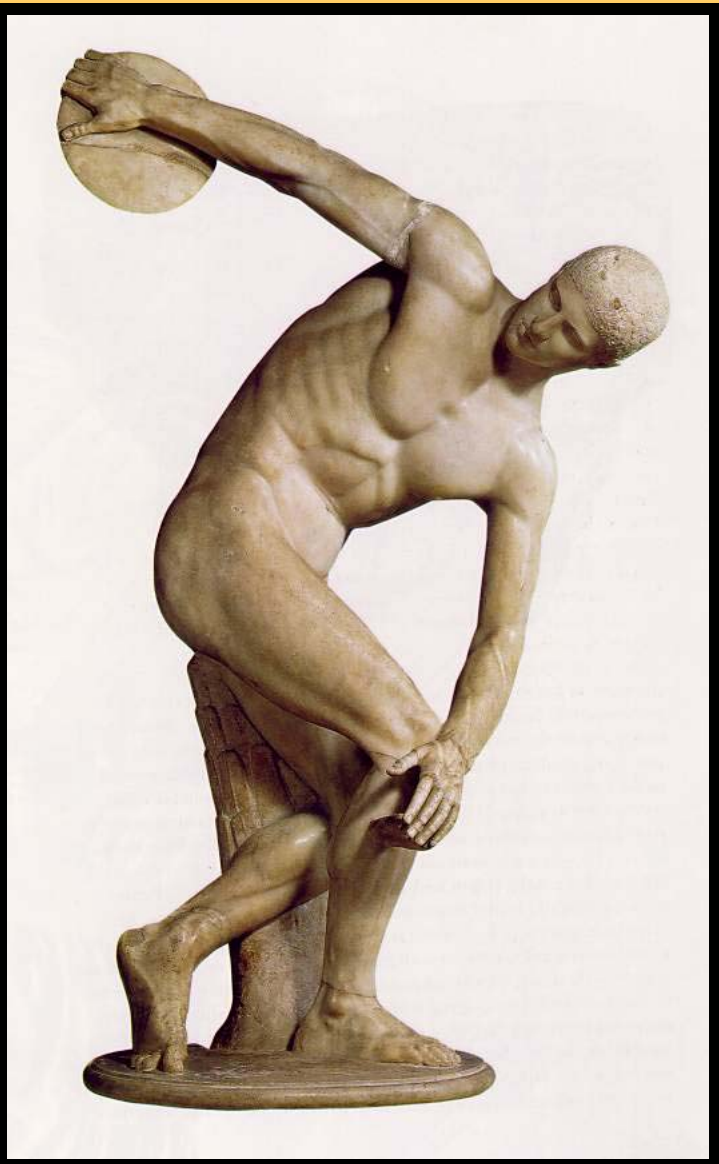


The picture is static

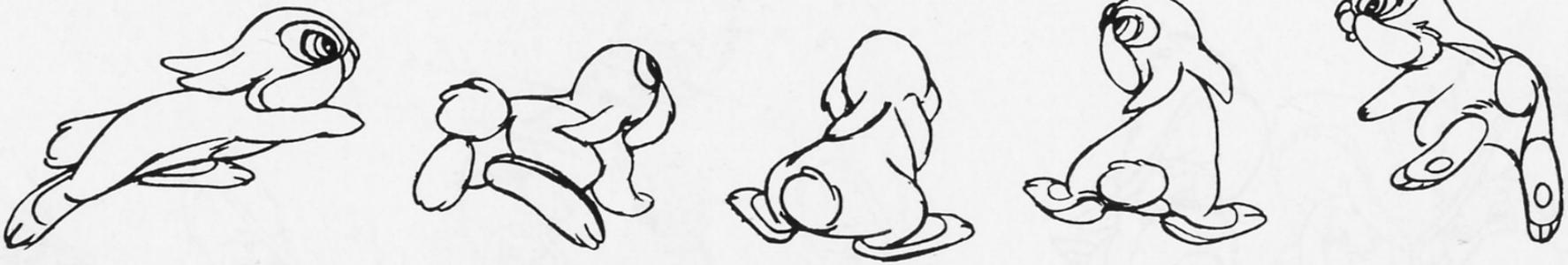
- Pose (not at rest)
- Motion Blur & path
- Multiple snapshot
- Composition
- Op’ Art

Egyptian vs. Greek



Pose accentuated

- Cartoons
- Even when there is no limitation!

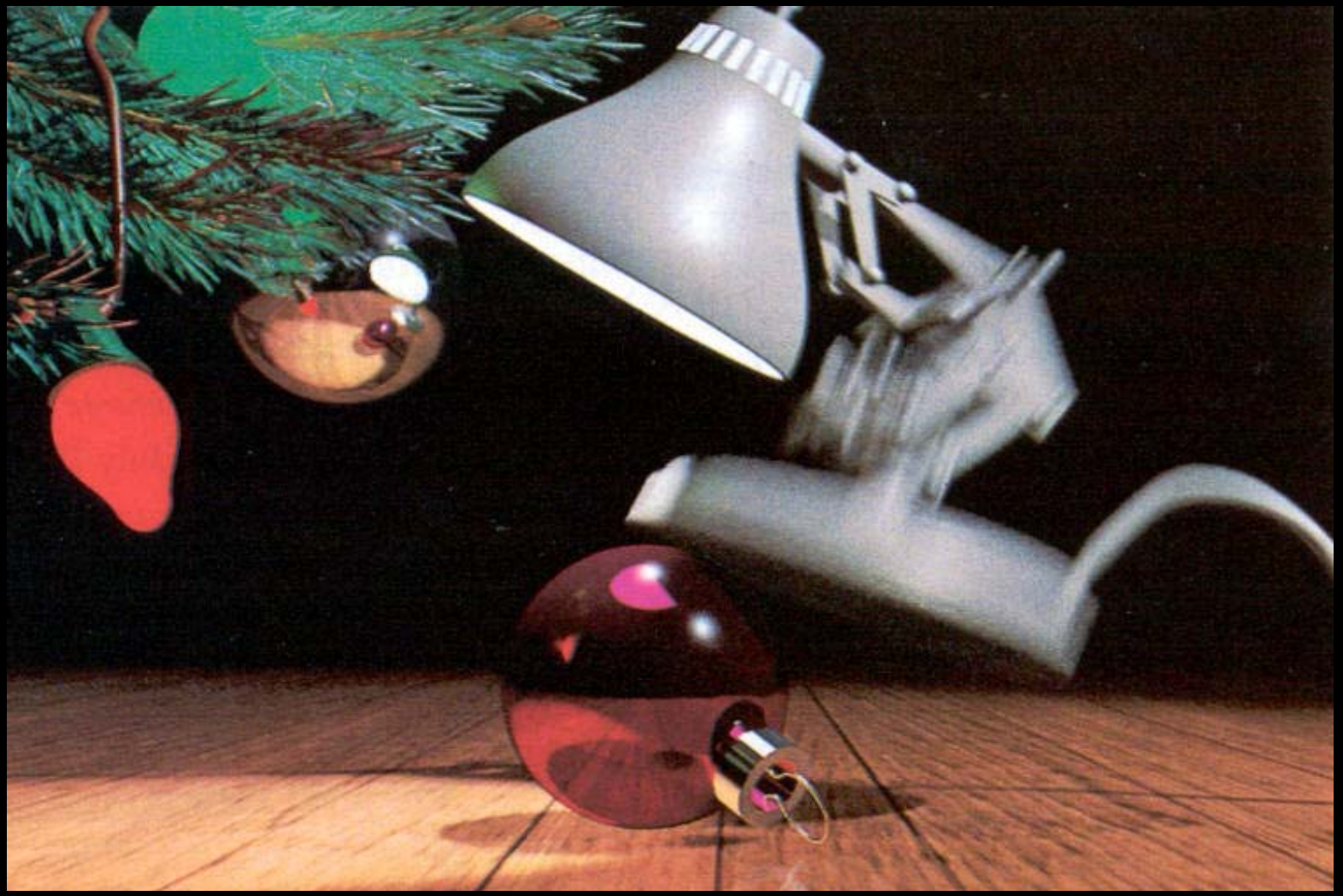


ANIMATOR: *Ollie Johnston*—Bambi.

