Perspective

- Does linear perspective "occur" in nature
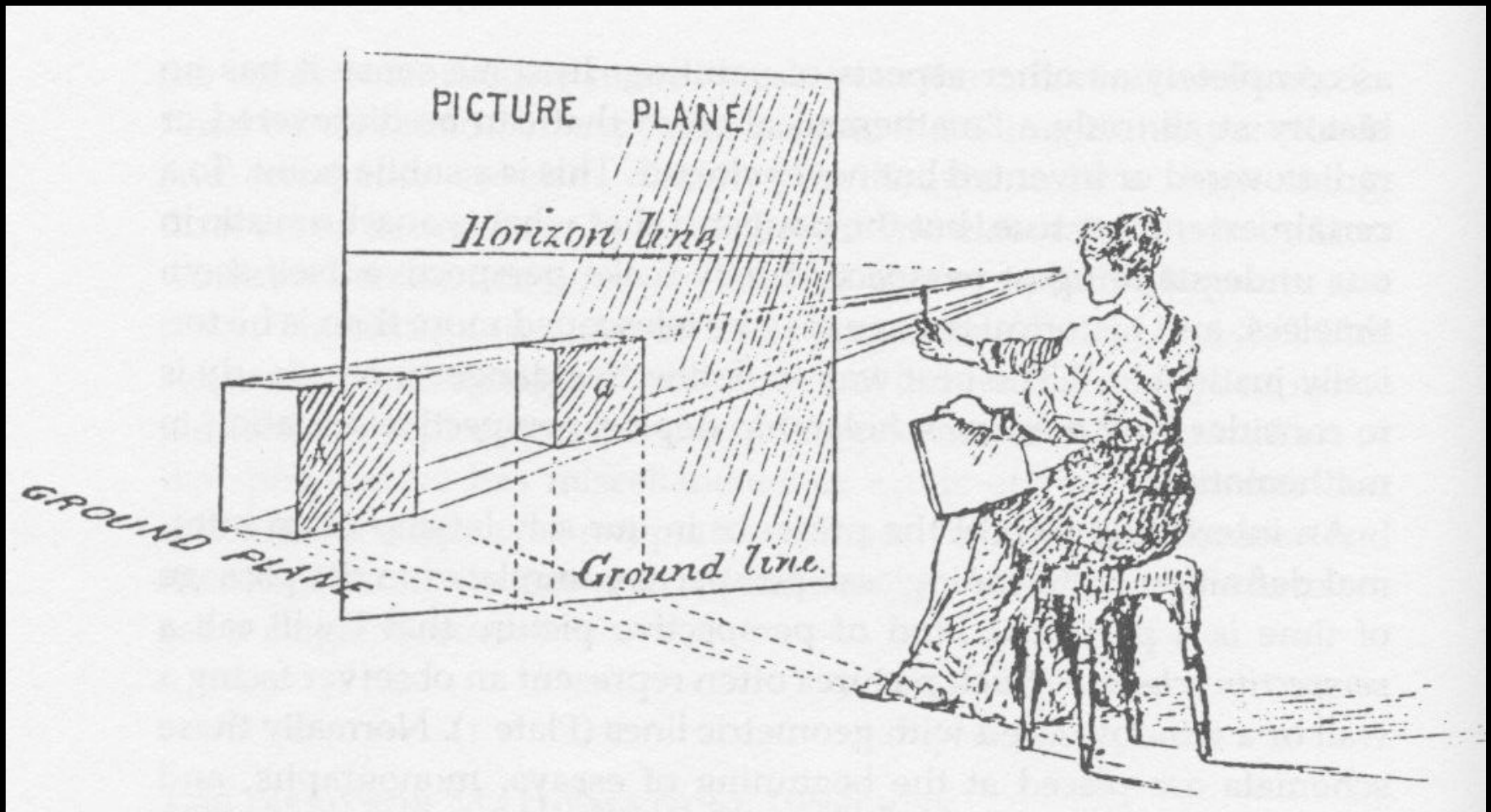 - E.g. we "experience" foreshortening
- Perspective or perspectives?

Pictorial depth cues

- Occlusion

- Size

- Position relative to the horizon

- Convergence of parallels, linear perspective

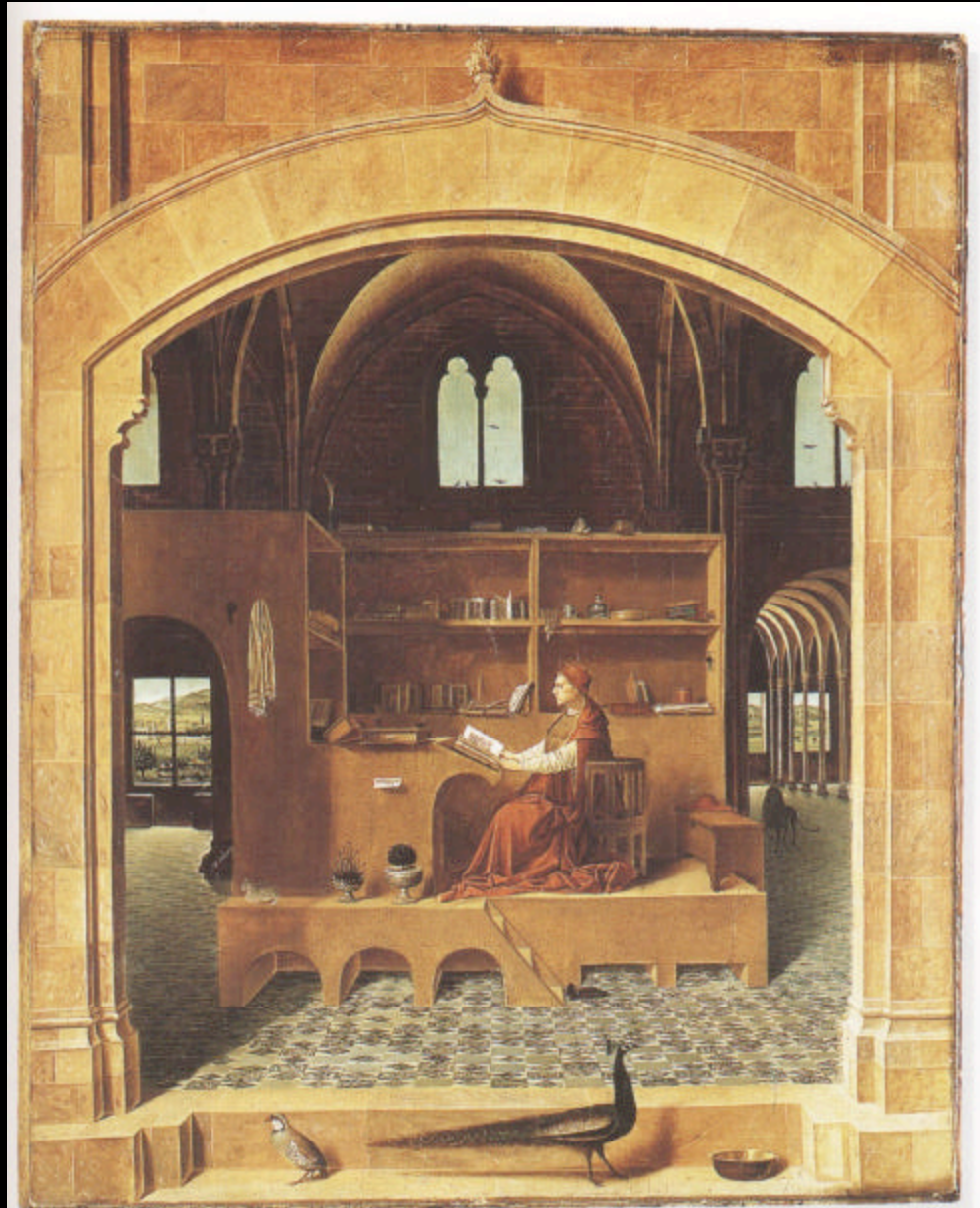- Shading, shadow

- Texture gradient

- Aerial perspective

Introduction to Perspective

- Importance of the single viewpoint

Linear Perspective

- Image as a window
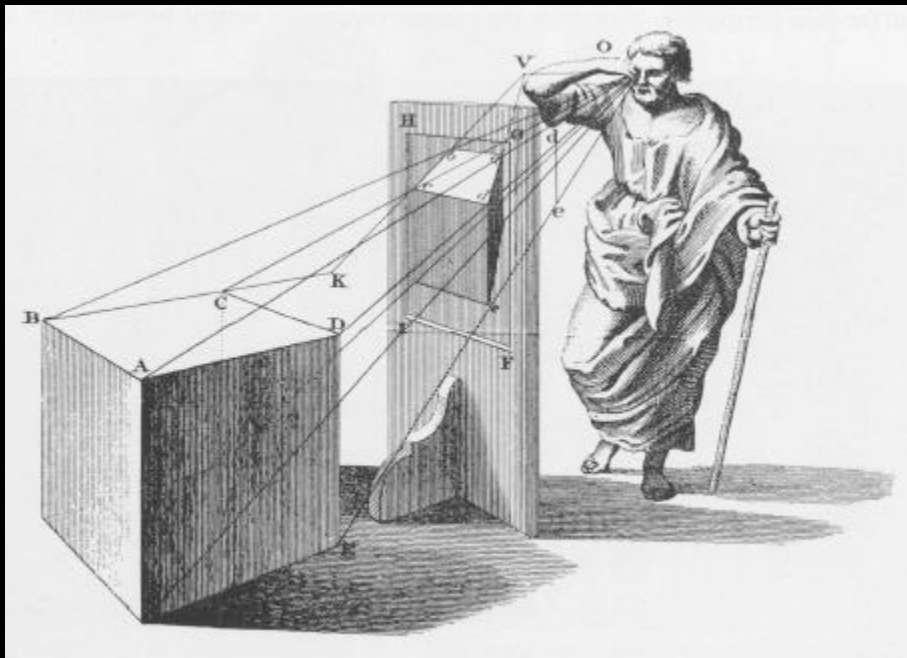- *St Jerome In His Study* Antonello da Messina 1475
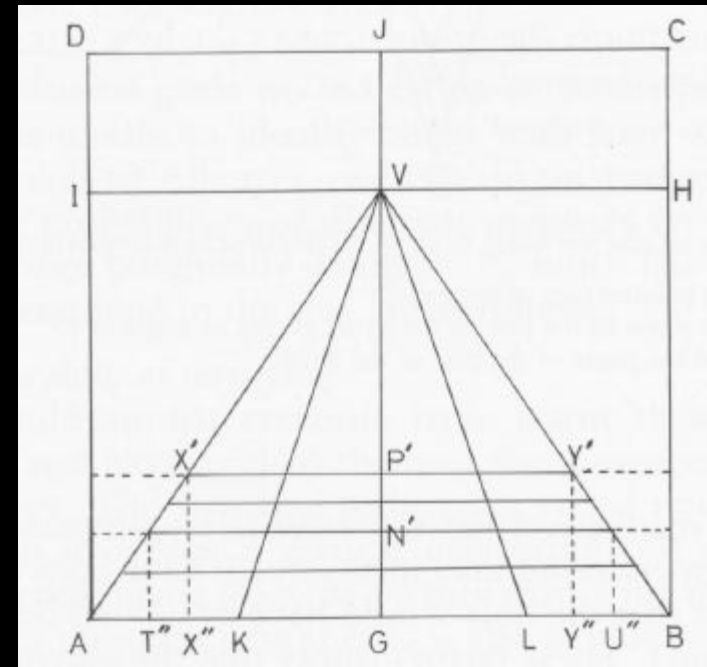
Some accompanying concepts

