The Art and Science of Depiction

Drawing systems

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Assignments for Monday 30.

• Solso Cognition and the Visual Arts
  – Chapter 8 & 9
• Final project
  – Firm subject

Plan

• Drawing and projection
  – Linear perspective & the Renaissance
  – Drawing systems

  Catalogue of “all” drawing systems
  Advantage/disadvantages
  – Distortion and constraints
• Denotation
• Tone & color

Issues

• Place of the spectator
• Intrinsic/extrinsic (essential/accidental)
• Unified space
• Shape representation
• Error/distortion/choice

• Child development
• No cultural judgment!

Context

• Importance of the notion of front/top/side
• Presence of lines and planes or not
• Orthogonals
  – Lines orthogonal to the picture plane
  – I.e. lines that converge in the center of the image in central perspective
• Picture plane/curved picture
Efficient shape representation

- True shape
- 3D layout
- Canonical view
- General/accidental view

Generic vs. accidental viewpoint

- Accidental alignment of trash and sea

Generic vs. accidental viewpoint

- Accidental alignment of trash and sea

Generic vs. accidental viewpoint

- Accidental alignment of trash and sea

Canonical view

- Rate views

Canonical view

- Rate views
- Features must be salient
- General view
- Front view
- ¾ up view
**Invariants**
- Invariants
  - Alignments
  - Angles
  - Shape
  - Symmetry
- Property mapping
- Each system here assumes a unified space. Can be mixed up though

**3D and 2D attributes**
- Show a dice to children (~6-7)
- They usually draw a rectangle
- The rectangle can stand for one face

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**3D and 2D attributes**
- Show colored or numbered dice to children (6-7)
- The still draw a rectangle
- But different colors or many points

**3D and 2D attributes**
- Show colored or numbered dice to children (6-7)
- The still draw a rectangle
- But different colors or many points
- The rectangle stands for the whole dice
- The notion of 3D object with corners is translated as a 2D object with corners

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**Evolution of children’s drawings**
- Asked to draw a table

**Primary/secondary geometry**
- Primary geometry
  - Description in 3D object-space
- Secondary geometry
  - Description in 2D image-space
### Primary/secondary geometry

- **Primary geometry**
  - Description in 3D object-space
- **Secondary geometry**
  - Description in 2D image-space
  - Permits the description of more drawing systems
  - Often better corresponds to the drawing approach

### British standard classification

- **Primary geometry**

### Willats’s classification

- **Secondary geometry**

### Classification of drawing systems

- **Linear**
  - Parallel
  - Linear perspective
  - Divergent perspective
- **Non Linear**
  - Quasi linear
  - Curved projections
  - Topological
  - Split views, fold-out
  - Multiple viewpoints

### Linear projections

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

- No foreshortening
- Can represent true shape
- Some are poor shape representations

- Projection direction
  - Orthogonal to image plane or not
  - Along one principal direction or not
- “Stretching” or not

Orthogonal

- Direction
  - Perpendicular to image plane
  - Along one principal direction
- True shape for objects parallel to image plane

Orthogonal

- Direction
  - Perpendicular to image plane
  - Along one principal direction
- True shape for objects parallel to image plane
- Typically engineering

Orthogonal

- Amphora, 6th century BC

Orthogonal

- Bayeux Tapestry 1080
**Orthogonal**
- Telephoto

*As the hijack bargaining goes on under the sweltering sun…*

**Orthogonal**
- Child drawing

**Parallel projections**
- Orthogonal
- Fold-out oblique
  - Horizontal oblique
  - Vertical oblique
- Non orthogonal
  - Oblique
  - Axonometric
- Orthographic
  - Isometric
  - Others

**Fold-out oblique**
- Horizontal oblique
- Vertical oblique
- Direction
  - 45°, parallel to one principal face (top or side)
- Can be stretched for fold-out
  - True shape for 2 directions
- Mainly interesting for secondary geometry

**Horizontal oblique**
- Folk art
**Horizontal oblique**
- Icons

**Horizontal oblique**
- Child drawing

**Horizontal oblique**
- Cézanne Still life with a commode, 1887

**Pushing the envelope**

**Vertical oblique**
- Soriguerola, 13th

**Vertical oblique**
- Soriguerola, 13th
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<tr>
<th>Drawing systems</th>
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<td>Vertical oblique</td>
<td>• Juan Gris, <em>Breakfast</em>, 1914</td>
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<td>• Indian art, 1660</td>
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<td>• Claude Rogers, <em>The Hornby Train</em>, 1951-53</td>
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<td>• Andre Kerstesz, <em>Tulipe Melancolique</em></td>
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**Pushing the envelope**