Path of Movement – Motion Blur

Motion Blur

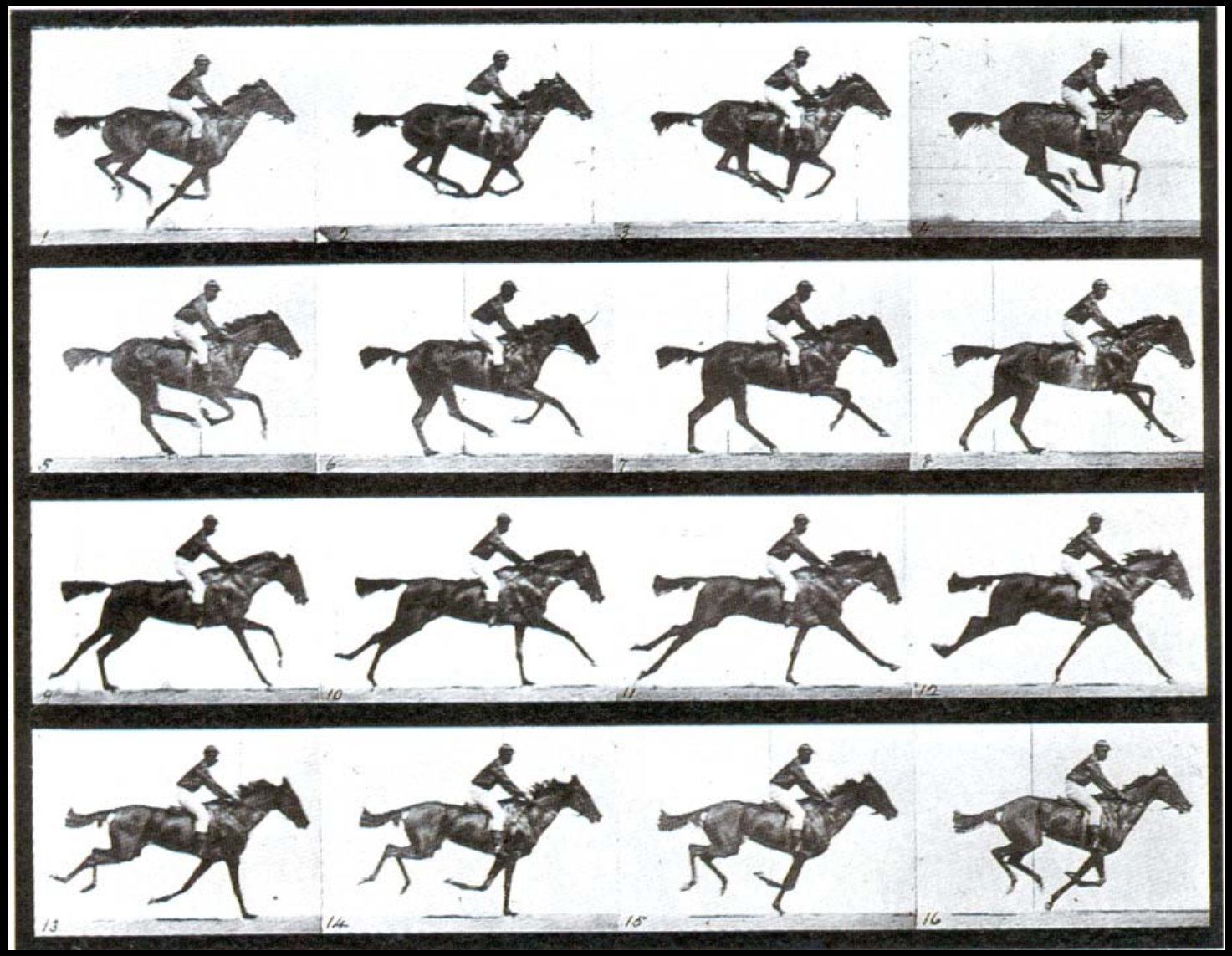
- Luxo Jr., Pixar



Motion Blur

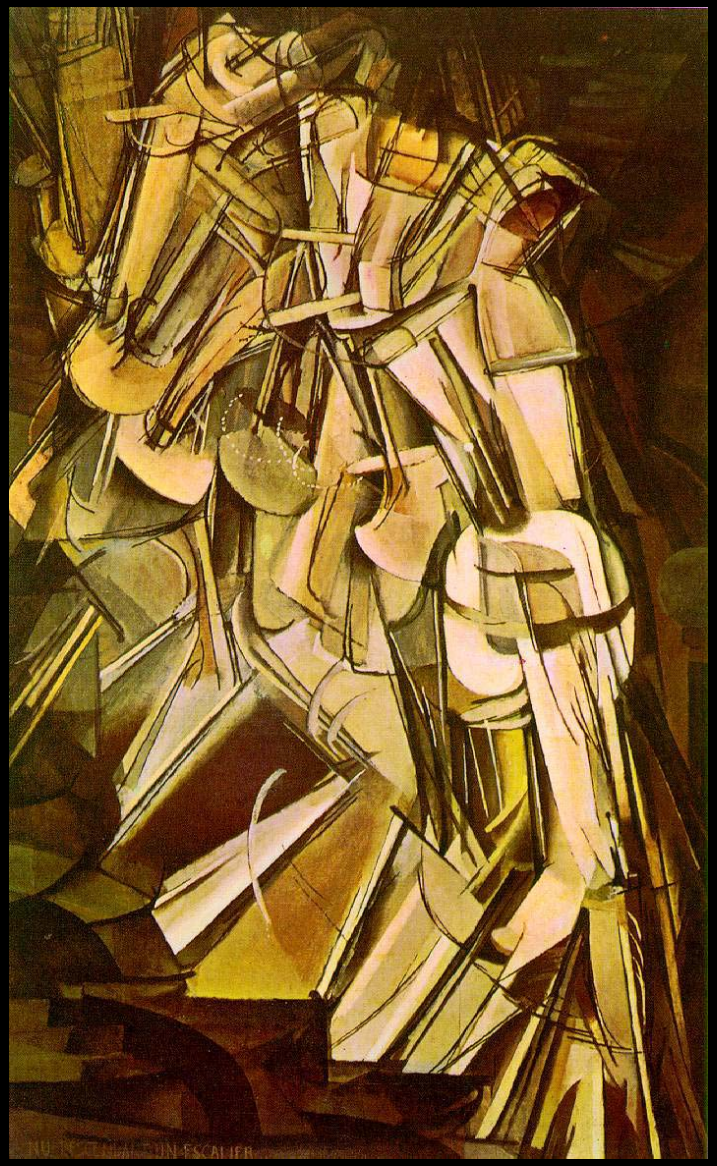
- Velasquez: does not imitate a camera!

Multiple snapshots



Multiple Snapshots

- Marcel Duchamp
  Nude Descending a Staircase
  1912



Multiple snapshots

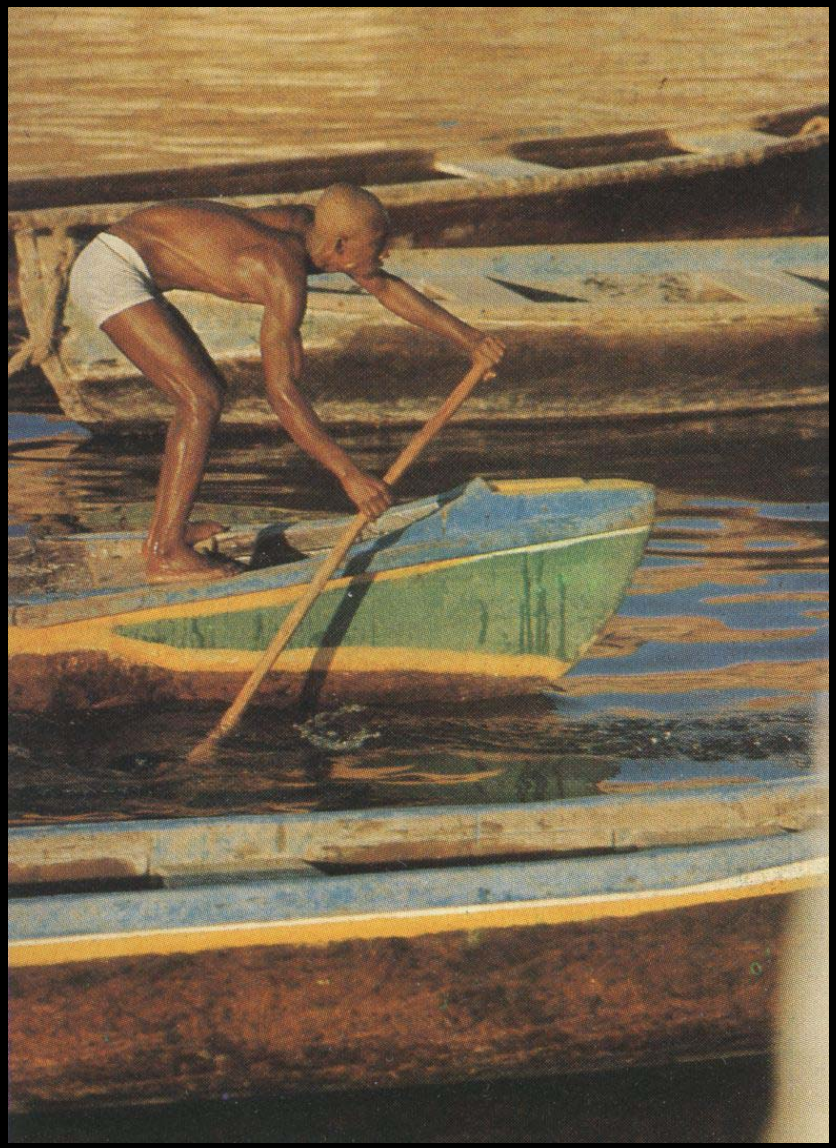
- Sassetta, *The Meeting of St Anthony and Saint Paul*, 1440