- Viewpoint

- Foreshortening

- Vanishing point

- Very linked to architectural spaces

Primary/secondary geometry

- Primary geometry
    - Description in 3D object-space

- Secondary geometry
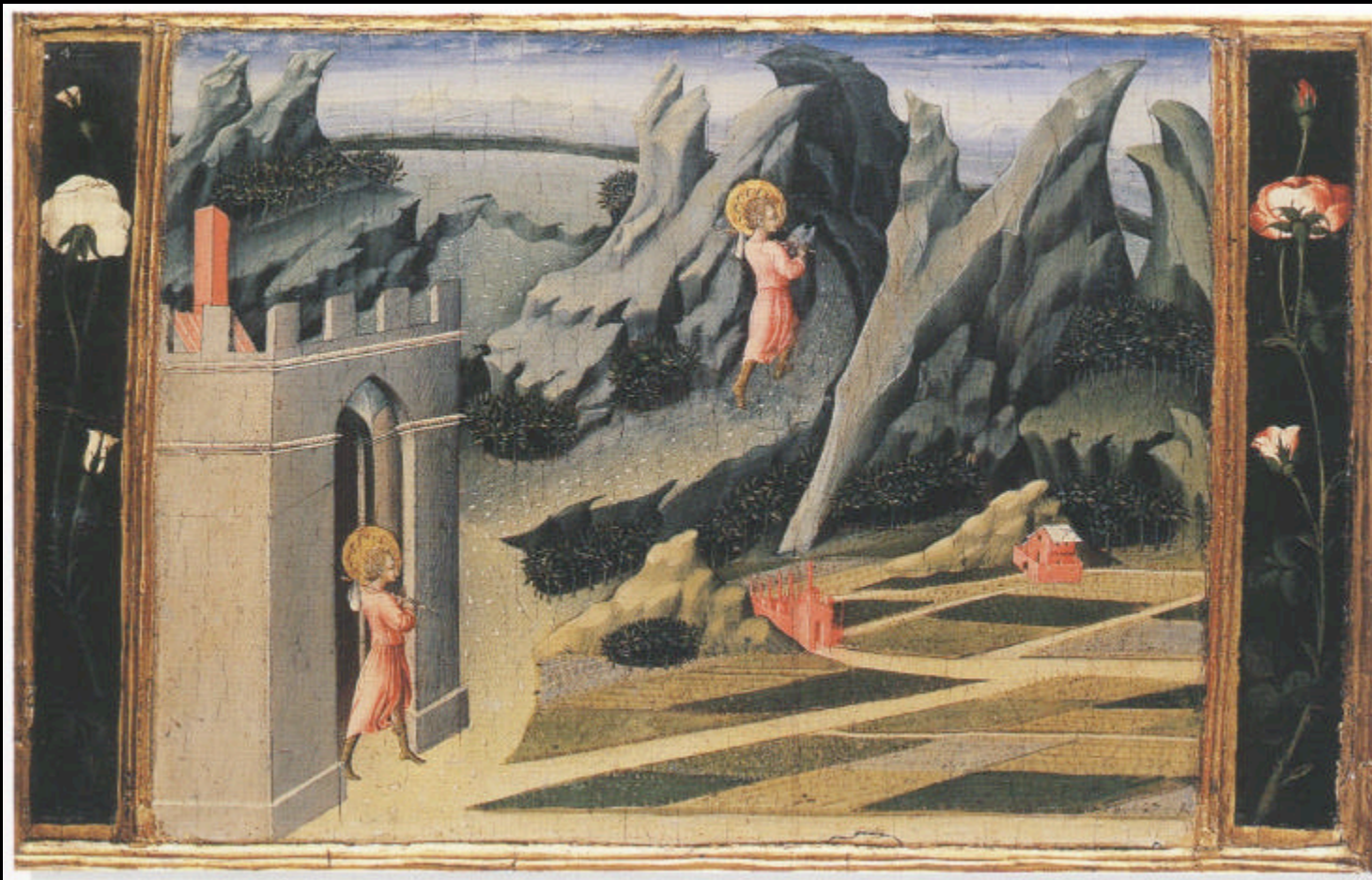   - Description in 2D image-space

Early attempts

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

Early attempts

- Giotto, 1297-1299

Early attempts
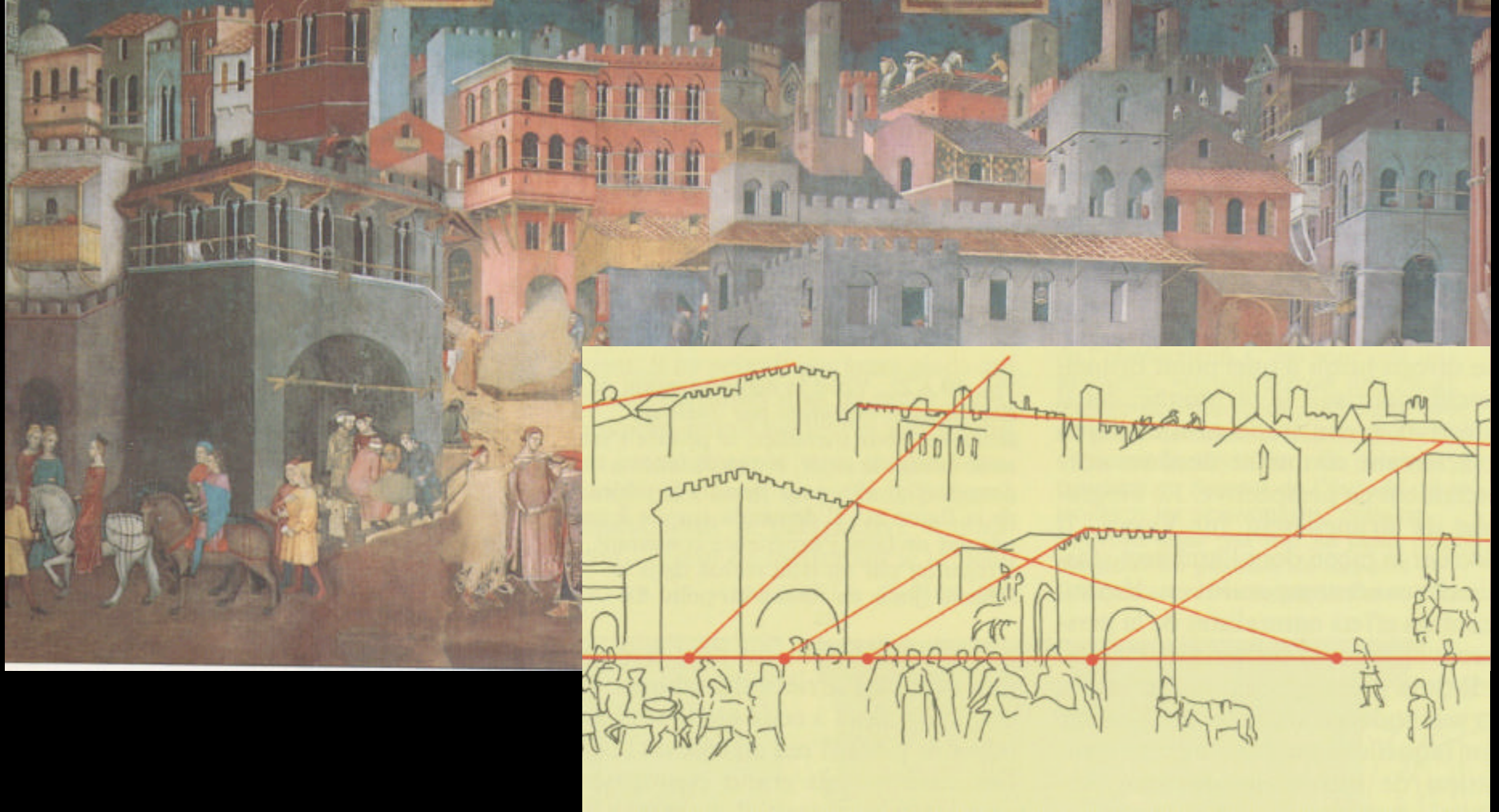
- Lorenzetti 1337-1340

Early attempts

- Lorenzetti 1337-1340

Giotto's rules

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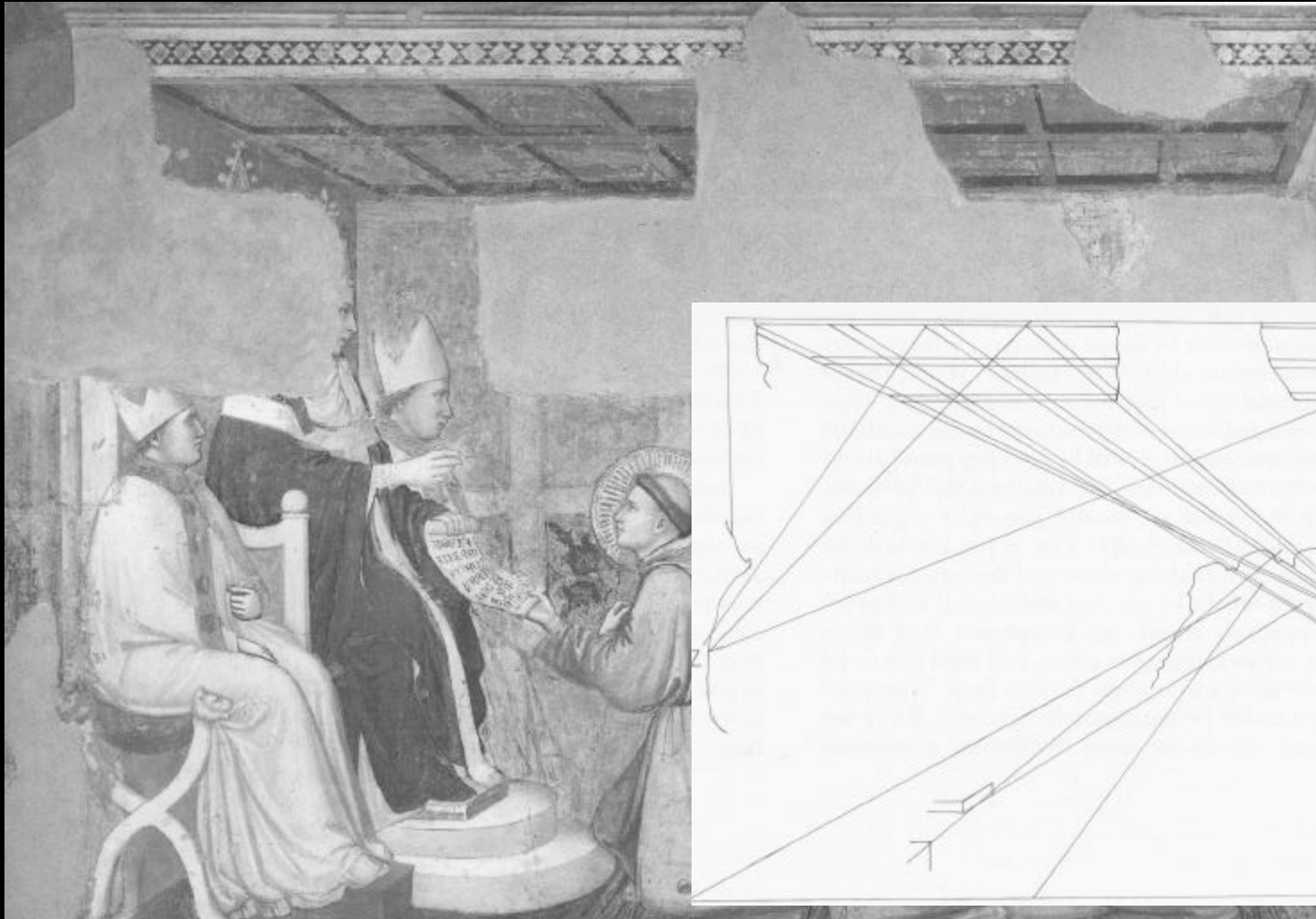- Lines to the left incline inwards to the right

