Perceptual and Artistic Principles for Effective Computer Depiction

Gaze Movement and Focal Points

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Focus, gaze

Kathe Kollwitz
Self Portrait
1891-92
**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

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**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

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**Saccadic exploration**

- Reading: Javal, 1878
- Images: Yarbus, 1965
- Two important issues:
  - Path
  - Fixation time

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**Depends on task**

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

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**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 Braque
  *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

**Foveal zone**
- Eugene Delacroix
  Study for a portrait of Chopin

**Focus via contrast**

**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

**Diversive vs. specific**

- Different strategies (Berlyne 1971)
  - Diversive 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

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Triple focus and subject gaze

- Robert Doisneau
  *Les Gosses de la place Hebert*
  - The path of our gaze follows their gaze direction

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Turner’s Loire journey

- The gaze follows the journey
- [See part on motion depiction page 27]

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Focal point conflict

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

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Advertisement and focal points

- Evolution of saliency

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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