Viewpoint

- + lines +pose

Composition - lines

- + Balance

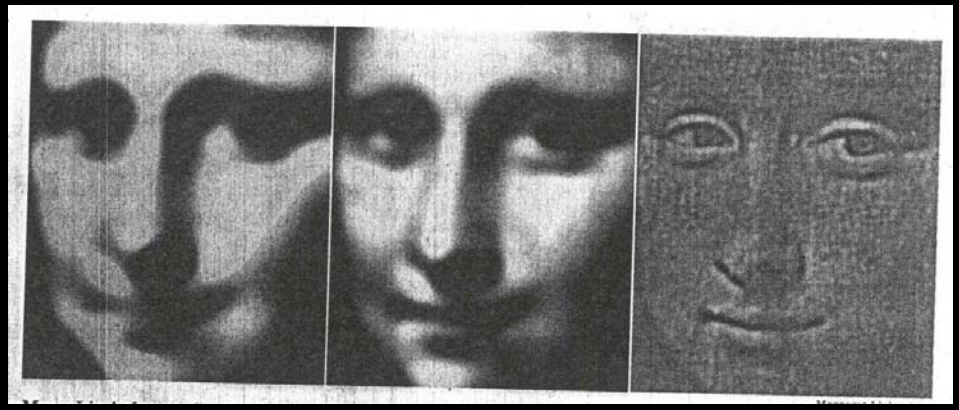


La Gioconda

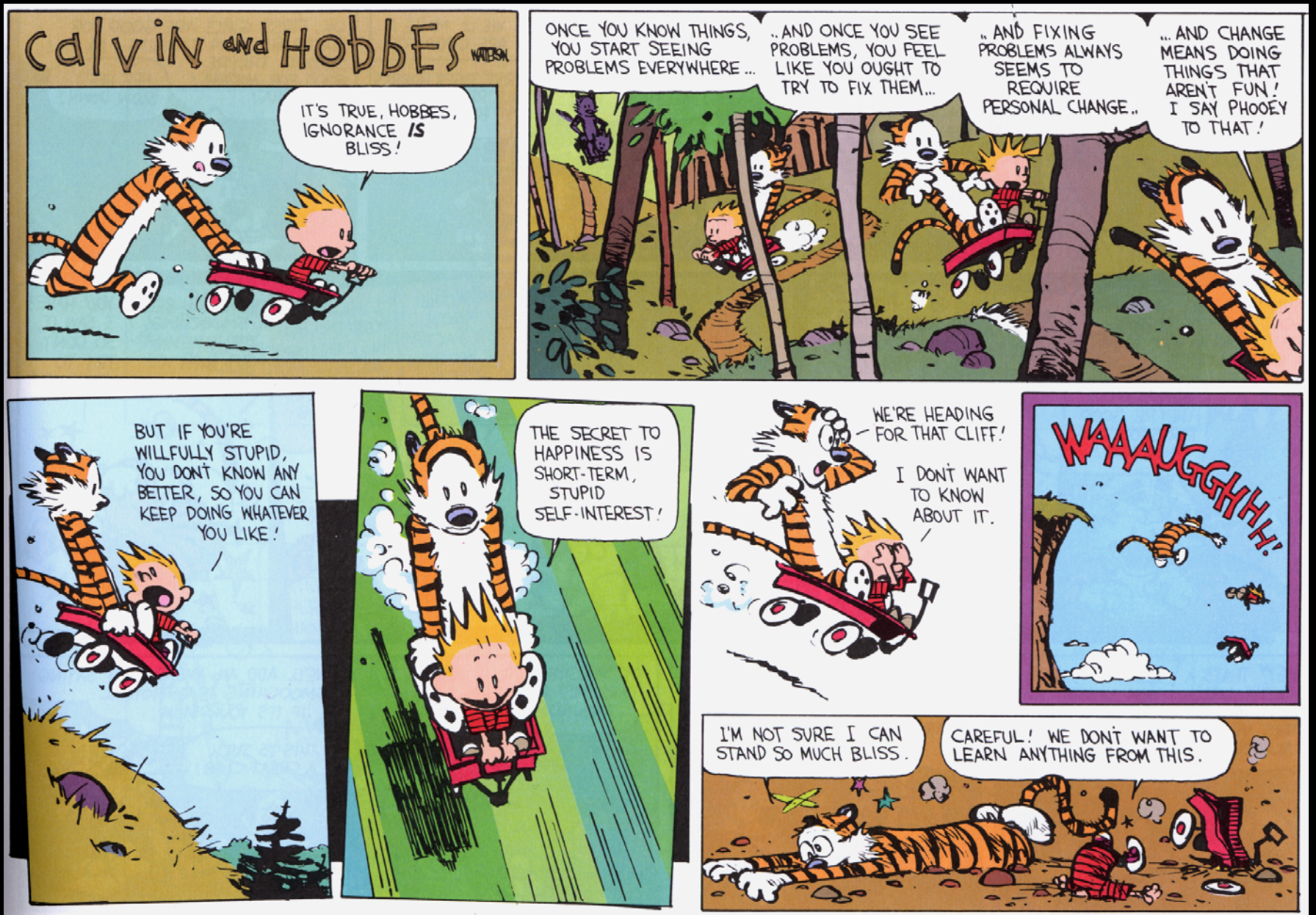
- Sfumato

La Gioconda

- Sfumato
- [Dr. Livingstone]
- Multiresolution vision



A Paradigm…

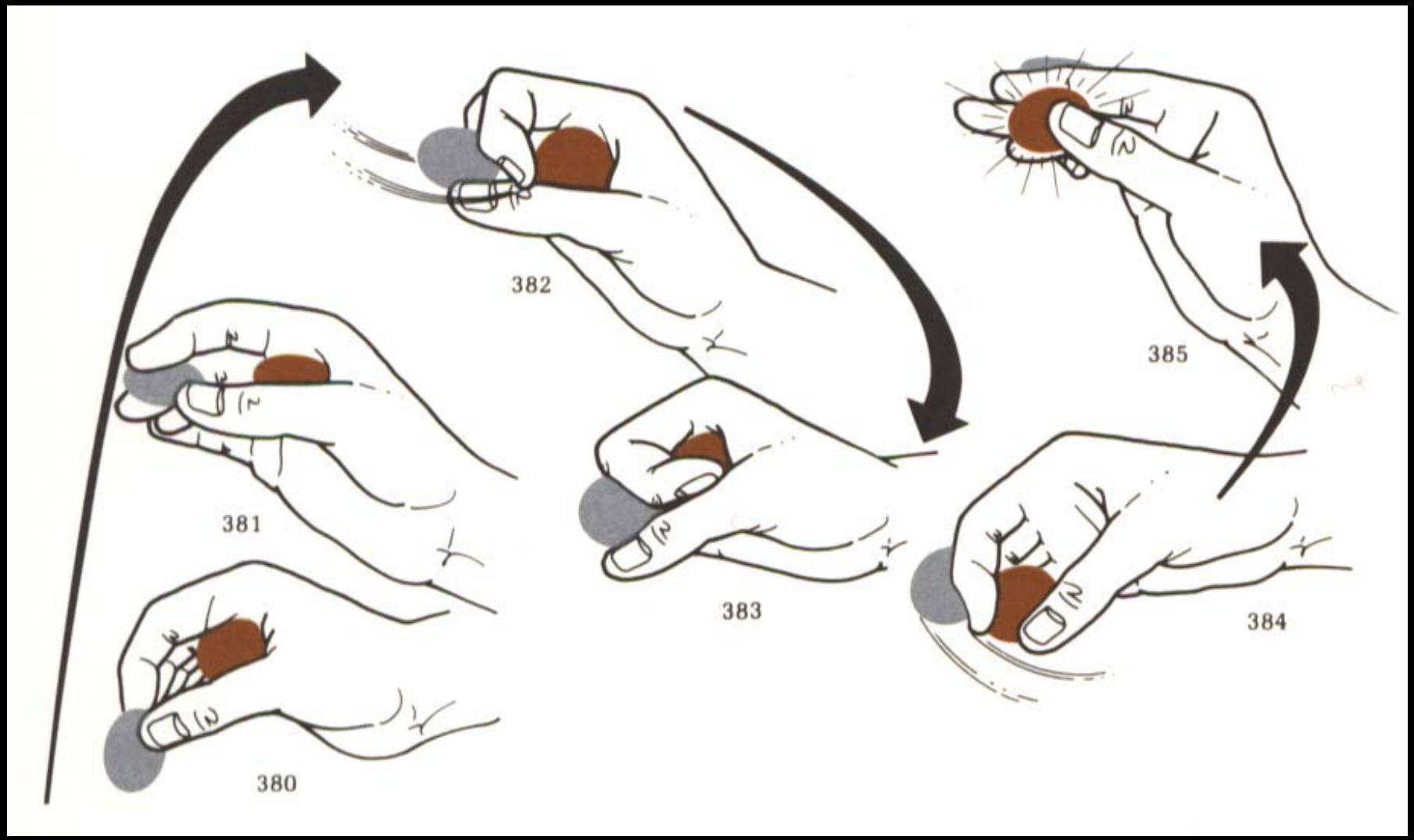

Calvin and Hobbes
WATTERSON
IT'S TRUE, HOBBES, IGNORANCE IS BLISS!
ONCE YOU KNOW THINGS, YOU START SEEING PROBLEMS EVERYWHERE…
..AND ONCE YOU SEE PROBLEMS, YOU FEEL LIKE YOU OUGHT TO TRY TO FIX THEM…
..AND FIXING PROBLEMS ALWAYS SEEMS TO REQUIRE PERSONAL CHANGE..
…AND CHANGE MEANS DOING THINGS THAT AREN'T FUN! I SAY PHOOEY TO THAT!
BUT IF YOU'RE WILLFULLY STUPID, YOU DON'T KNOW ANY BETTER, SO YOU CAN KEEP DOING WHATEVER YOU LIKE!