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

Bruneleschi's experiments, 1413

- Existing buildings

- Measurement, surveying

- Single viewpoint

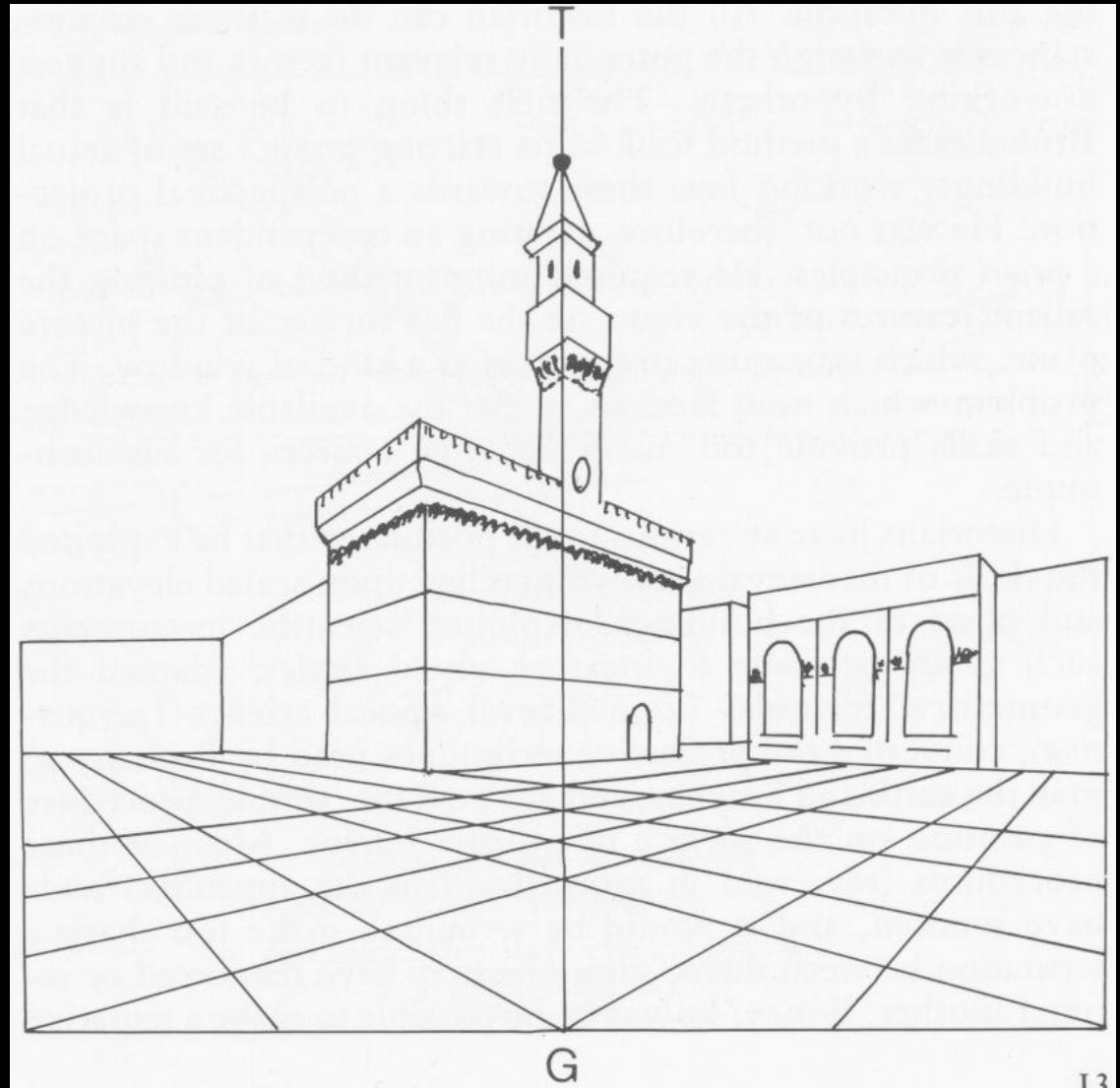- First scientific mimesis

Bruneleschi's experiment, 1413

Bruneleschi's second experiment
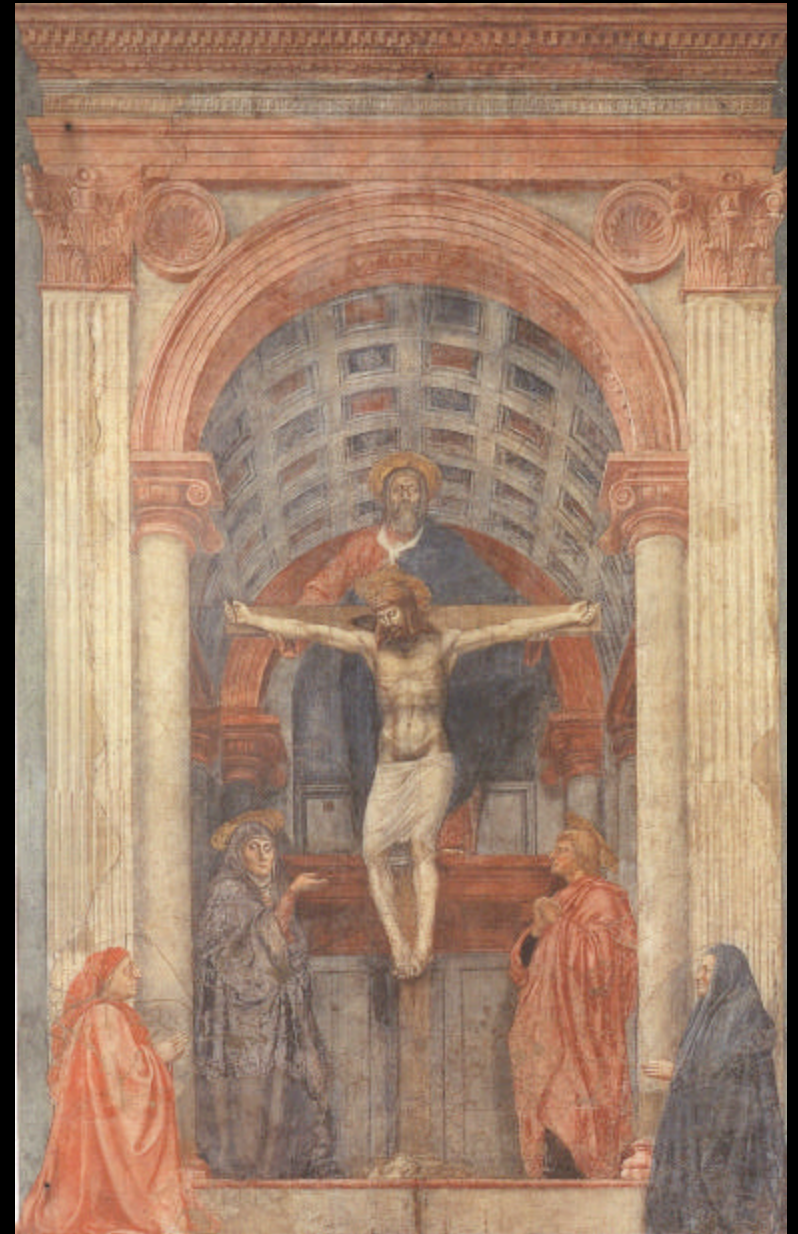
- Cut out

- Note that this is 2-point perspective

Limitations

- Existing buildings

- Requires measurement

Masaccio, The Trinity, 1427

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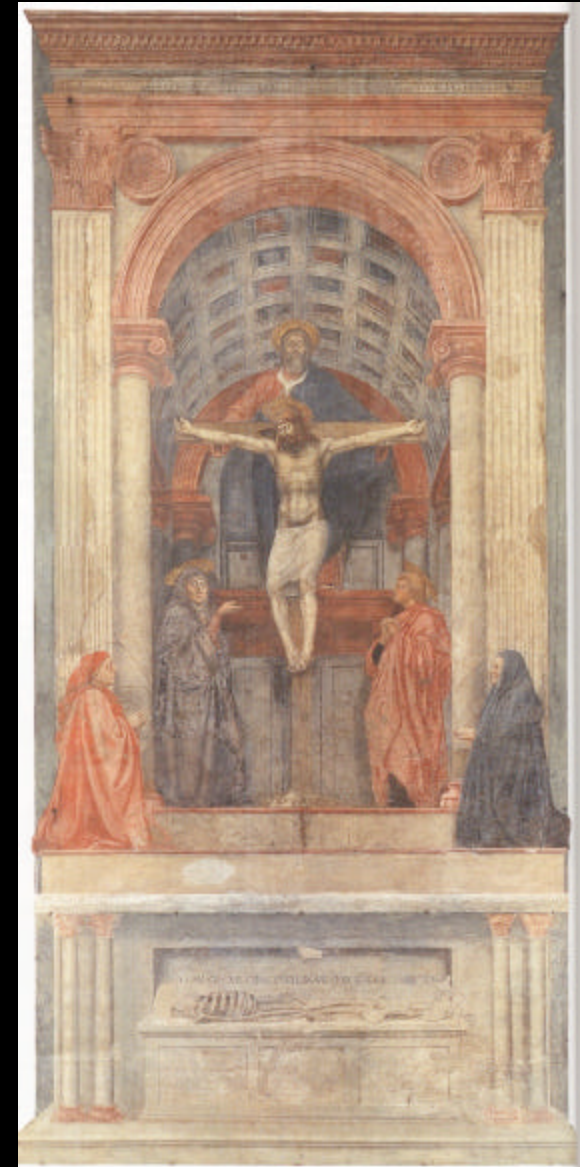- Maybe helped by Bruneleschi

Perspective

Masaccio, The Trinity, 1427

- The oldest perspective painting
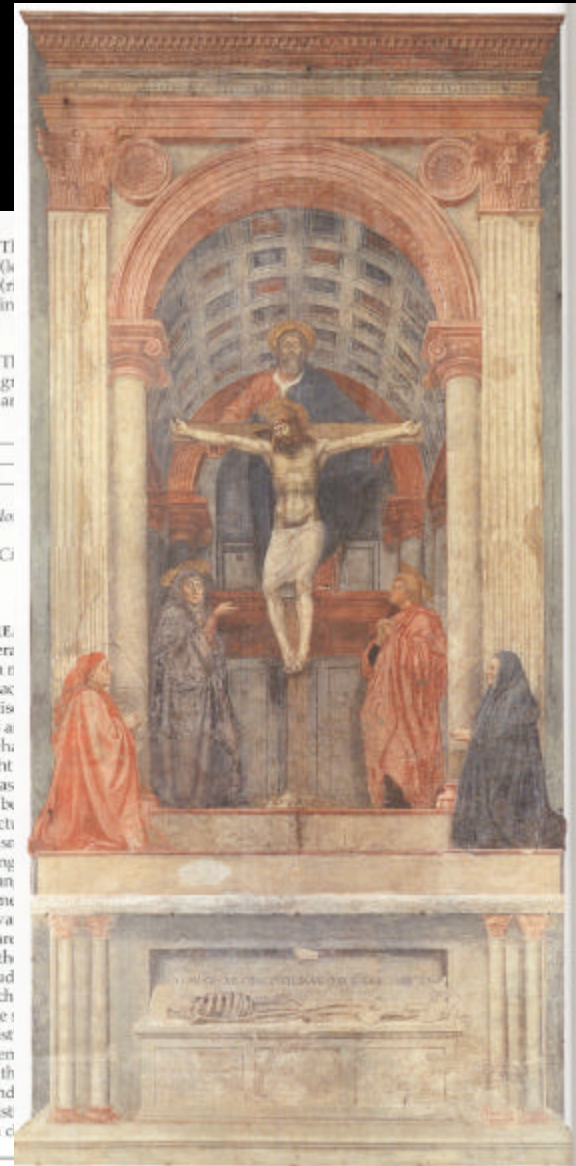
- Santa Maria Novella (Florence)
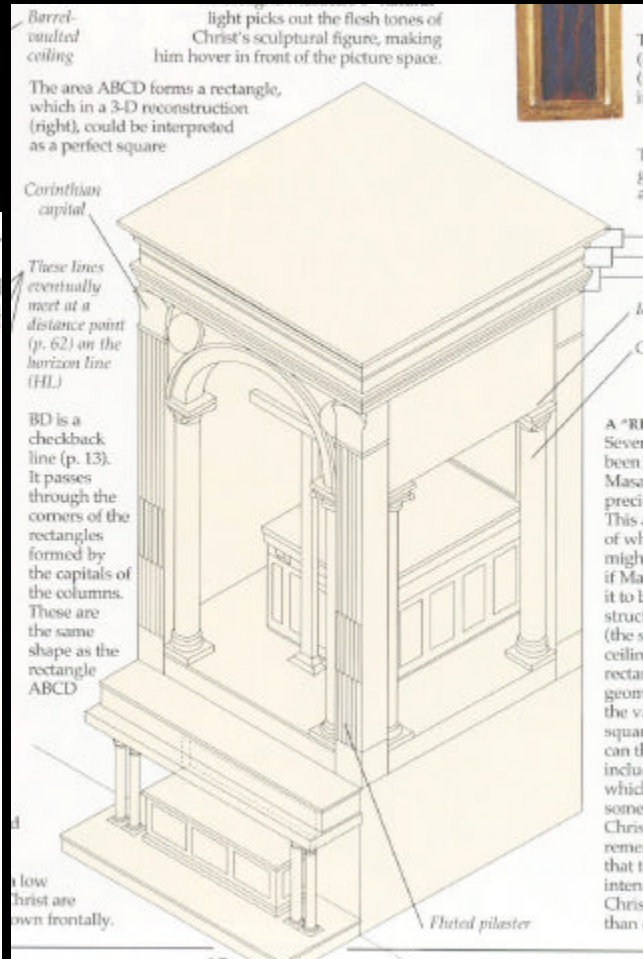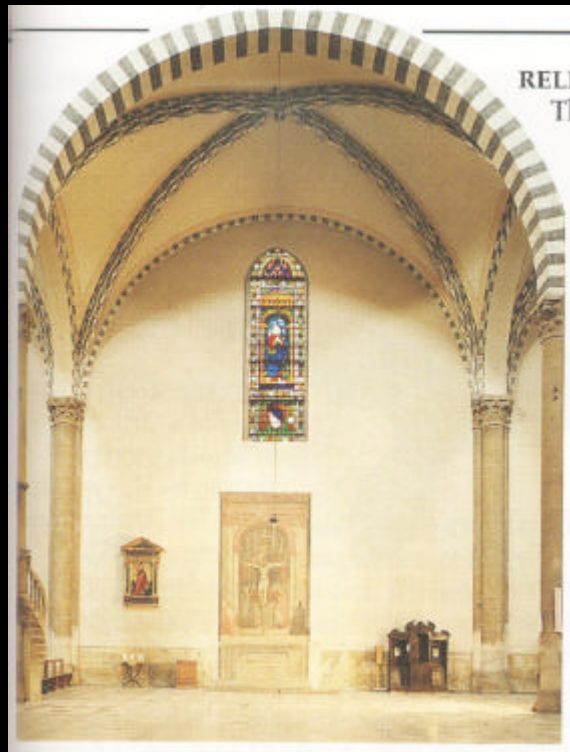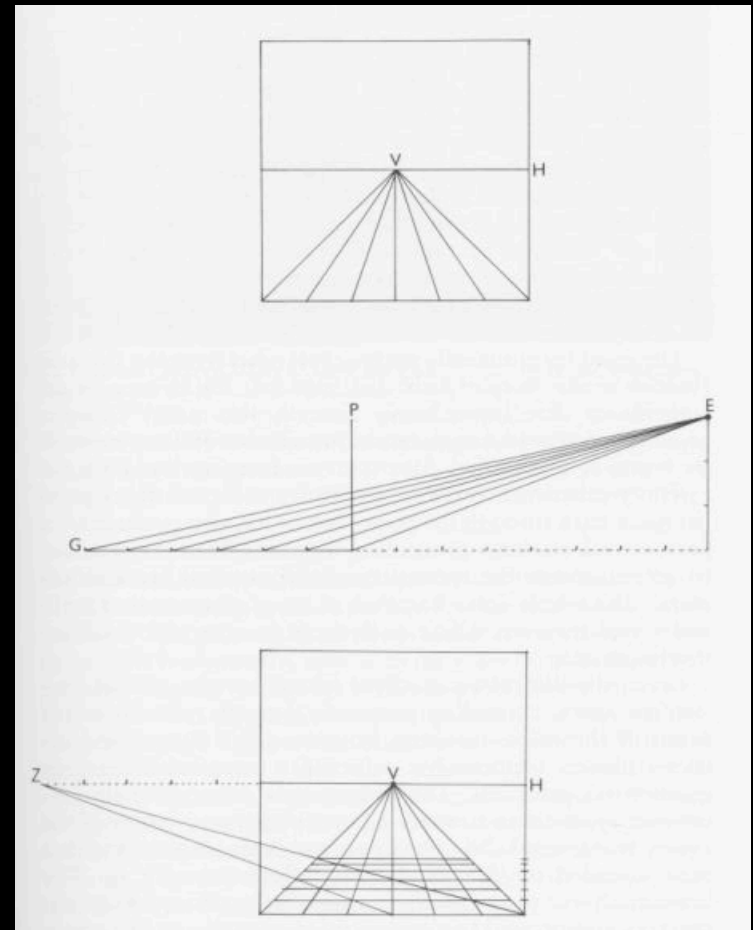
Masaccio, The Trinity, 1427