- Non-linear
- Locally linear

**Parallel projections**

- Orthogonal
- Fold-out oblique
  - Horizontal oblique
  - Vertical oblique
- Non orthogonal
  - Oblique
  - Axonometric
- Orthographic
  - Isometric
  - Others

**Non orthogonal**

- Direction
  - non orthogonal to picture plane
- Oblique
  - Picture plane parallel to front
  - True shape for front face
- Axonometric
  - True shape for top face
  - True distance for up direction
  - Direction 45° of the picture plane

**Oblique**

- Picture plane parallel to front
- True shape for front face
- Can use true distance for 3rd direction

**Oblique**

- Henry Lapp, 19th century

**Oblique**

- Lady Wenji’s Return to China, 12th century
Oblique

- Phoenix and Achilles, 350-340 BC

Axonometric

- Axonometric
  - True shape for top face
  - True distance for up direction
  - Direction 45° of the picture plane

- Le Corbusier was a big fan

Axonometric

- James Stirling, 1953

- Juan Gris, Breakfast, 1914
### Parallel projections
- **Orthogonal**
- **Fold-out oblique**
  - Horizontal oblique
  - Vertical oblique
- **Non orthogonal**
  - Oblique
  - Axonometric
- **Orthographic**
  - Isometric
  - Others

### Orthographic
- **Direction**
  - Orthogonal to picture plane
  - Along no principal direction
- **Isometric**
  - Direction along the average of the principal directions
  - True distances along 3 directions
- **Others**
  - Generic orthographic

### Isometric
- **Brooks-Greaves**
  - *St Paul’s Cathedral*
  - 1928

### Isometric vs. Axonometric
- **Isometric**
  - No true shape
  - True distances in 3 directions
  - Little distortion
  - Direction average 2 principal directions
- **Axonometric**
  - True shape for top face
  - True distance for up direction
  - Direction 45° from picture plane

### General Orthographic
- **Seldom used!**
**Mixed parallel system**
- Persian miniature, 1494
- Oblique+vertical oblique

**Classification of drawing systems**
- Linear
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  - Linear perspective
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**Linear perspective**
- Foreshortening
- The spectator is “immersed”
- Potential distortions
  - One point
  - Two points
  - Three points

**1-point perspective**
- Central focus
- Preserves horizontals and verticals

**1-point perspective**
- Jean Vredeman de Vries, 1604
- Central focus
- Preserves horizontals and verticals
- Can mean that the optical center is not the center of the image
  - View-camera
1-point perspective
- Unknown artist Ideal city, 15th

1-point perspective
- *Interior of St Bavo's church at Haarlem*, Pieter Jansz Saenredam, 1648

1-point perspective
- The Avenue Middelharnis, Meindert Obbema 1689

1-point perspective
- Western perspective in a Japanese picture

2-point perspective
- Objects stand out of the picture
- Preserves verticals
- Can mean that the optical center is not the center of the image – Architecture lens
Old assignment

• Before: 3-point perspective

3-point perspective

• Dramatic 3D effect
• The generic case, nothing preserved
• seldom used through art history

Perspective anomaly and expression

• Giorgio de Chirico, Mystery and Melancholy of a Street, 1914

Perspective anomaly and expression

• Giorgio de Chirico Les Muses Inquietantes 1925
Perspective distortion

- Wide angle projection
- Does not preserve subjective size

Perspective distortion

- Wide angle projection
- Does not preserve subjective size

Perspective distortion

- Wide angle projection
- Distorts shape

Perspective distortion

- Wide angle projection
- Portrait: distortion with wide angle

Perspective distortion

- The sphere is projected as an ellipse
- Symmetry is not preserved
- Some perspective manuals claim that the projection of a sphere is a circle

Perspective distortion

- The sphere should be projected as an ellipse
- But a circle is used
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Divergent perspective

- A.k.a. inverted perspective
- Subject of quarrel, hard to include in a theory
- Icons
- Asian
- Cubism
- Children

Divergent perspective: explanations

- Does not exist!
- Lack of skill
- Represents more faces
- Fear of idolatry
- Perceptual over-compensation
- Perceptual effect of field of view and size constancy

Divergent perspective

- The Four Gospels, Luke, 1380, Byzantine

Divergent perspective

- Mark, 15th century, Byzantine

Divergent perspective

- Andrei Rublev, The Holy Trinity, 1408~1425
Divergent perspective
• Hasadera Enji (Japanese)

Divergent perspective
• Georges Braque, *Still Life: The Table, 1928*

Divergent perspective
• David Hockney, *Chair*

Divergent perspective
• Child drawing (Kenyan here)

Evolution of children’s drawings
• Asked to draw a table

Class of drawing & average age

- Child’s view
  - 7.4
  - 11.9
  - 14.3
  - 9.7
  - 13.6
  - 13.7