THE SECRET TO HAPPINESS IS SHORT-TERM, STUPID SELF-INTEREST!
WE'RE HEADING FOR THAT CLIFF!
I DON'T WANT TO KNOW ABOUT IT.
WAAAUGGHHH!
I'M NOT SURE I CAN STAND SO MUCH BLISS.
CAREFUL! WE DON'T WANT TO LEARN ANYTHING FROM THIS.

The limitation is good!

- Tak Kwong Chan
  The Horse –
  Away He Goes 1980
- Static and dynamic quality

The limitation is good!

- Static+dynamic allows us to visualize everything



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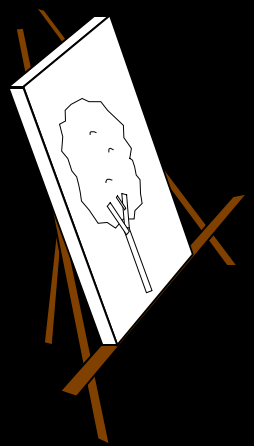
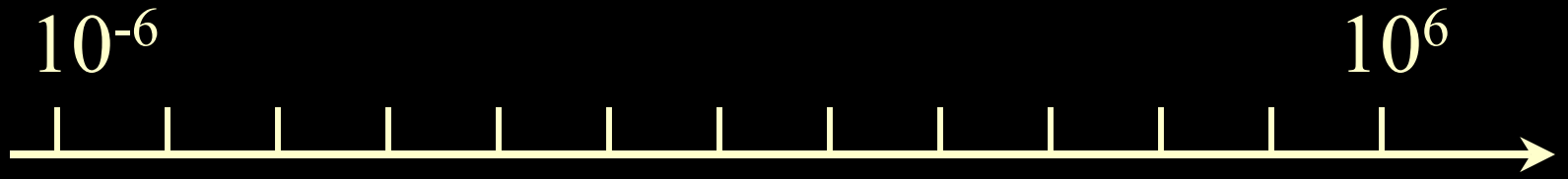


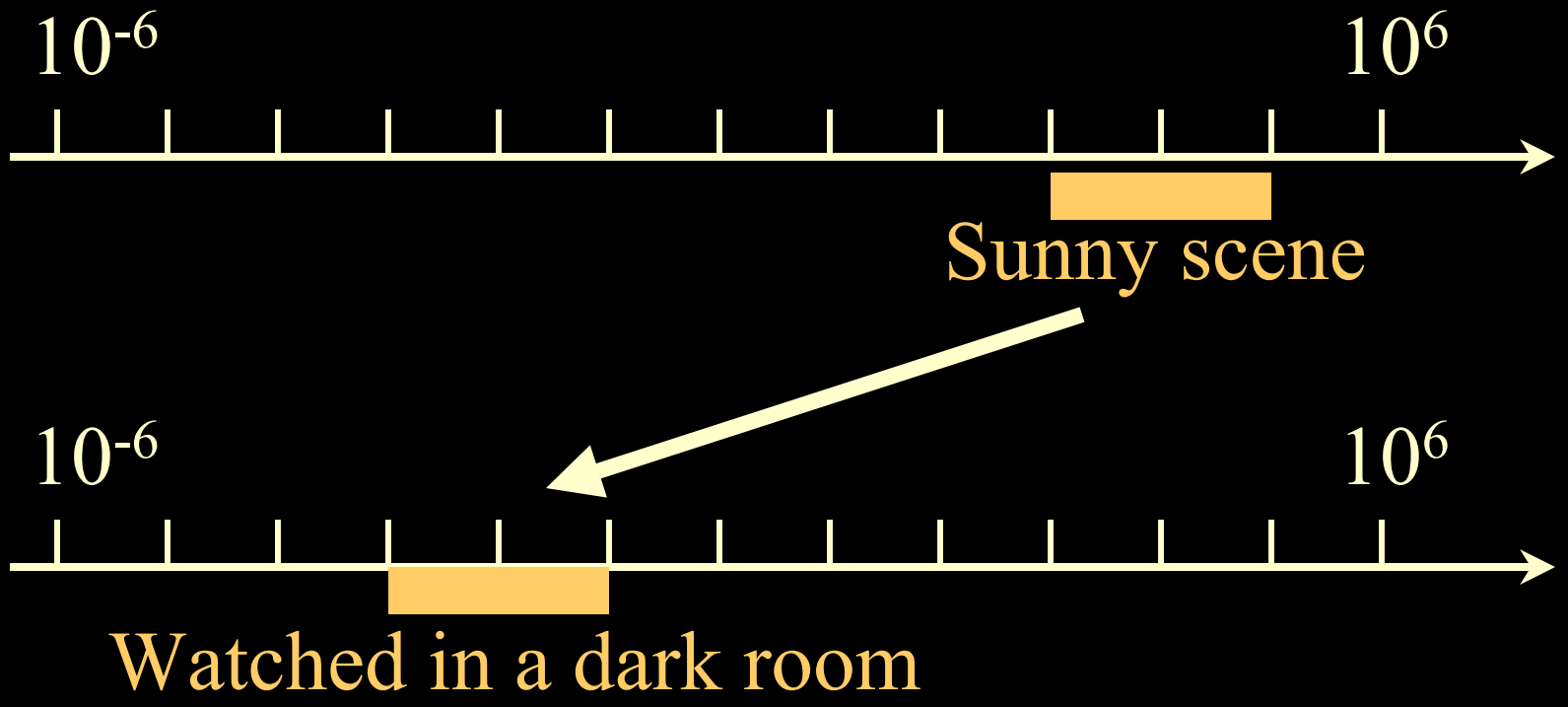
Contrast limitation

- Real world: 10^{-6} to 10^{6} cd/m^2
- Picture
  - Max contrast 1:500
  - Typically 1:50