- The oldest perspective painting

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

Piero de la Francesca

- *De Prospectiva Pingendi*, 1474 (On the perspective of painting)
- Ratios of distance and size
- Use plan and elevation view
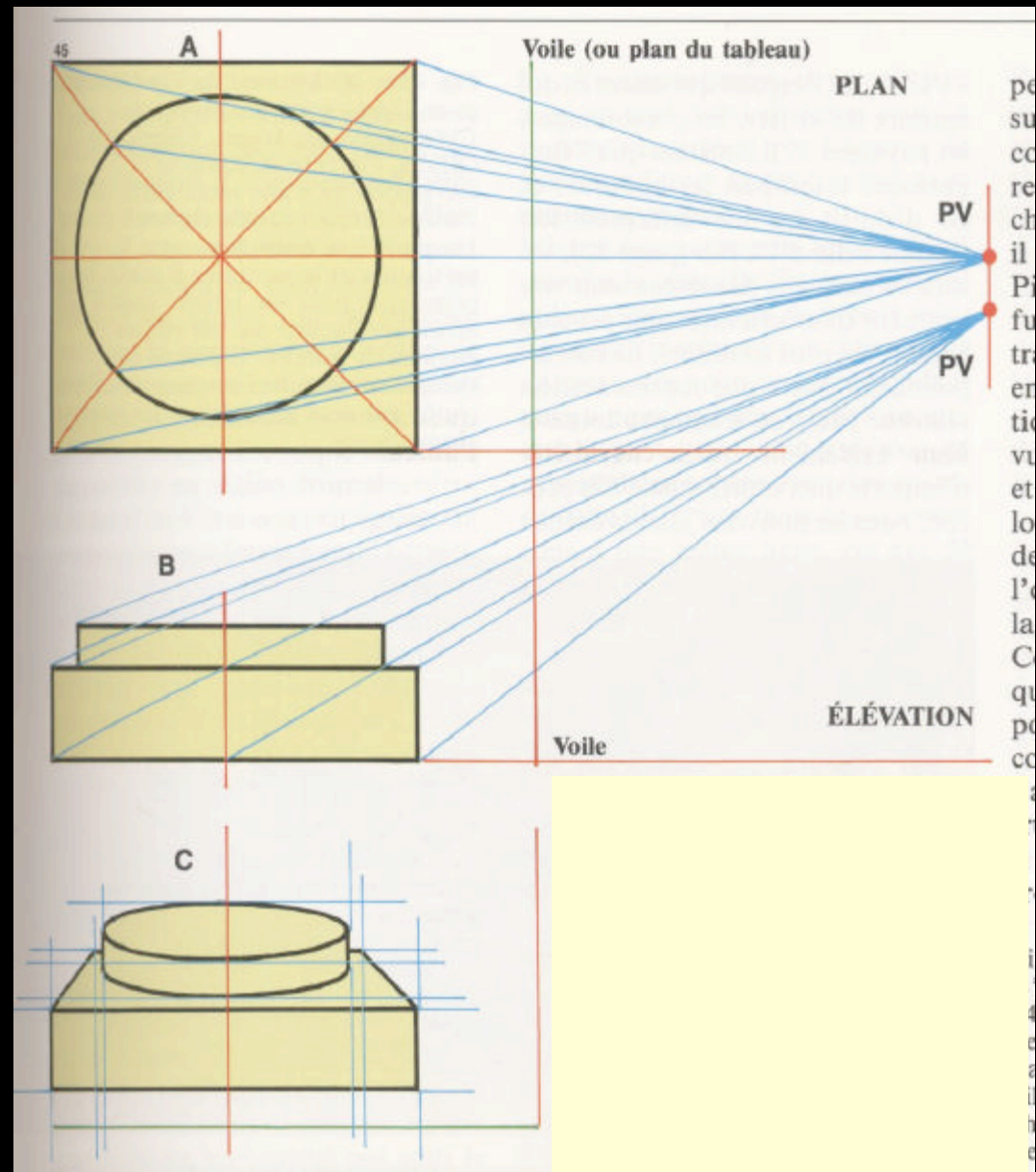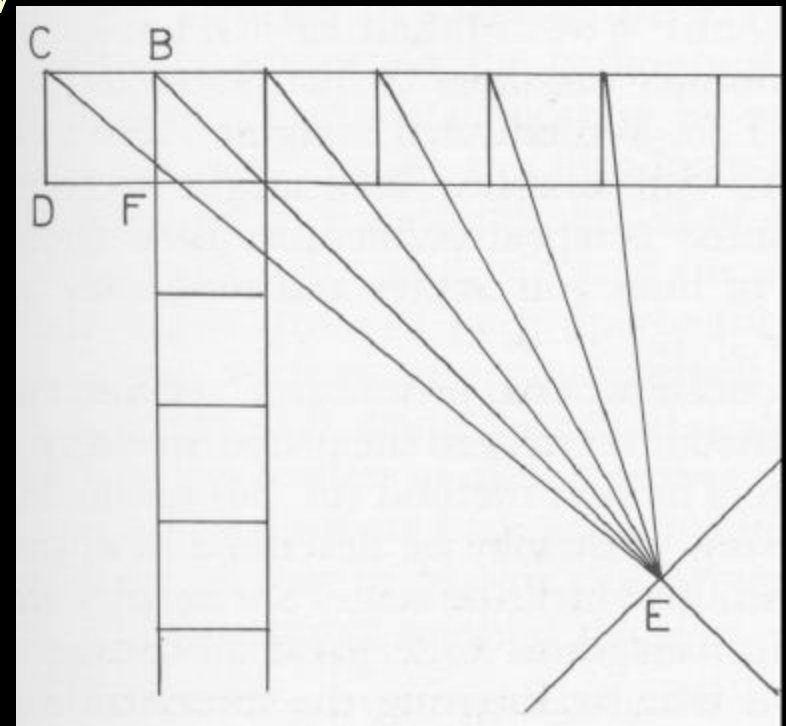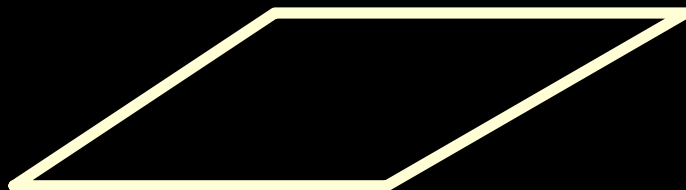
Piero de la Francesca
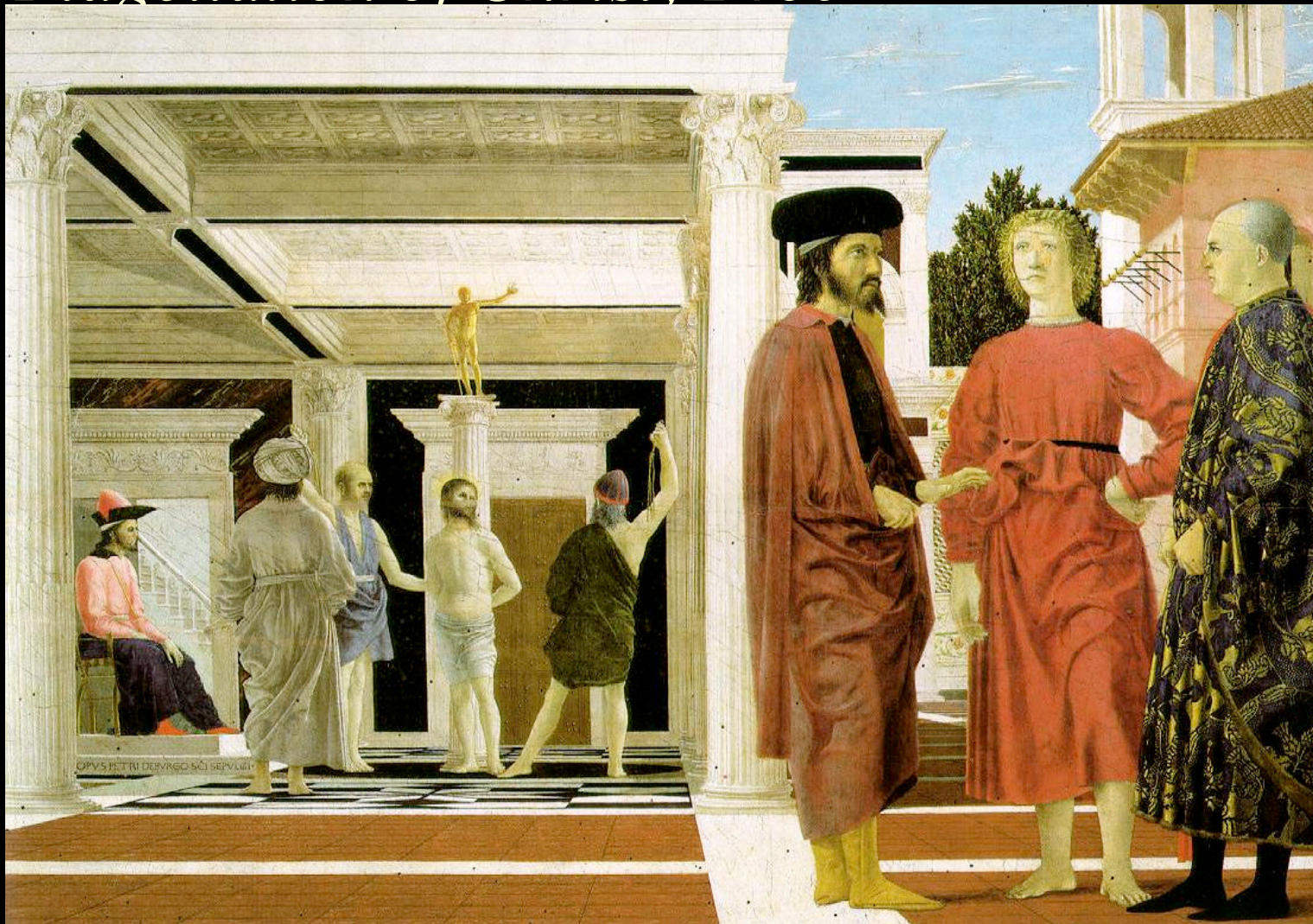
- Use plan and elevation view

