The Art and Science of Depiction

Non-linear

Drawing systems

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Non-linear drawing systems

Drawing systems
Munch exhibition

- Boston College
- Until May 21.
- Birth of expressionism

Munch
Munch

Drawing systems

Munch

Drawing systems
Green flash

Green flash
Green flash

Anamorphosis

• Gregoire Huret
  1670

INFERIOR-MIRAGE
GREEN FLASH
for
L = -10 m
seen from 4 m
Plan

- Drawing and projection
  - Linear perspective & the Renaissance
  - Drawing systems
    - Catalogue of “all” drawing systems
    - Advantage/disadvantages
    - Distortion and constraints
- Denotation
- Tone & color

Classification of drawing systems

- Linear
  - Parallel
    - Orthogonal
    - Fold-out oblique
      - Horizontal oblique
      - Vertical oblique
    - Orthographic
      - Isometric
      - Others
  - Non orthogonal
    - Oblique
    - Axonometric
  - Linear perspective
    - One point
    - Two points
    - Three points
    - Divergent perspective
- Non Linear
  - Quasi linear
    - Naive perspective
    - Expressionist perspective
    - Importance-driven
    - Cell panorama
  - Curved projections
    - Panorama
    - Fish-eye
    - Topological
    - Split views, fold-out
    - Multiple viewpoints

Drawing systems
**Linear projections**

- Straight lines and alignments are preserved
- Can be expressed in primary geometry
  - Ray-image intersections
  - A matrix
- Parallel
- Linear perspective
- Divergent perspective

**Classification of drawing systems**

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  - Linear perspective
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**Non Linear**

- Does not preserve straight lines
- Can get rid of some distortions
- More freedom
- Dramatic effects

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**Non Linear**

- Quasi linear
- Curved projections
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**Quasi linear**

• Locally linear
• Preserves the drawn straight lines
• No “accurate” space
• Unified space

**Quasi linear**

• Naïve perspective
• “Expressionist” perspective
• Importance-driven
• Locally linear
• Cell panorama
**Naïve perspective**

- Attempt to depict scene 3 dimensionally
- Often lack of skill
- More or less formal secondary geometry rules

**Naïve perspective**

- Pompeii
Naïve perspective

• Giotto

Naïve perspective

• 18th century
Locally linear

- Linear for objects or parts of the scene
- Choose the best system for each part
- Allows different scales, provide context

- In fact, this is the most common system!
Locally linear

• Egyptian
• Best view for each object
Locally linear

- Persian miniature, 1494
- Oblique+vertical oblique
Locally linear

• Plan of Manhattan

Locally linear

• Llibre Dels Feus
  1162-1199
Locally linear

- *St John the Baptist Retiring to the Desert*
  Giovanni di Paolo 1454

Locally linear

- Raphael, *The School of Athens*
**Importance-driven**

- Size depends on importance, symbol
Importance-driven

• Piero de la Francesca
  *Mercy*

Comparison

• Piero de la Francesca, *Flagellation*, 1460
Importance-driven

Data-driven

- Scientific American
Cell multiperspective panorama

- Pinocchio, Walt Disney

Multiperspective panorama

- [Wood et al. 98]
Multiperspective panorama

• [Wood et al. 98]
“Impressionist” perspective

• Pissaro

“Expressionist” perspective

• Munch, 
  the Scream
“Expressionist” perspective

• Van Gogh

Cézanne

• Still life with basket, composition rule
Cézanne

- *Montagne Ste Victoire*
“Expressionist” perspective

• Max Beckman *Family Picture* 1920

• Umberto Boccioni *The Street Enters The House* 1911
**Quasi linear**

- Modigliani
  
  *Femme au Chapeau*

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Leonardo & contradictions

- Wide angle vision

Leonardo & contradictions

- Wide angle vision
- Lateral recession
Curved perspective

- Panorama
  - Preserve verticals
- Fish eye
Curved perspective

- Jean Fouquet, 15th century

- A View of Delft Carel Fabritius (follower of Rembrandt) 1652
Curved perspective

- Turner *Petworth Park Tillington, Church in the Distance* 1828

Curved perspective

- Panoramic camera
“Expressionist” perspective

- Van Gogh, *Bedroom in Arles*
Curved perspective

- Panorama
  - Preserve verticals
- Fish eye
Fish-eye vs. wide angle

Drawing systems

Fish-eye vs. wide angle

Drawing systems
Bird’s eye attachment

Fish-eye
Fish-eye

• MC Escher, *Hand with Reflecting Globe*

Fish-eye

• MC Escher, *Balcony*
Fish-eye

- London from St Paul's cathedral 1845

Fish-eye

- Anthony Green The 30th Wedding Anniversary
**Projection surface**

- Panorama, Imax
- “Good viewpoint”
  - Primary geometry and viewing conditions match

**Projection**

- Pavilion in the Colosseum Regent's Park 1829
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Topological

- Paul Klee,
  Another Camel
**Topological**

- London Underground, Beck, 1931

- Children drawing
**Topological**

- Comics

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Split views, fold-out

- Can be seen as a smooth viewpoint change
- Can represent an object from all sides
- Continuity, preserves topology
Split views, fold-out

• Picasso,  
  *Portrait of a woman*
Split views, fold-out

- Northwest Indian
  Double Profile Bear
Split views, fold-out

- Multiple-center of projection images, Paul Rademacher
Split views, fold-out

- Multicultural study

Split views, fold-out

- Interactive caricature (Fred Vernier)
Split views, fold-out

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Split views, fold-out

- Interactive caricature (Fred Vernier)

Cinema

- Robert Wiene The cabinet of Dr Caligari 1919-1920
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**Multiple viewpoints**

- No more unity of pictorial space
- Represents objects from different viewpoints
- Less continuity, no topology
Cubism

- **Candlestick**
  George Braque
  1911

Cubism

- **Boats**
  George Braque
Hockney

Drawing systems

Hockney

Drawing systems
Escher

- *Other World* 1947

Mirrors, lenses

- Freddie Francis
  *The Skull*
Mirrors, lenses

• Hedgecoe

Mirrors, lenses

• Casas Abarca
  Le Salon
  1875-1958
**Mirrors, lenses**

- Manet, Le Bar Des Folies Bergeres

**Discussion**

- No universal solution
- Secondary geometry
- Invariants
- Property mapping or translation
Drawing and cinema

- Characters too close
- Trenching
- Etc.