Two problems

- The image intensity does not match the real conditions



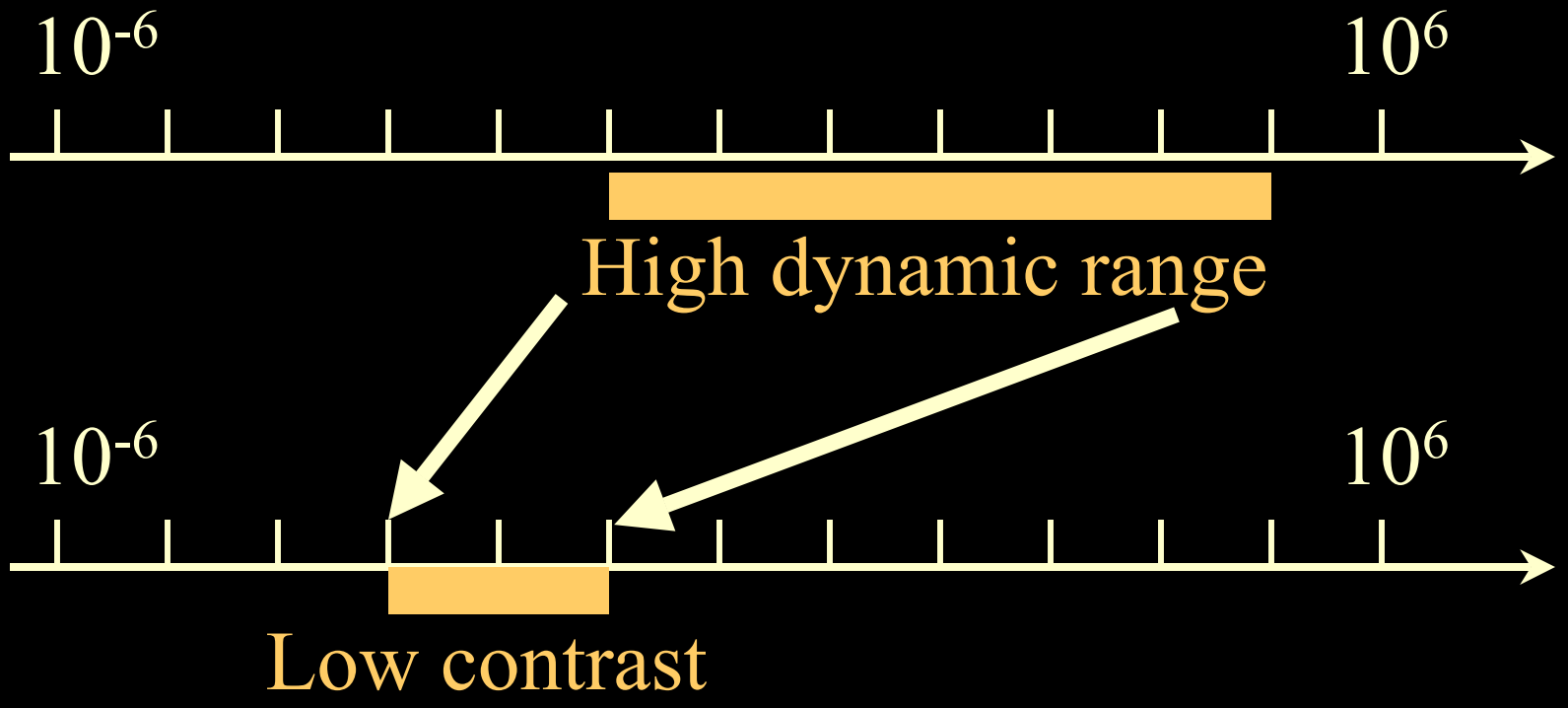
Hunt and Stevens effect

- Perceived contrast increases with luminance
- Colors are more vivid in bright environments

- Hence gamma correction
  - Well, at least one form of gamma correction

Two problems

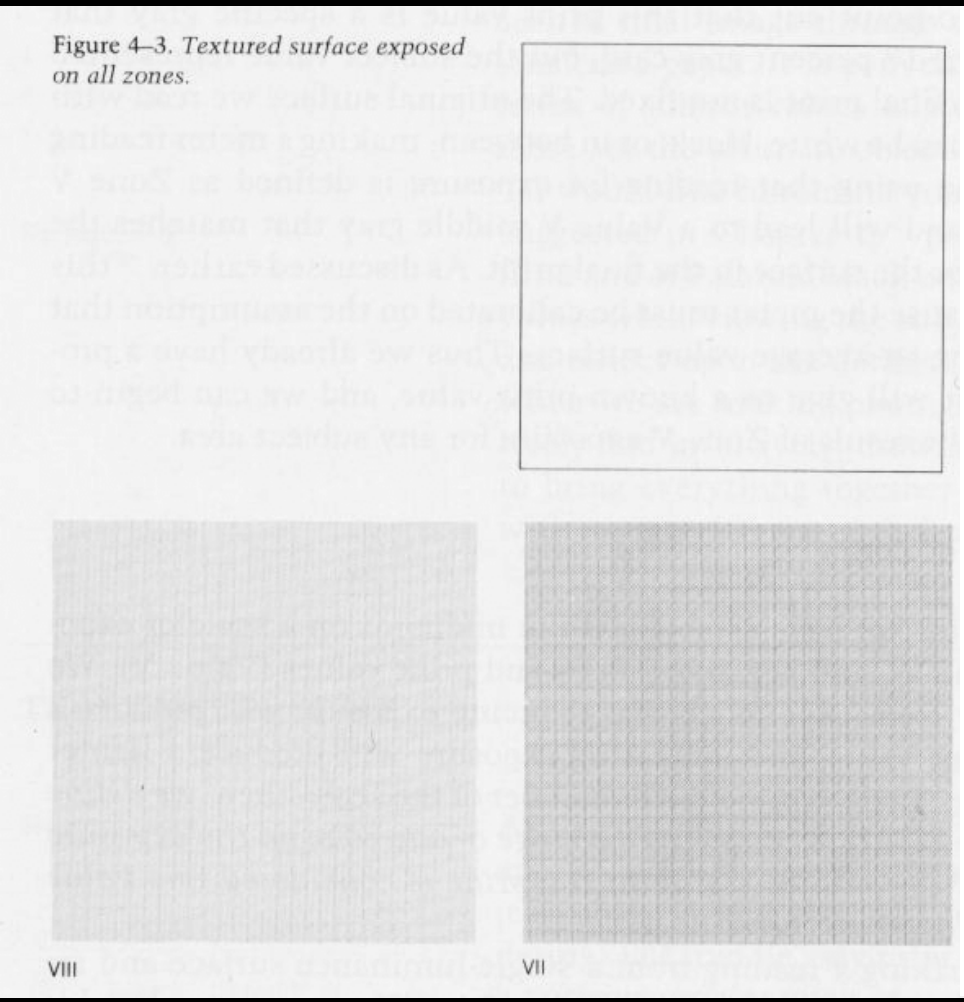
- The image intensity does not match the real conditions
- The contrast is not sufficient

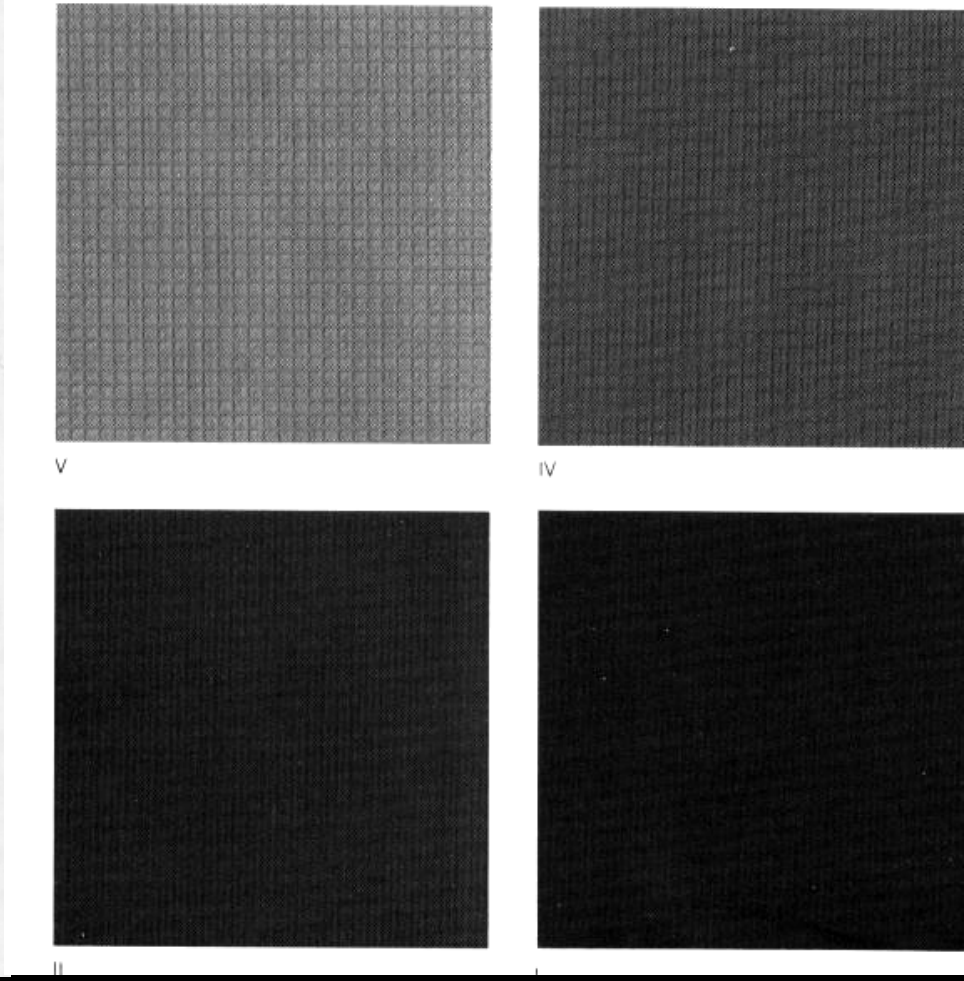


Photography & contrast management

- Try to preserve texture (details)