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 90º

Piero de la Francesca

- *Flagellation of Christ*, 1460

Piero de la Francesca

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

Piero de la Francesca

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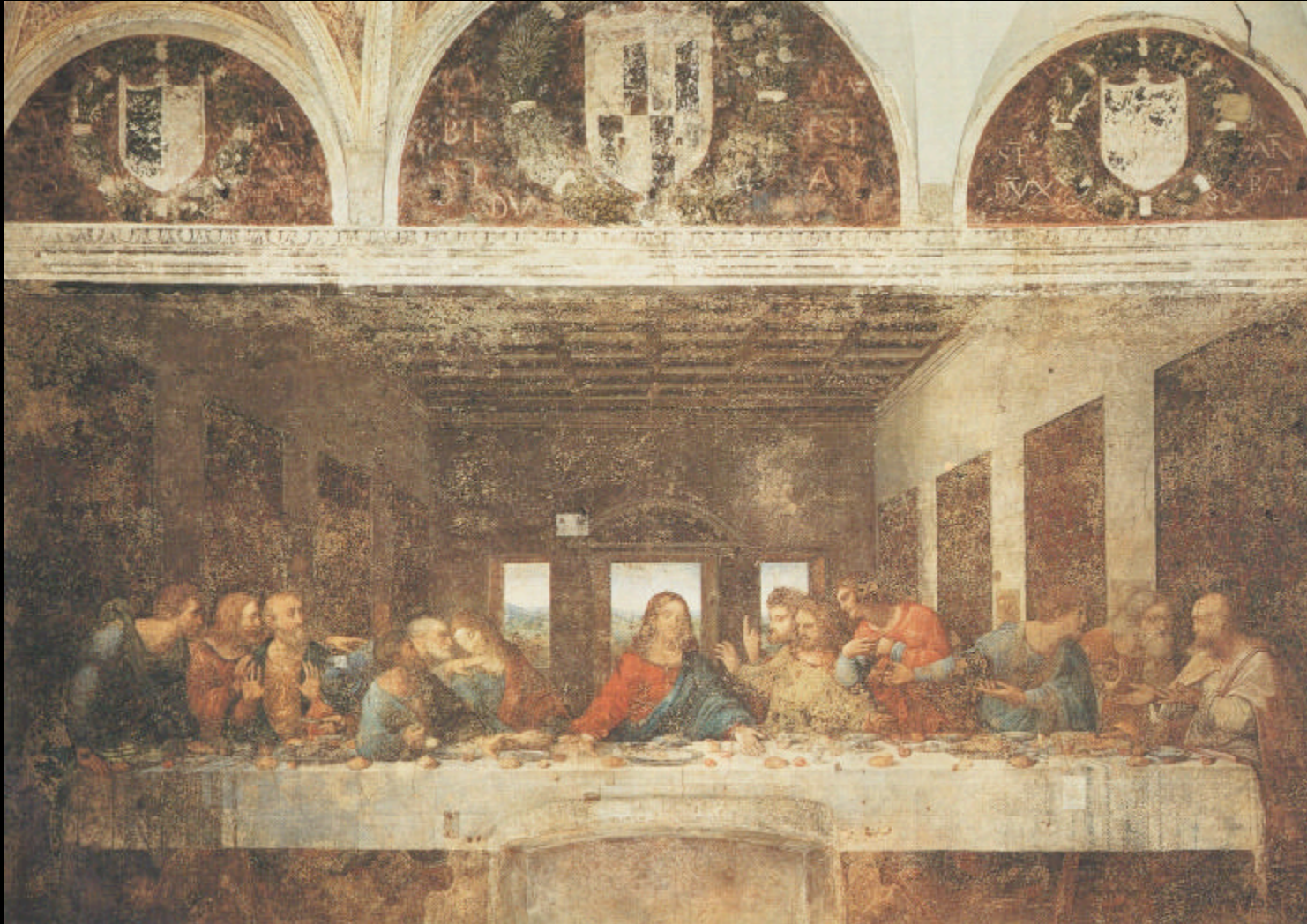
- "wrong perspective on the left

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)
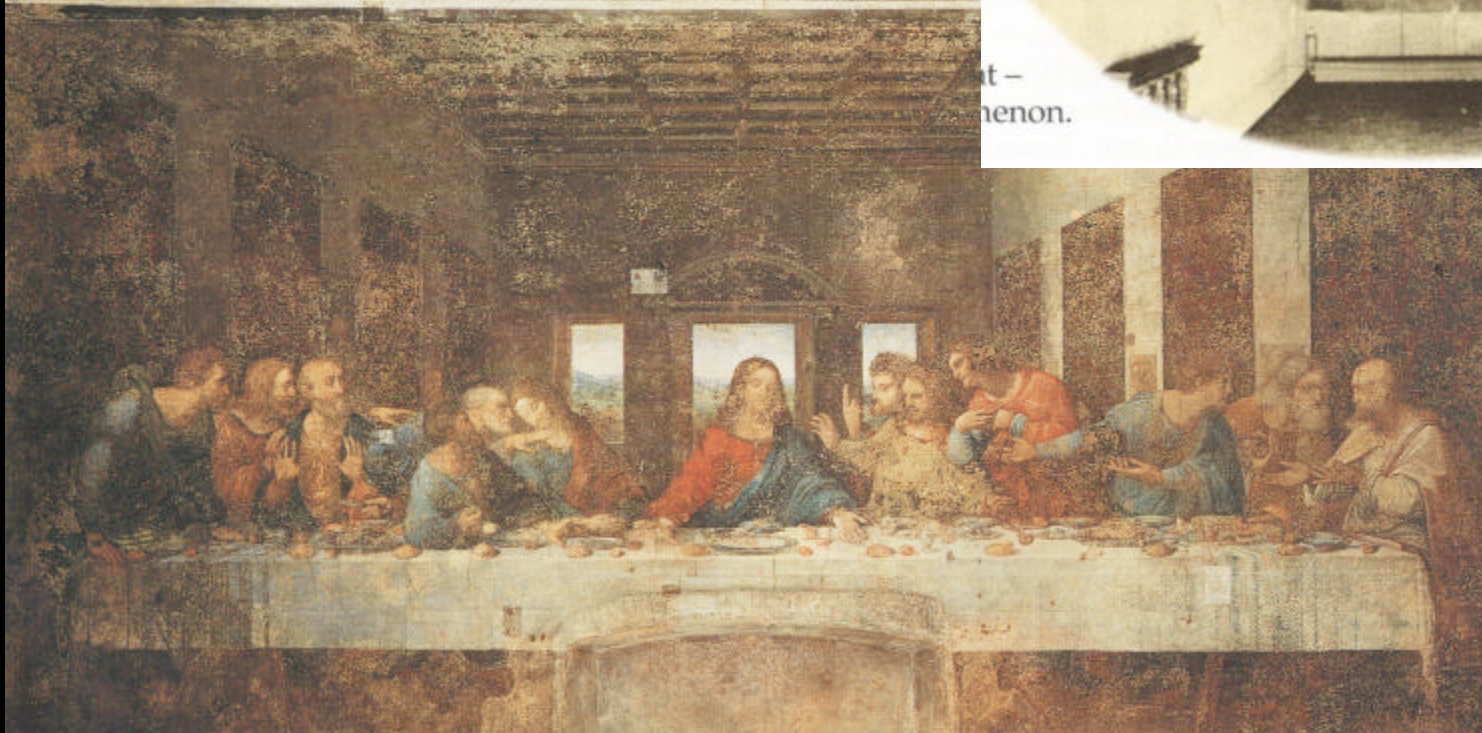- Apparent contradictions

Leonardo

- *Last Supper*, 1497

Leonardo

- *Last Supper*, 1497

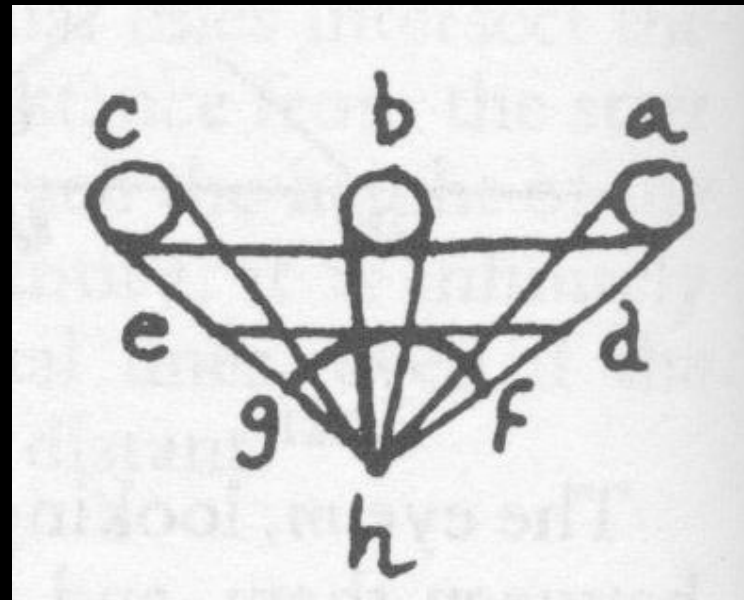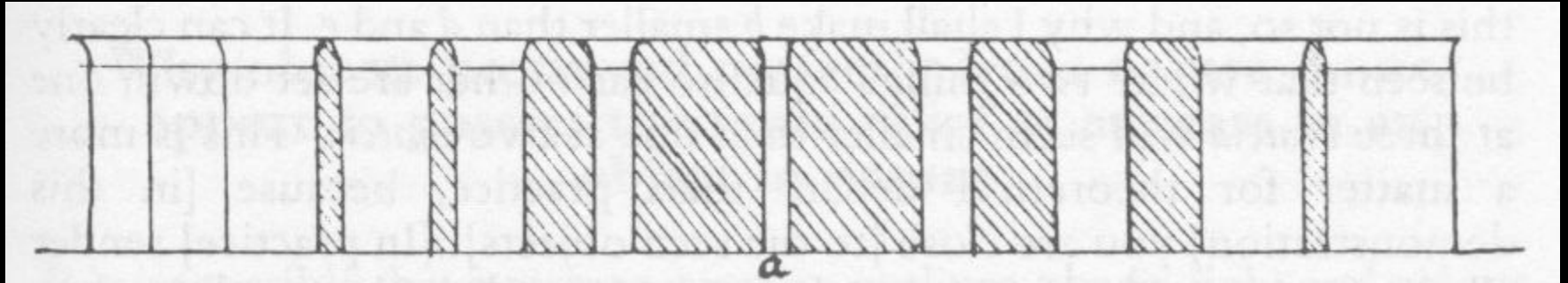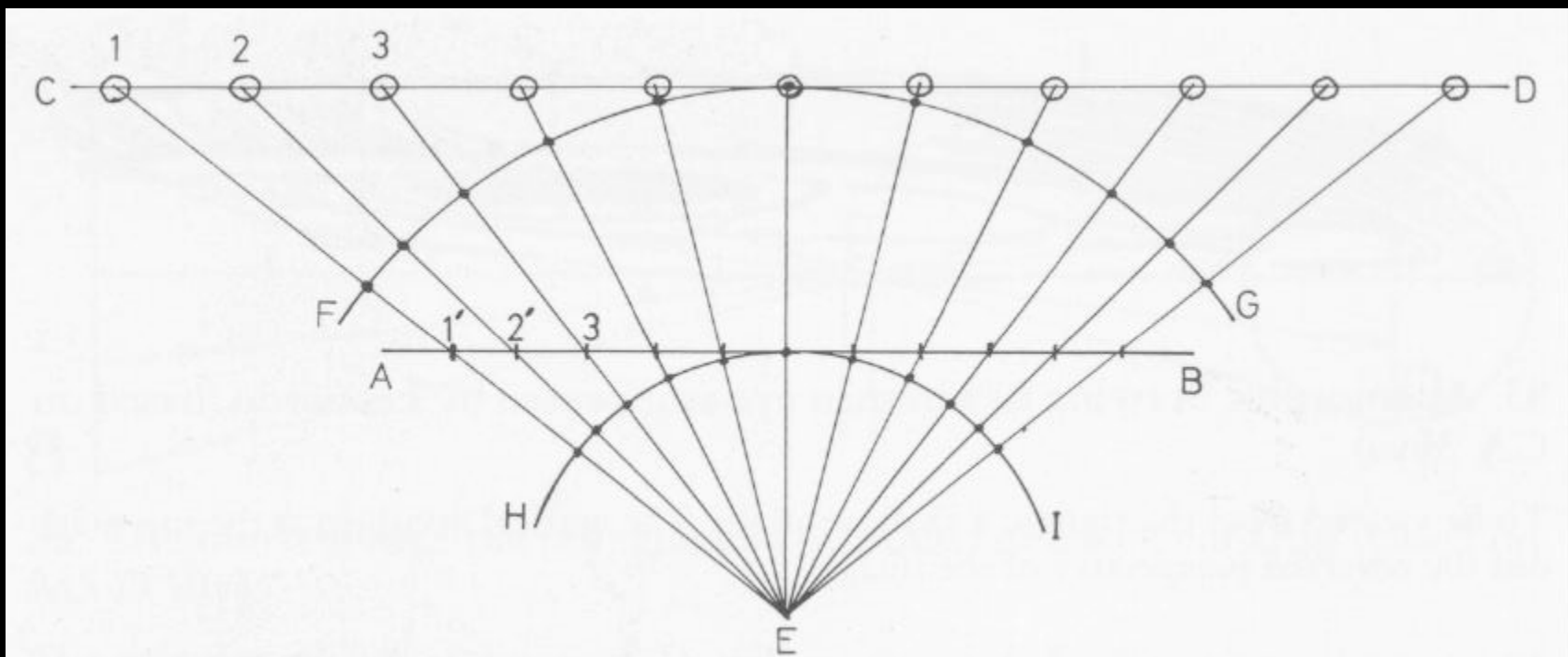# *Leonardo & contradictions*

