The Art and Science of Depiction

Linear Perspective

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Assignments for Monday 30.

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

Plan of the next sessions

• Drawing and projection
• Denotation
• Tone & color

Plan

• Intro to perspective
• History of Renaissance perspective
  – Early attempts
  – Brunelleschi
  – Alberti
  – De la Francesca
  – Leonardo
  – Dürer
• Gadgets
• Distortion issues

Perspective

• Does linear perspective “occur” in nature
  – E.g. we “experience” foreshortening
• Perspective or perspectives?
### Pictorial depth cues
- Occlusion
- Size
- Position relative to the horizon
- Convergence of parallels, linear perspective
- Shading, shadow
- Texture gradient
- Aerial perspective

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### Introduction to Perspective
- Importance of the single viewpoint

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### Linear Perspective
- Image as a window
- *St Jerome In His Study*
  - Antonello da Messina 1475

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### Some accompanying concepts
- Viewpoint
- Foreshortening
- Vanishing point
- Very linked to architectural spaces

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

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Early attempts

• St John the Baptist Retiring to the Desert
  Giovanni di Paolo 1454

Early attempts

• Giotto, 1297-1299

Perspective 14

Early attempts

• Lorenzetti 1337-1340

Perspective 15

Early attempts

• Lorenzetti 1337-1340

Perspective 16

Giotto’s rules

• Lines and planes above eye level incline downwards when they move away
• Below eye level upwards when they move away
• Lines to the left incline inwards to the right

Giotto

• Confirmation of the Rule of St Francis 1325
**Giotto**

- Confirmation of the Rule of St Francis 1325

**Early attempts**

- Pietro Lorenzetti, *Birth of the Virgin* 1342

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**Bruneleschi’s experiments, 1413**

- Existing buildings
- Measurement, surveying
- Single viewpoint
- First scientific mimesis

**Bruneleschi’s experiment, 1413**

- Cut out
- Note that this is 2-point perspective
Limitations

• Existing buildings
• Requires measurement

Masaccio, The Trinity, 1427

• The oldest perspective painting
• Probably measurement
• Maybe helped by Bruneleschi

Masaccio, The Trinity, 1427

• The oldest perspective painting
• Santa Maria Novella (Florence)

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Leon Battista Alberti, On Painting

• 1435
• Intersections of pyramids with image surface
• Proportional triangles
• Use side view for foreshortening
• Check with diagonal
• Use pavement as reference
• Center = prince of rays
**Leon Battista Alberti, On Painting**

- Paolo Uccello, *The Selling of the Host*, 1468

**Legitimate construction**

- Carlo Criveli, *Annunciation*, 1486

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**Piero de la Francesca**

- *De Prospectiva Pingendi*, 1474
  (On the perspective of painting)
- Ratios of distance and size
- Use plan and elevation view
- Deformation of square
  - Angle of view less than 90°
**Piero de la Francesca**

- *Flagellation of Christ, 1460*

- *Invention of the true cross 1452-59*
  - "wrong perspective on the left"

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**Leonardo & perspective**

- Techniques of artists’ perspective in theory and practice
- Geometry of visual rays
- Devices and instruments
- Optics and the eye
- Curiosities of vision (e.g. anamorphosis)
- Apparent contradictions

**Leonardo**

- *Last Supper, 1497*
Leonardo

- *Last Supper, 1497*

Leonardo & contradictions

- Wide angle vision

Leonardo & contradictions

- Wide angle vision
- Lateral recession

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Dürer

- Traveled to Italy
- Mainly influenced by de la Francesca
- *Instruction in Measurement with Compass and Ruler in Lines, Planes and Solid Bodies, 1525*
Perspective 49
Dürer
• St Jerome in his Study 1514
• Very off-center
• Note the verticals

Perspective 50
Dürer
• The artist’s glass

Perspective 51
Dürer
• The draftsman's net

Perspective 52
Dürer
• Jacob de Keyser's invention

Perspective 53
Dürer

Perspective 54
Conclusions about Renaissance
• Different techniques, refinement
• Measurement
• Mainly central perspective
• No notion of infinity, no vanishing point
• Spiritual notion of mathematical harmony
### After Renaissance

- 17th
  - Vanishing point
  - Abstraction
  - Desargues, Descartes
- Flourished until 19th
- 20th century
  - Come-back for computer graphics and computer vision

### After Renaissance

- Thomas Malton
  *A Complete Treatise on Perspective, 1779*

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### Gadgets

- Camera obscura

### Vermeer 1660

- Camera obscura

### Gadgets

- Baldassare Lanci’s universal instrument for surveying and perspective 1557
### Gadgets

- Camera Lucida
- E.g. Talbot

### Perspective grids

![Perspective grids](image)

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### Leonardo & contradictions

- Wide angle vision

![Leonardo & contradictions](image)

- Wide angle vision
- Lateral recession
<table>
<thead>
<tr>
<th>Perspective distortion</th>
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<tbody>
<tr>
<td>- The sphere is projected as an ellipse</td>
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