Figure 4–3. *Textured surface exposed on all zones.*

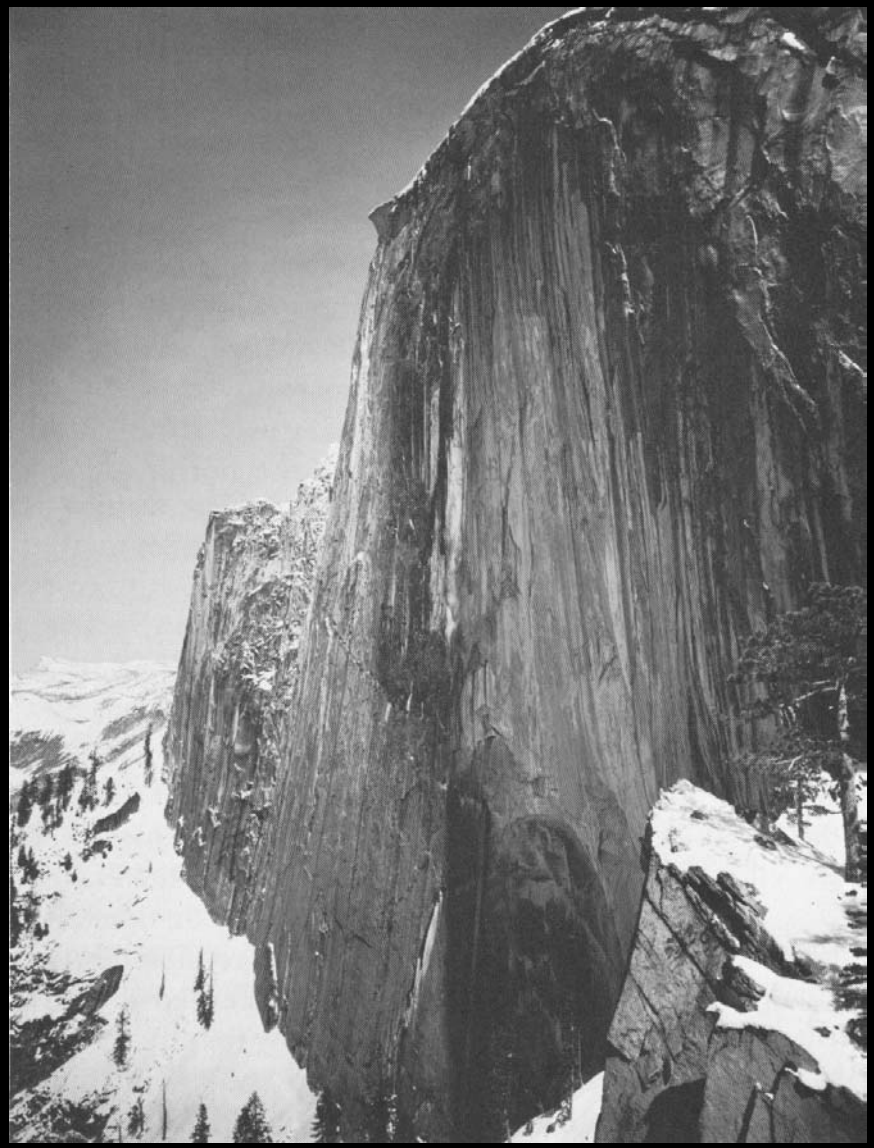


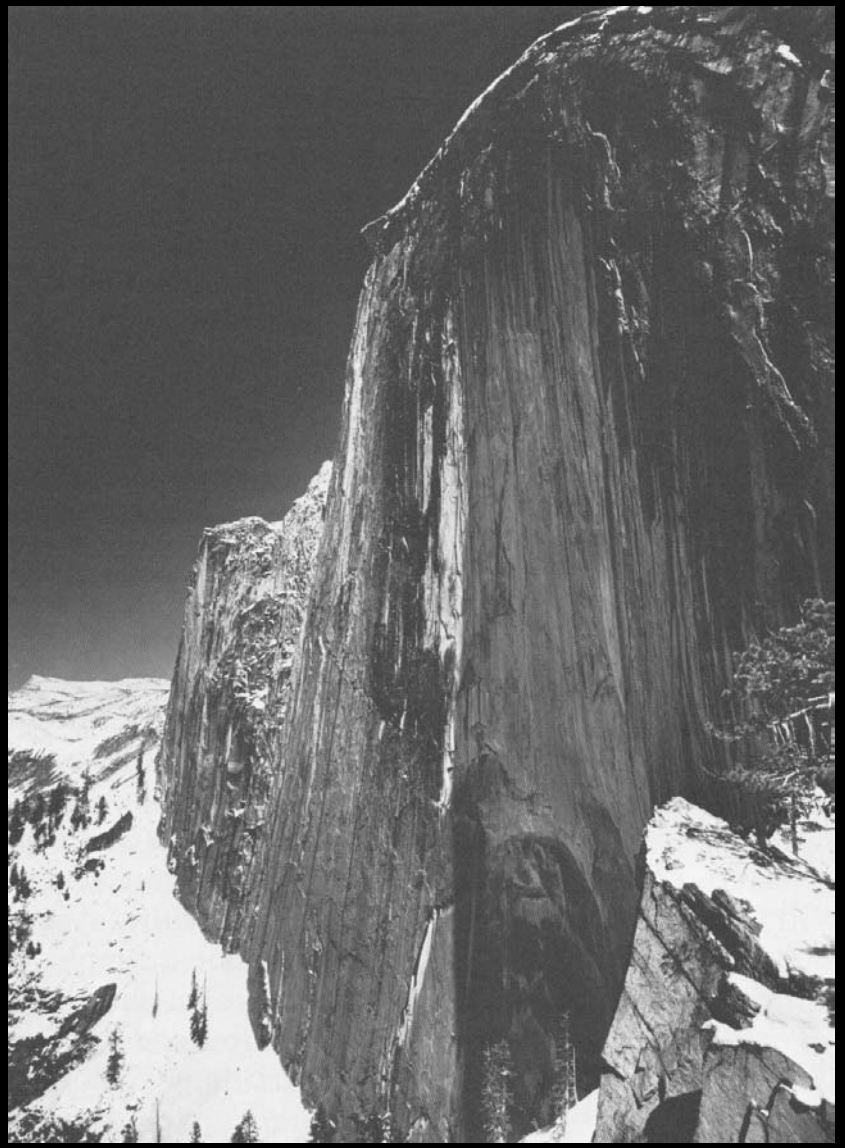


Photography & contrast management

- Try to preserve texture (details)
- When the picture is shot
- Film processing
- Printing