- Wide angle vision

Leonardo & contradictions
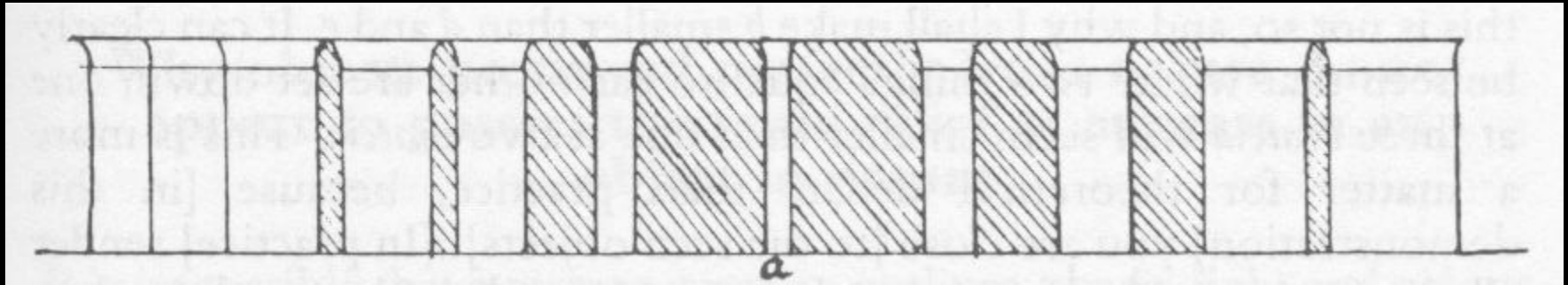
- Wide angle vision

Leonardo & contradictions

- Wide angle vision
- Lateral recession
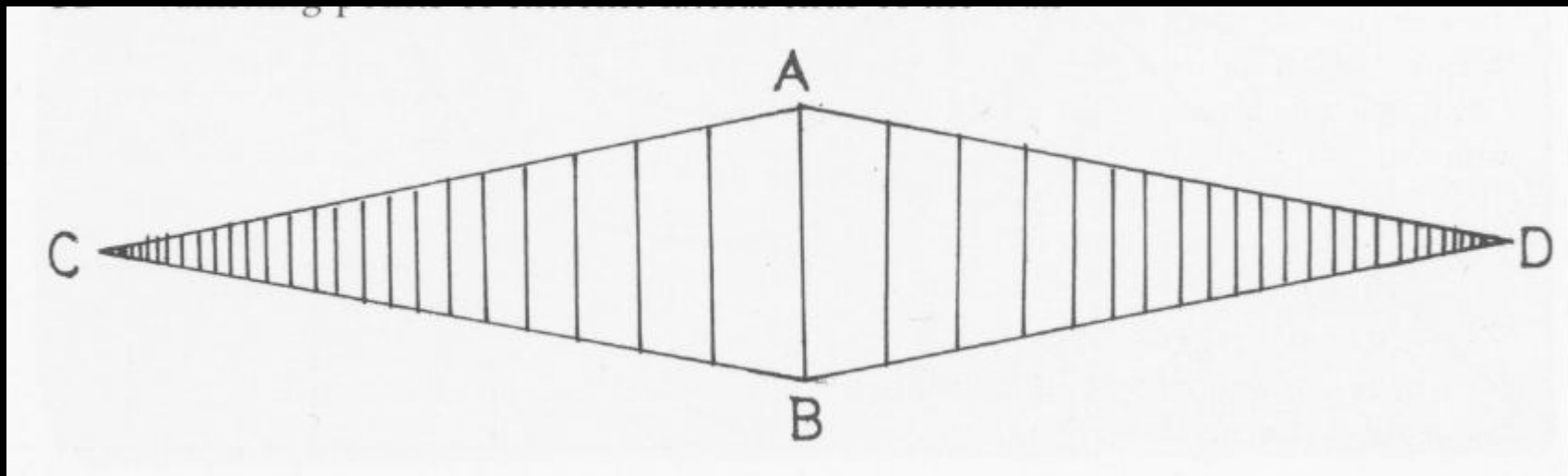
Dürer

- Traveled to Italy

- Mainly influenced by de la Francesca

- *Instruction in Measurement with Compass and Ruler in Lines, Planes and Solid Bodies*, 1525

Dürer

- *St Jerome in his Study* 1514
- Very off-center
- Note the verticals
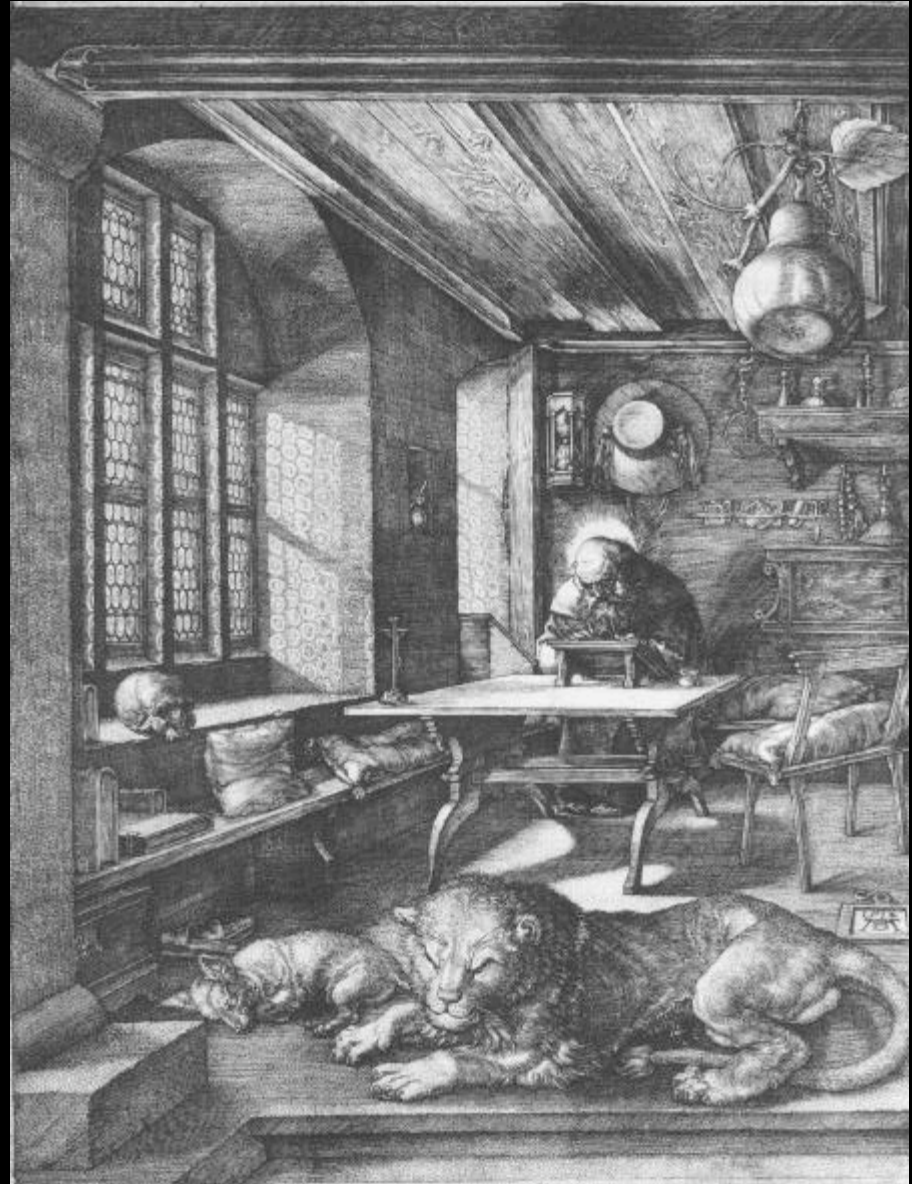
Dürer

- The artist's glass

Dürer

- The draftsman's net
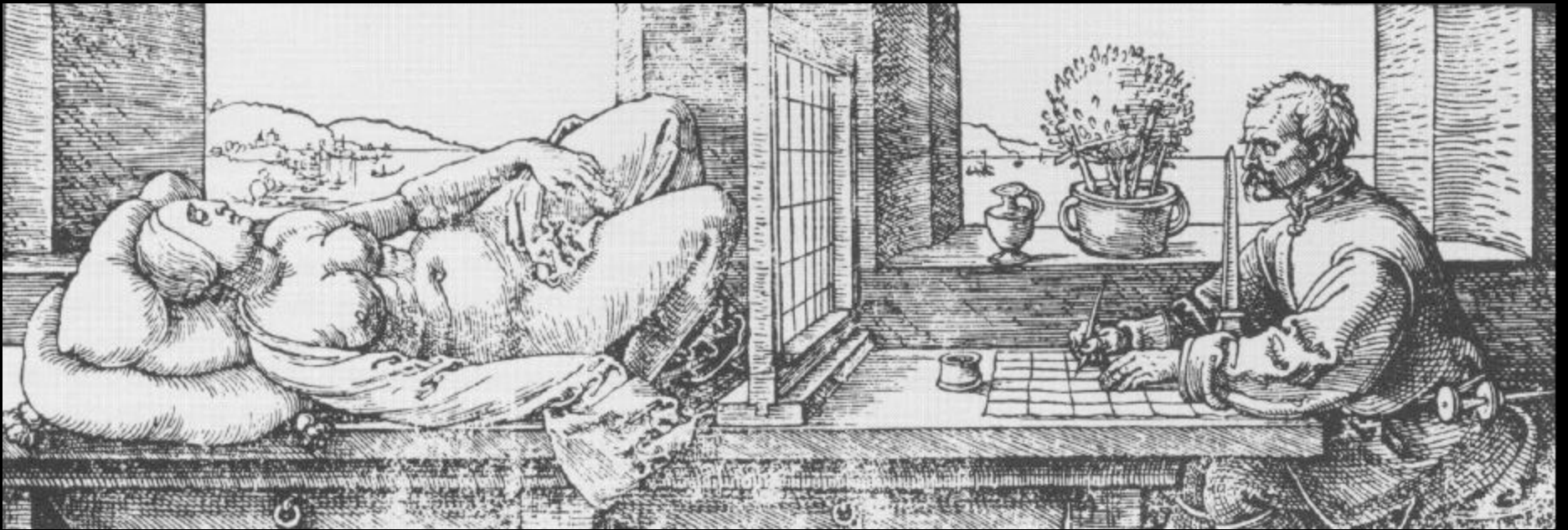
Dürer

- Jacob de Keyser's invention

Dürer

- Dürer's device
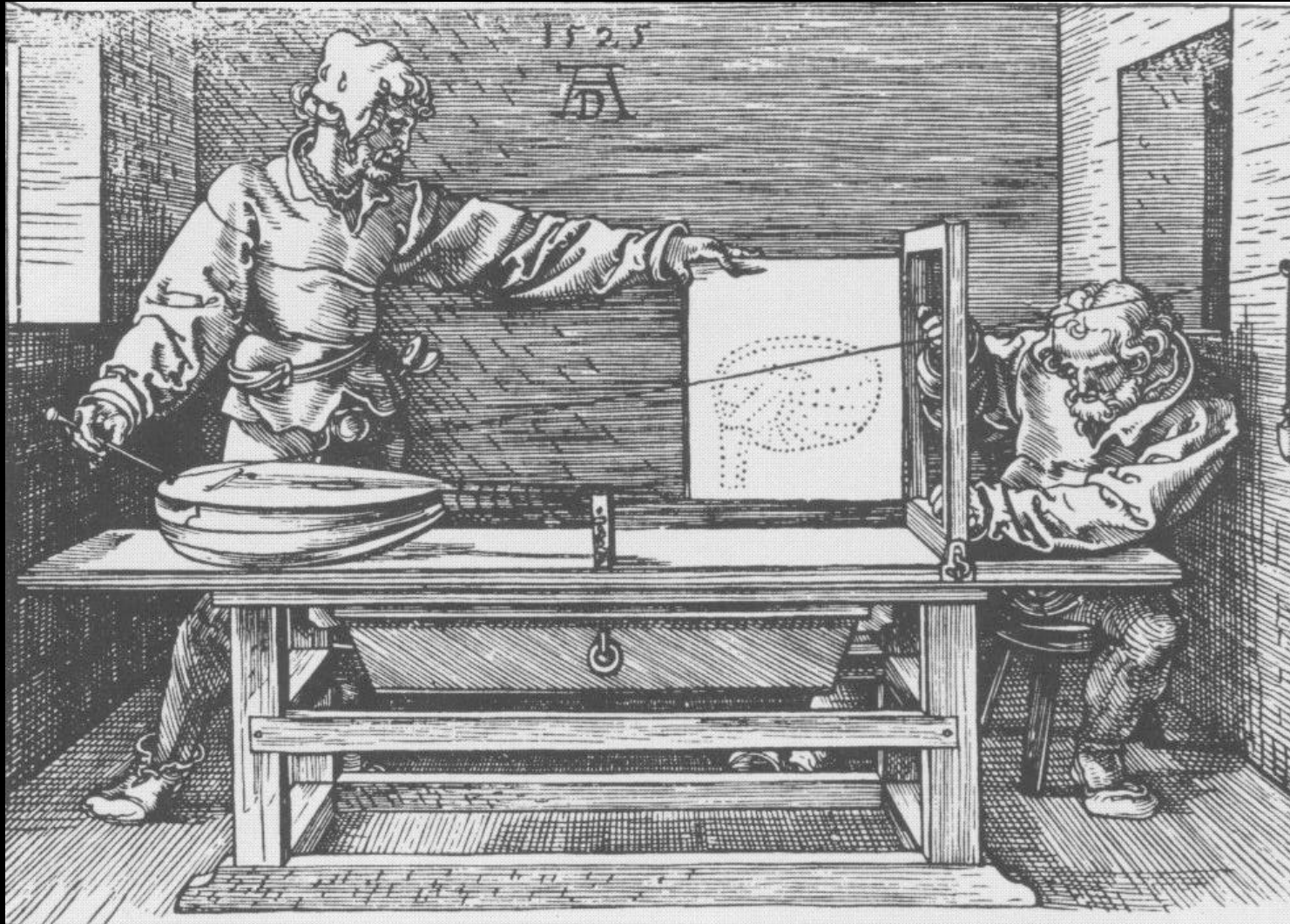
Conclusions about Renaissance

