Perceptual and Artistic Principles for Effective Computer Depiction

This is what I like about photography. People think cameras always tell the truth.

They think the camera is a dispassionate machine that records only facts, but really, cameras lie all the time. Select the facts and you manipulate the truth.

For example, I've cleared off this corner of my bed, take a picture of me here, but crop out all the mess around me, so it looks like I keep my room tidy.

Is this even legal?

Wait, let me comb my hair and put on a tie.
Perceptual and Artistic Principles for Effective Computer Depiction

[Comic strip with Calvin and Hobbes characters discussing the laws of perspective, stating that objects no longer diminish in size with distance, lines do not converge toward any point on the horizon, and all spatial relationships are lost.]
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“Gad, that’s eerie… no matter where you stand the nose seems to follow.”

Cartoon teen-agers

Hey, look! I didn’t ask to be drawn!
Gaze Movement and Focal Points

Frédo Durand
MIT- Lab for Computer Science
Focus, gaze

Kathe Kollwitz
Self Portrait
1891-92
Delacroix
Need for exploration

- Acuity not uniform
- Concentrated in the fovea (\(~2\) degree)
- Need to align fovea with relevant features
- Explore our visual environment with gaze movements
- How we then stitch all these observations together is still a mystery
Saccade

- Used to scan the visual field
- Can be controlled
- Two phases
  - Ballistic movement: 30 ms and up to 900°/s
  - Fixation ~300ms
- Saccadic suppression
  - No blur is experienced during the ballistic movement
  - We “suppress” our vision while the gaze moves
Saccadic exploration

- Reading: Javal, 1878
- Images: Yarbus, 1965

- Two important issues:
  - Path
  - Fixation time
Depends on task

- painting by Repin
- B: free
- C: economic level
- D: ages
- E: what were they doing
- F: remember cloth
Gaze and image cognition

• Similar to scientific method
  – Make hypothesis
    (mental model of the scene)
  – Perform experiments
    (gaze)
David Hockney’s collages

• Temporal too
Gaze movement & cubism

• George Bracque
  Le Portugais
  1911-1912
Gaze attraction

• Bottom-up (stimulus-driven)
  – Contrast
  – Color
  – Patterns

• Top-bottom (High-level, potentially conscious)
  – Semantic information, familiarity
  – Human beings, eyes
  – Task
  – Personal context
Focus via contrast

Gaze Movement & Focal Points
Foveal zone

- Eugene Delacroix
  Study for a portrait of Chopin
Focus through perspective

• Raphael, The School of Athens
Focus on human

- Chardin 1735
- Compensate high-level with low-level
- [Baxandall Patterns of Intention]
Figure/ground and comics

- Background more detailed
- Low-level gaze attraction (details) conflicts/compensate for the high level (interest for the character)

From

Gaze Movement & Focal Points
Diverse vs. specific

• Different strategies (Berlyne 1971)
• Diverse exploration
  – Hunt for new stimulation
  – Dispersed
  – Shorter fixation (<300ms)
• Specific exploration
  – Seeks specific information
  – Longer fixation (>400ms)
Fixation time & style

- Depends on style “complexity”
- Shorter fixation for more complex style
Number of focal point

• The number of focal points is a crucial aspect of composition
• Dynamics of the image
• One region: imitates One foveation, striking
• Many regions: the gaze is transported, dynamism
• Path
Focus through contrast

- Rembrandt
Two focal zones

- Robert Mapplethorpe
  *Self-portrait*, 1988
Triple focus and subject gaze

- Robert Doisneau
  Les Gosses de la place
  Hebert
- The path of our gaze follows their gaze direction
Turner’s Loire journey

• The gaze follows the journey
• [See part on motion depiction page 27]
Focal point conflict

- Bottom-up (more detail on the foot) is different from top down (attraction to faces)
- Makes image dynamic
Advertisement and focal points

• Evolution of saliency
Further reading

*Vision Science, from photons to phenomenology*
Stephen E. Palmer, MIT Press, 1999
   – Excellent reference on all aspects of vision

*Cognition and the Visual Arts*
Robert Solso, MIT Press, 1996
   – Introduction to visual perception and relation with the visual arts