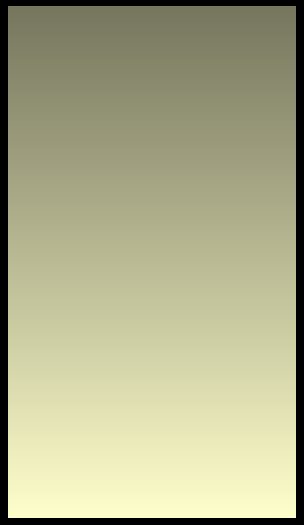
Filterering: red





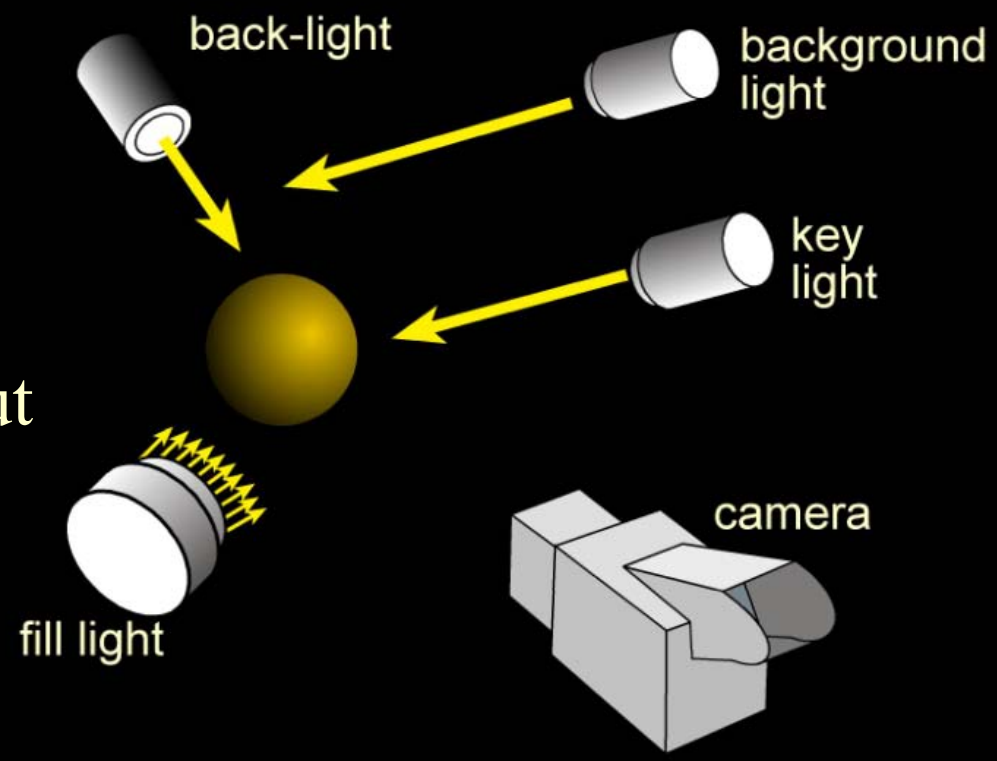
Gradient Filter

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

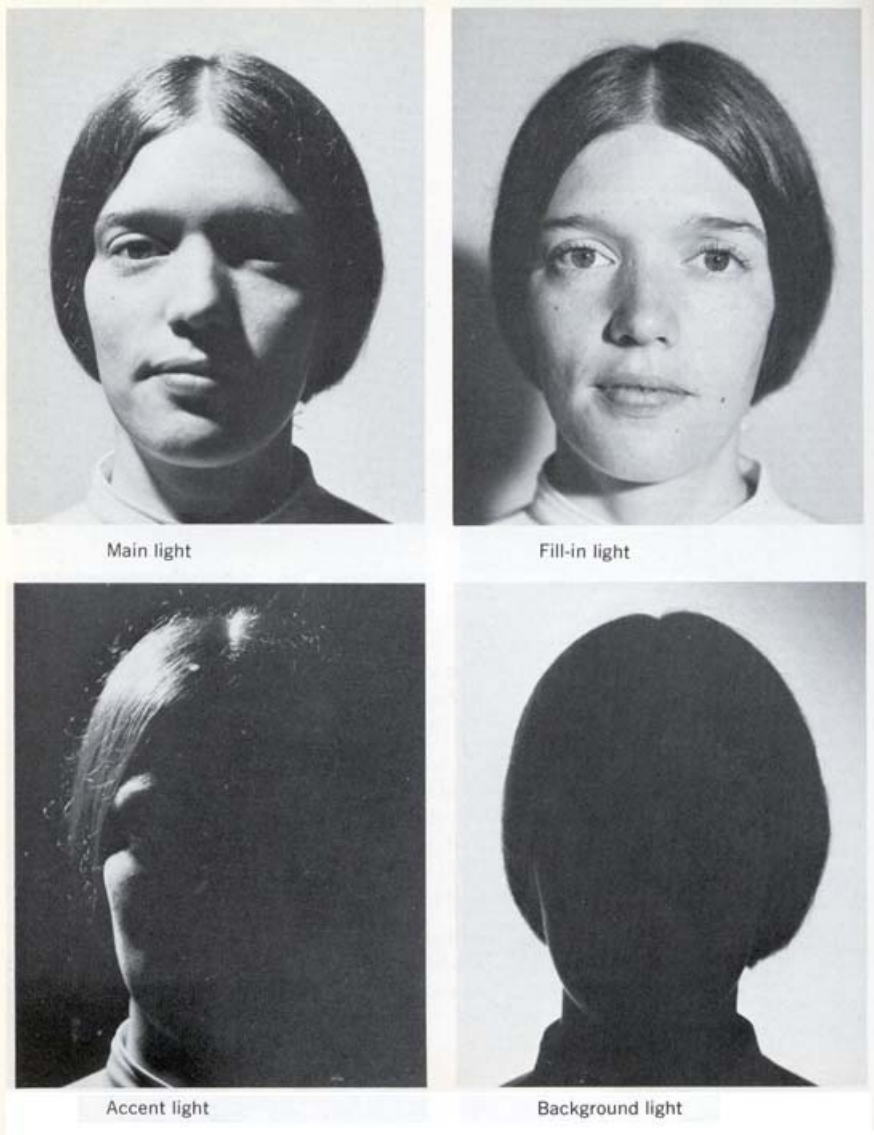


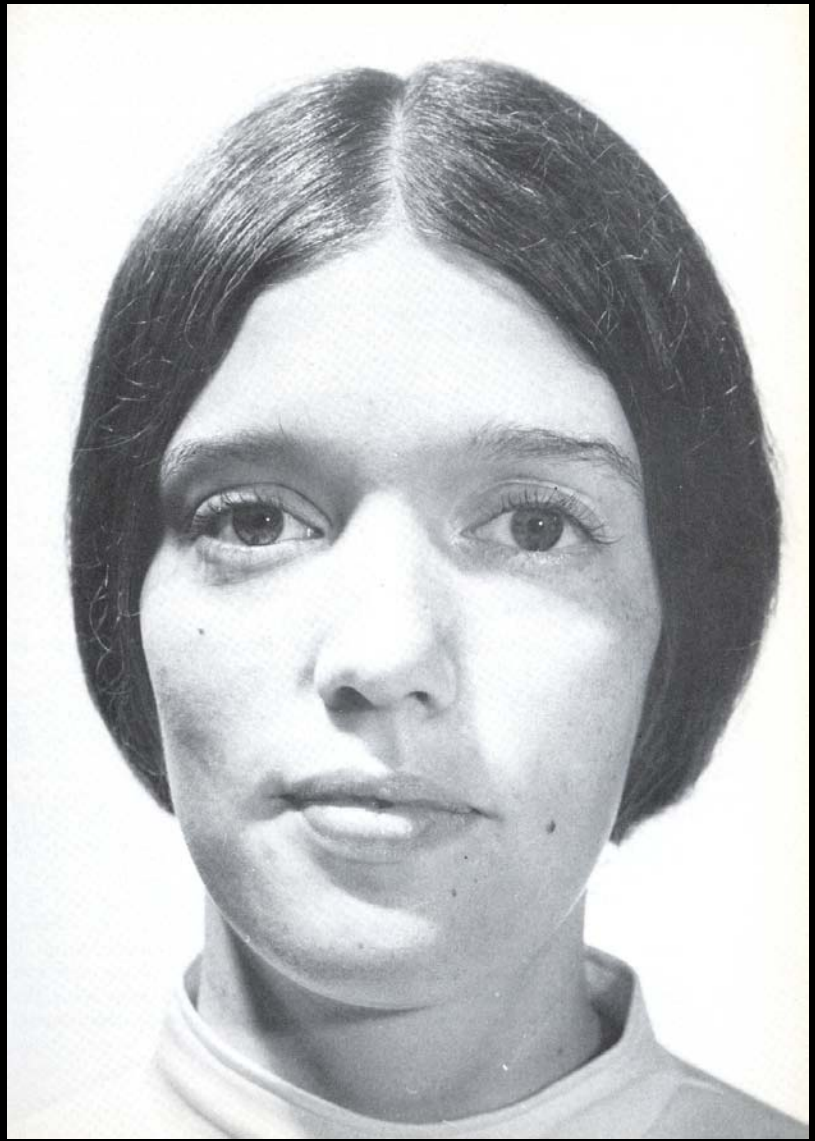
Three Point Lighting

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



Portrait lighting



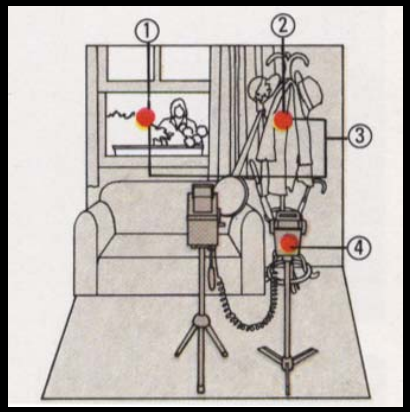


Portrait lighting

- Strong back light
- Enhances occlusion
- Enhance subjective brightness of main character

Fill-in

- Add flash to illuminate the interior
- Brings interior to the level of the exterior

