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

**Canonical view**
- Rate views
  - 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

**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

**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
### 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

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- 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
  – 45º, 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
**Vertical oblique**

- Juan Gris, *Breakfast*, 1914

**Vertical oblique**

- Indian art, 1660

**Vertical oblique**

- Claude Rogers, *The Hornby Train*, 1951-53

**Vertical oblique**

- Andre Kerstesz, *Tulipe Melancolique*

**Pushing the envelope**
**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 45º 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**
- 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**
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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**
- Central focus
- Preserves horizontals and verticals
- Can mean that the optical center is not the center of the image
  - View-camera

**1-point perspective**
- Jean Vredeman de Vries, 1604
1-point perspective
- Unknown artist Ideal city, 15th

1-point
- 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

**Old assignment**

- After: 2-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

• 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
Classification of drawing systems

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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
  - Child’s view
  - Class of drawing & average age:
    - 7.4
    - 9.7
    - 11.9
    - 13.6
    - 14.3
    - 13.7