The Art and Science of Depiction

There Is No Passive Recording

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MIT-Lab for Computer Science

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)
**Snapshot**

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

**Viewpoint**

- 2D composition

**Viewpoint**

- High viewpoint

**Viewpoint**

- The choice of the viewpoint is not innocent

**Viewpoint**

- Same event
- Two radically different photographs

**Special effects**
### Plan
- Snapshot
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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 Scorcese, Good Fellas

### Perspective vs. viewpoint
- Portrait: distortion with wide angle

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

### Architectural perspective
- Solution: view-camera
- Lens shifted with respect to film
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Architectural perspective

- 35mm SLR version

Architectural photography

- Photoshop, distort
- Can be done traditionally

Digital perspective correction

- Photoshop, distort

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

**Special effect**

**Special effects**

**Special effect: Ames room**

**Plan**

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**Exposure**
- Reciprocity speed-aperture

**Speed**
- Slow shutter, motion blur

**Speed**
- Fast shutter, freeze motion

**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
<table>
<thead>
<tr>
<th>Plan</th>
<th>Filter</th>
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</table>
| • Snapshot  
• Perspective  
• Speed, aperture  
• Filter  
• Lighting  
• Processing and Print  
• Make-up  
• Retouching  
• Discussion |
| • Diffusion  
• Focus the attention |

**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

- 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

**Filter for black and white**

**Plan**
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### 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**

**10 am**

**12:30 pm**

**2:30 pm**
**Time of Day**

- 3:30 pm

**Time of Day**

- 4:30 pm

**Dynamic range**

**Fill-in**

**Painting With Light**
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

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<tbody>
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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
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Processing and printing
- Limitation of contrast
  - Typically 1 to 300
  - Reality often exhibits 1 to 10,000

Tone Reproduction
- Not linear

The Zone System

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

**Edge burning**

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

**Plan**

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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

Make-up

- Scars, monsters, etc.
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Corrective Make Up

- Depending on the shape of the face

Corrective lighting

An example
Is it fair?

Plan
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Retouching
- Politics...

Fakery
- Nessy
- Oprah

Touch-up: too dark face

Touch-up: silhouette
**Touch-up: undesirable lines**

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

**Touch-up: stretch and arm**

**Deforming lens**

**Symmetry**

- Two right halves
- Two left halves

**Personal gallery**
There is no passive recording.

Personal gallery

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

Photo-montage

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

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Personal gallery

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Photo-montage

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Photo-montage

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### What are we trying to control?
- Perspective, composition
  - Viewpoint
  - Lens
  - View-camera, stretch, undistort
- Tones
  - Filter
  - Lighting
  - Processing and print
  - Make-up
  - Retouch
- Selection

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<td>- Different ways to achieve an effect</td>
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<td>- The end justifies the means</td>
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  - The final picture is the only criterion |

### Assignment
- Un-distort perspective: distort

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Assignment
• Wire

Assignment
• Distracting elements

Assignment: rubber-stamp
• Magical tool: rubber-stamp

Assignment
• Before