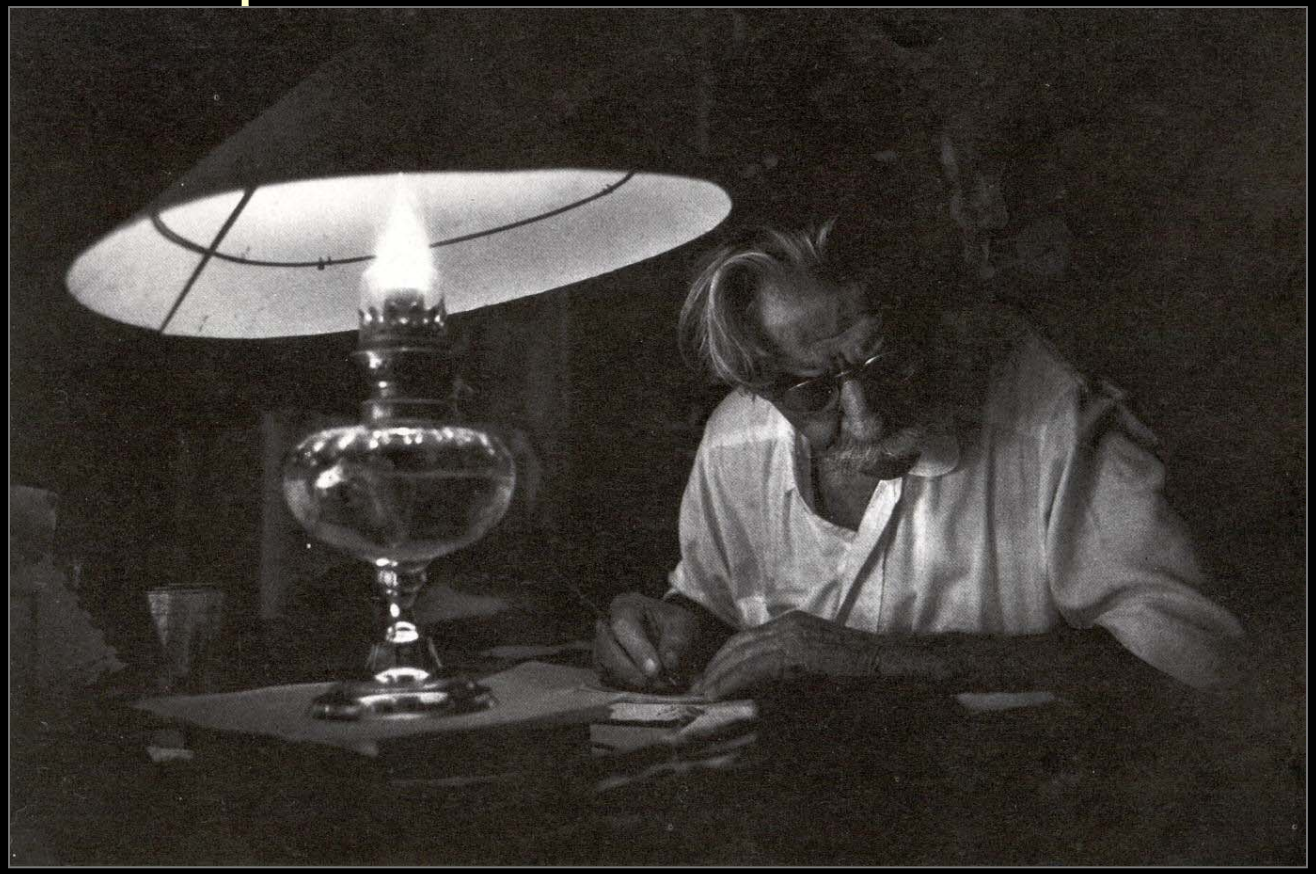


Fill-in & planes of light

- Lighting: contrast & flatness

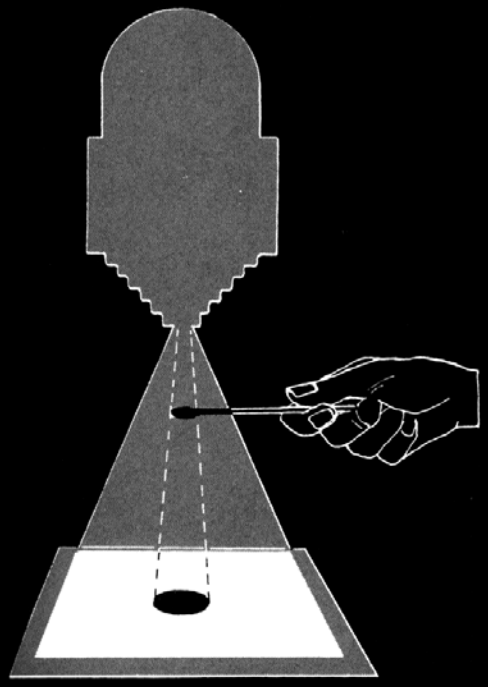
The Print

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

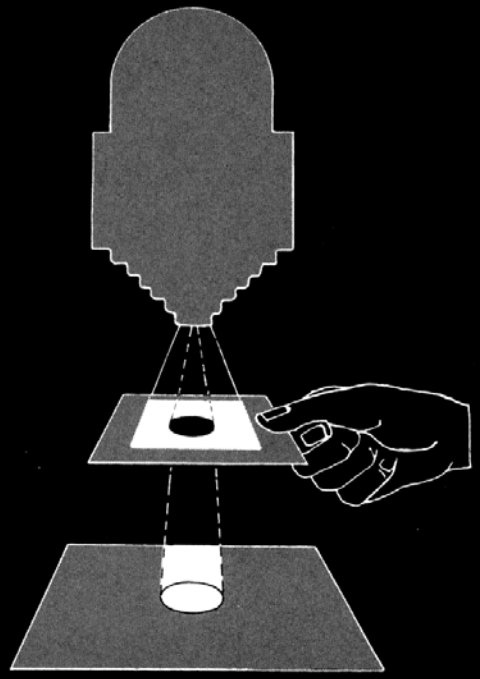


Dodging and Burning

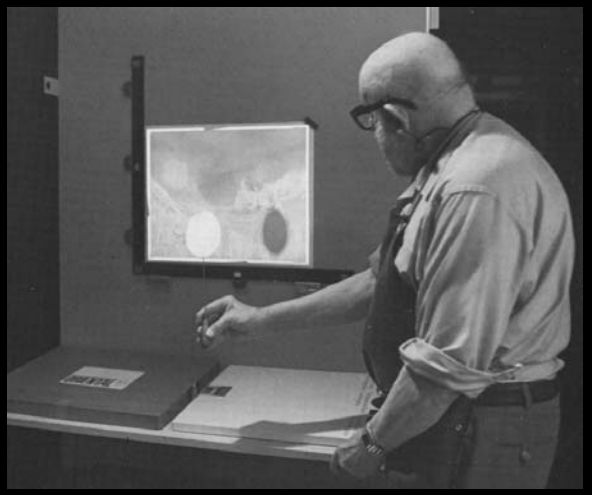
- Locally darken or lighten
- Mask to expose some areas less
- Has to be done for each print!



dodging



burning

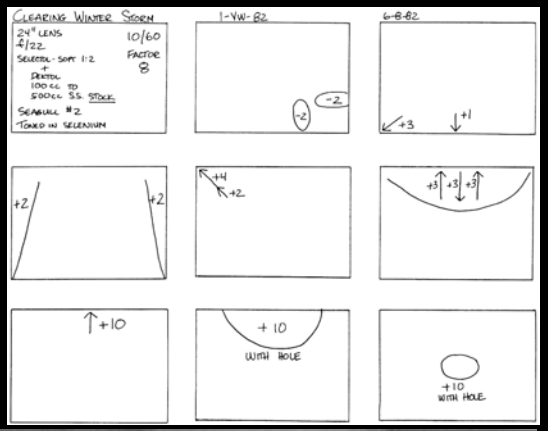


dodging

burning

Dodging and Burning

- Clearing Winter Storm



The limitation is good!

- Wolfrang Weber
  The Lash Bird Dancer
  On Madagascar
  Late 20s

The limitation is good!

- The Godfather

Tuesday at 8:30, technical session

- Three papers about digital contrast management
  - Gradient Domain High Dynamic Range Compression
    - Raanan Fattal, Dani Lischinski, Michael Werman
  - Photographic Tone Reproduction for Digital Images
    - Erik Reinhard, Mike Stark, Peter Shirley and Jim Ferwerda
  - Fast Bilateral Filtering for the Display of High-Dynamic-Range Images
    - Frédo Durand and Julie Dorsey