- Different techniques, refinement
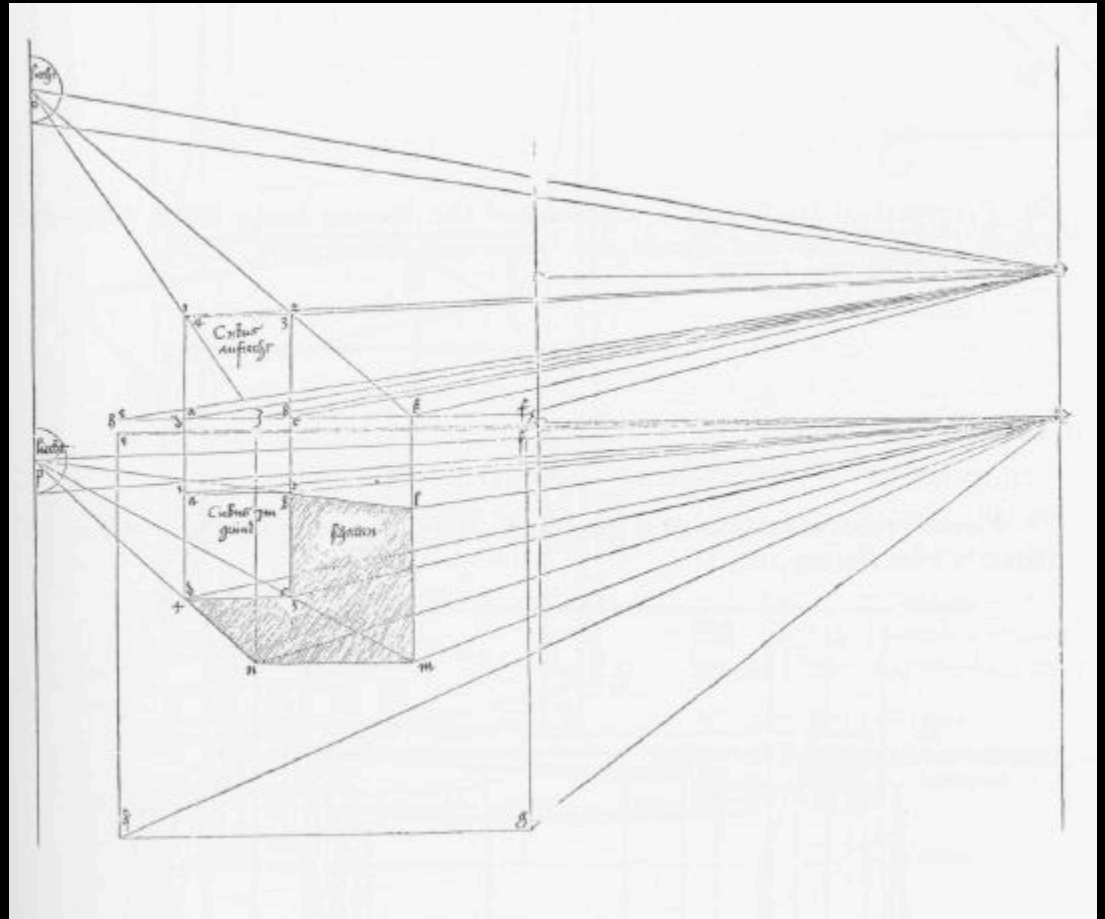- Measurement
- Mainly central perspective
- No notion of infinity, no vanishing point
- Spiritual notion of mathematical harmony

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

Gadgets

- Camera obscura

Vermeer 1660

- Camera obscura

Gadgets

- Baldassare Lanci's universal instrument for surveying and perspective 1557
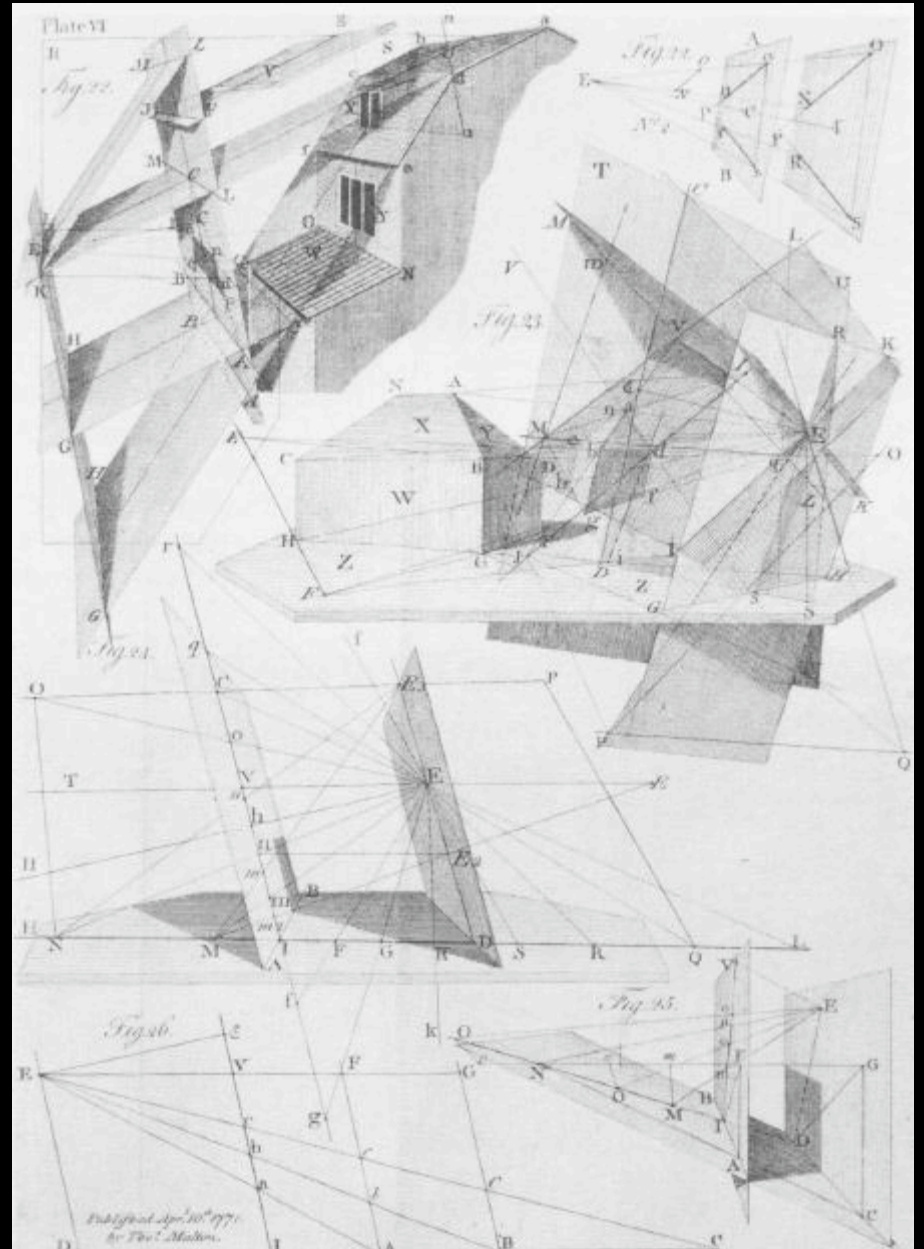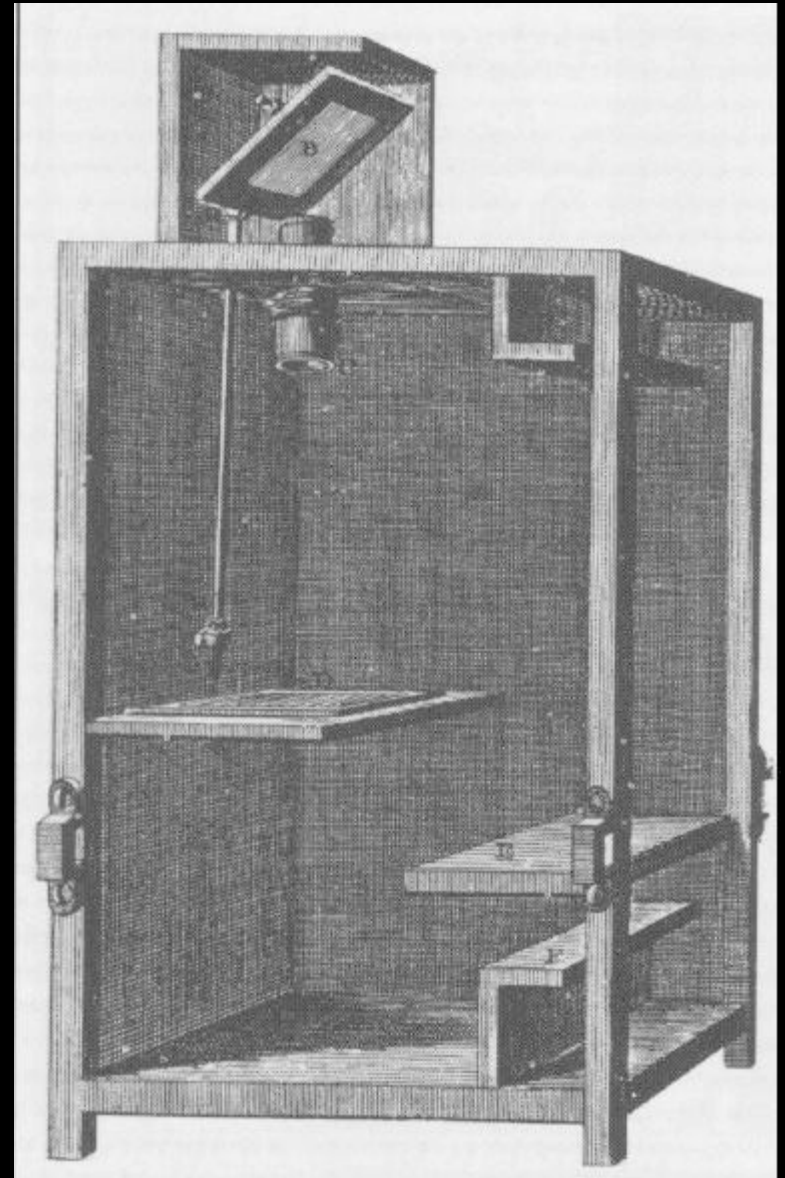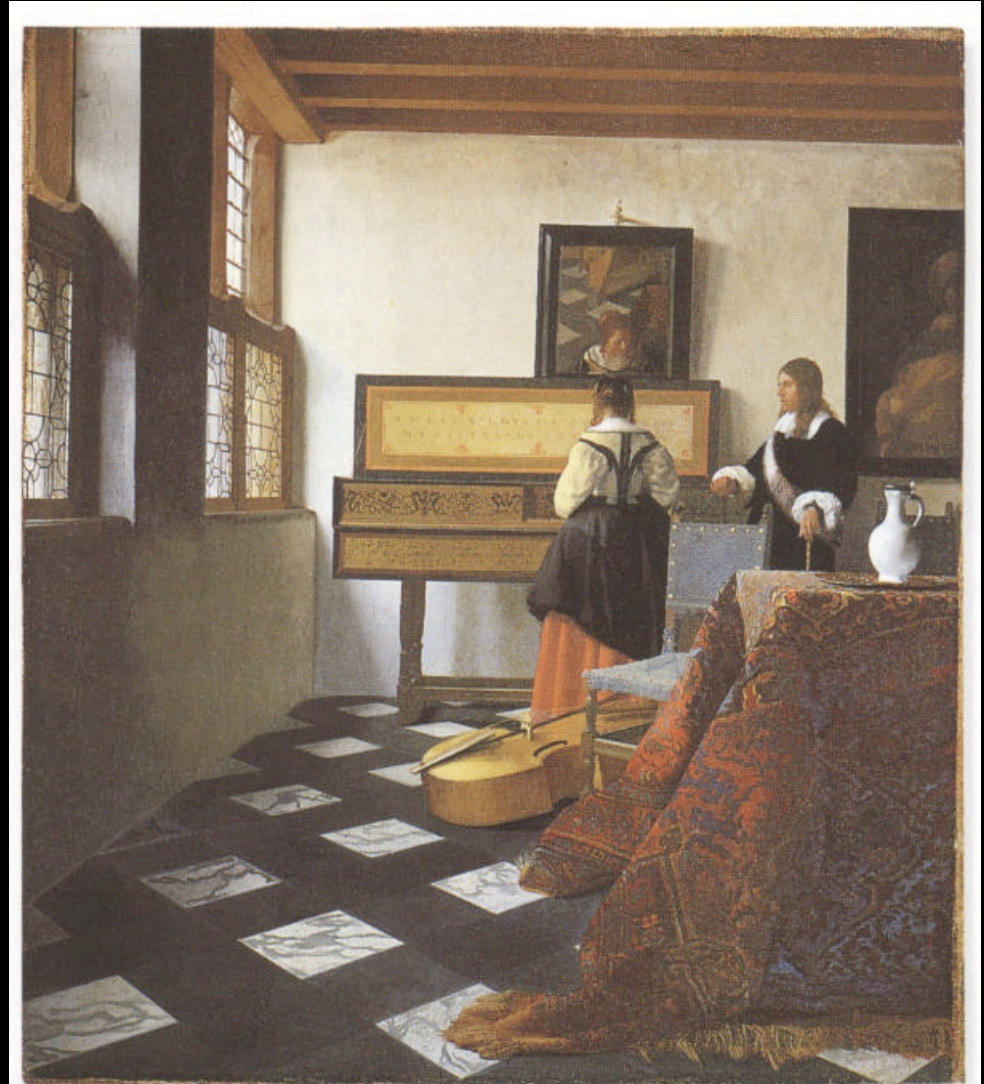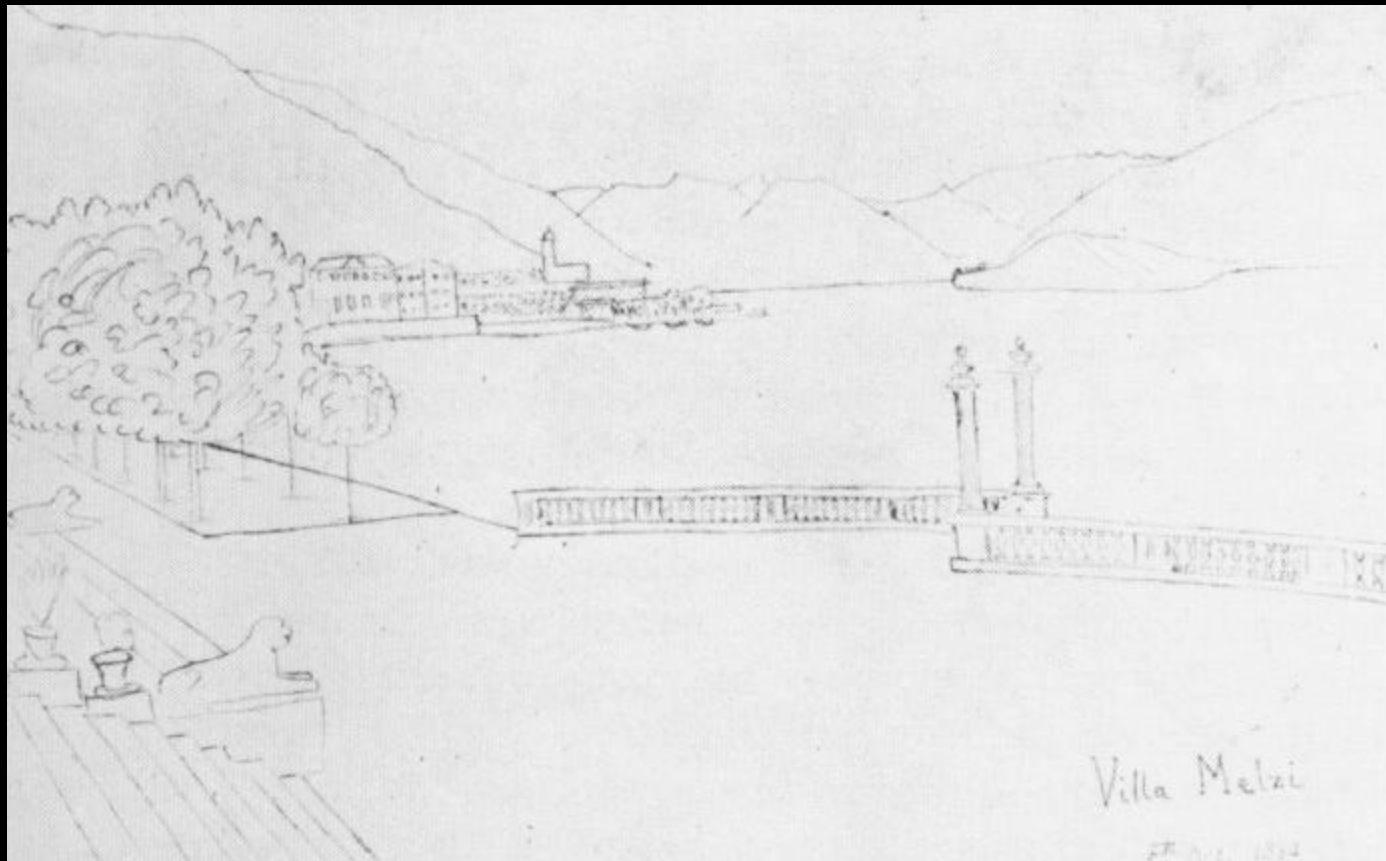

Instrument for Surveying and Perspective" dates from 1557. As a perspective aid, it was used in a horizontal position, with an upright cylindrical drawing surface attached around half its rim. The artist looked through the sight arm, moving it around as he took in the scene. The drawing pin moved with the sight arm, allowing the key points of the design to be pricked out on the inside of the drawing surface.

Sight arm

Drawing pin

Holes for attaching drawing surface

Part of the surface engraving shows the instrument in use

When the drawing surface was detached and flattened, the effect may have been like Fabritius's panoramic view (left)

cm); oil on wood itectural ng of St. Bavo's is paintings ildings.

Gadgets

- Camera Lucida

- E.g. Talbot

THE CAMERA LUCIDA *left*
W.H. Wollaston's Camera Lucida, patented in 1806, was a precise aid to perspective drawing. Closing one eye and looking down and over the edge of a four-sided prism, the artist could see the object in front of the apparatus, as well as the "three-dimensional" image of the object projected onto the drawing paper below.
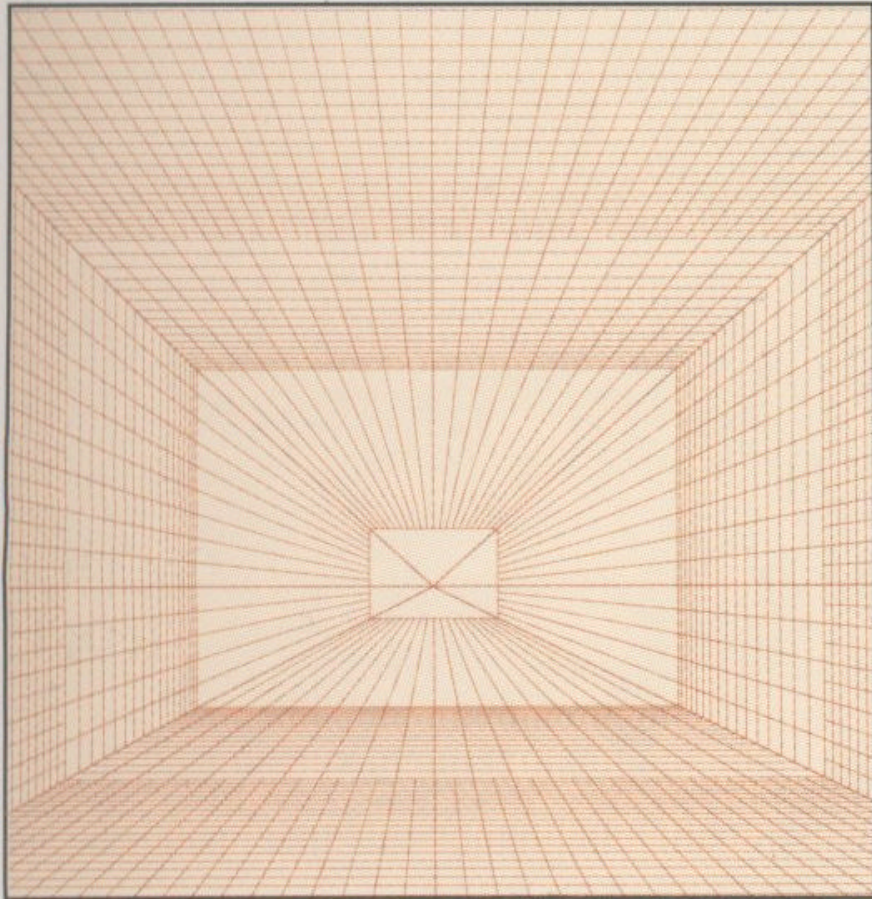
Eyepiece – this can be adjusted so that the viewer can focus the image

Villa Melzi

Perspective
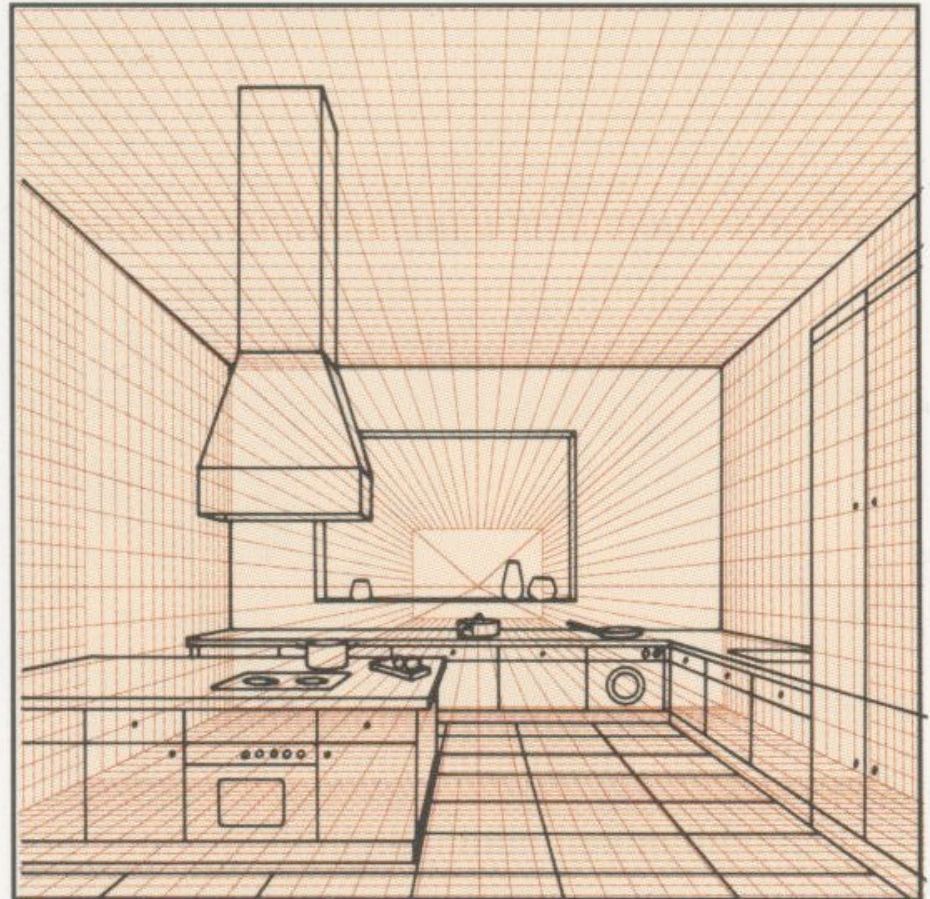
Perspective grids

42

43

Perspective distortion

- The sphere is projected as an ellipse

Perspective distortion

- The sphere is projected
  as an ellipse