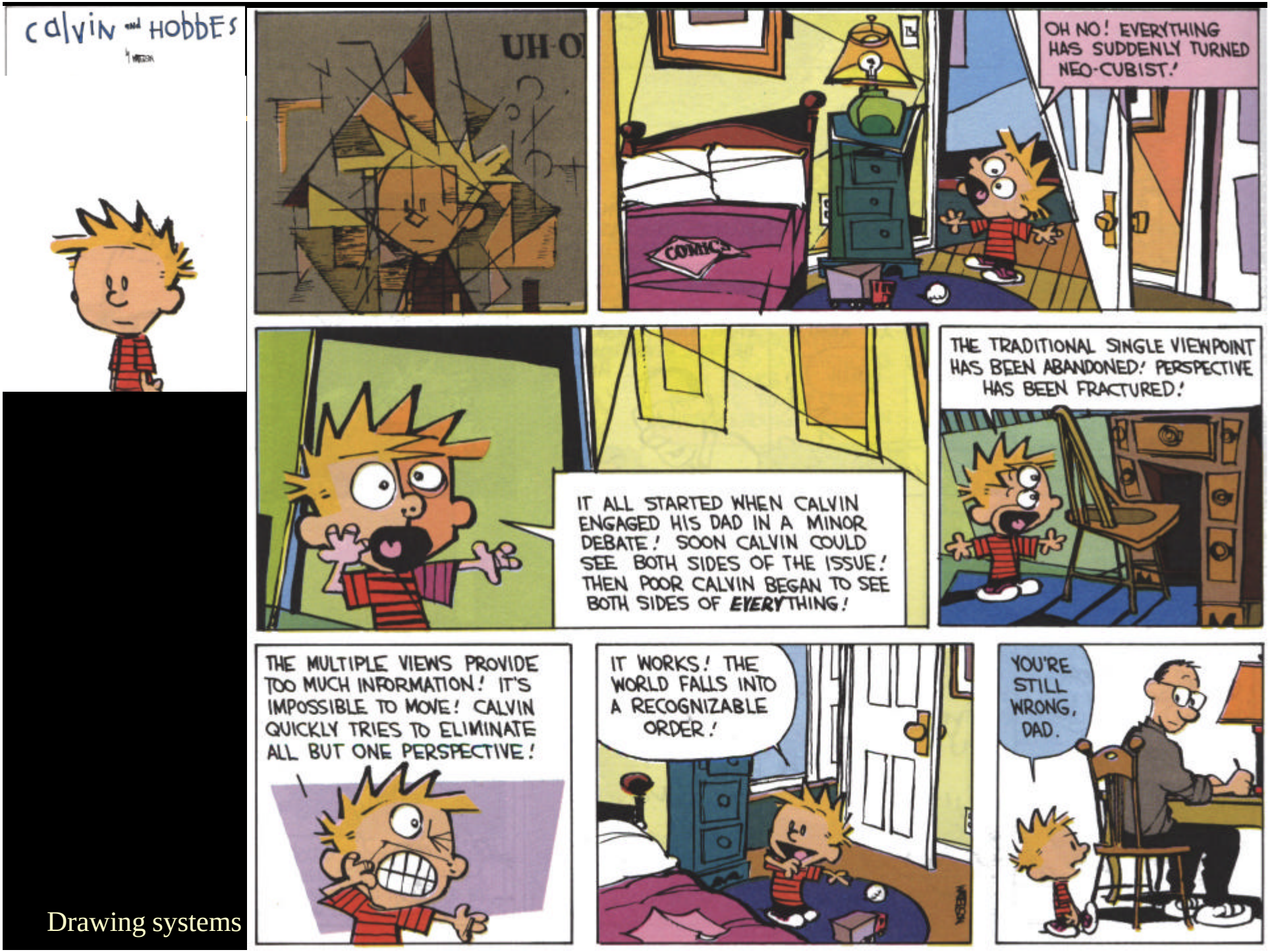
The Art and Science of Depiction

Drawing systems

Fredo Durand

MIT- Lab for Computer Science



Drawing systems

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

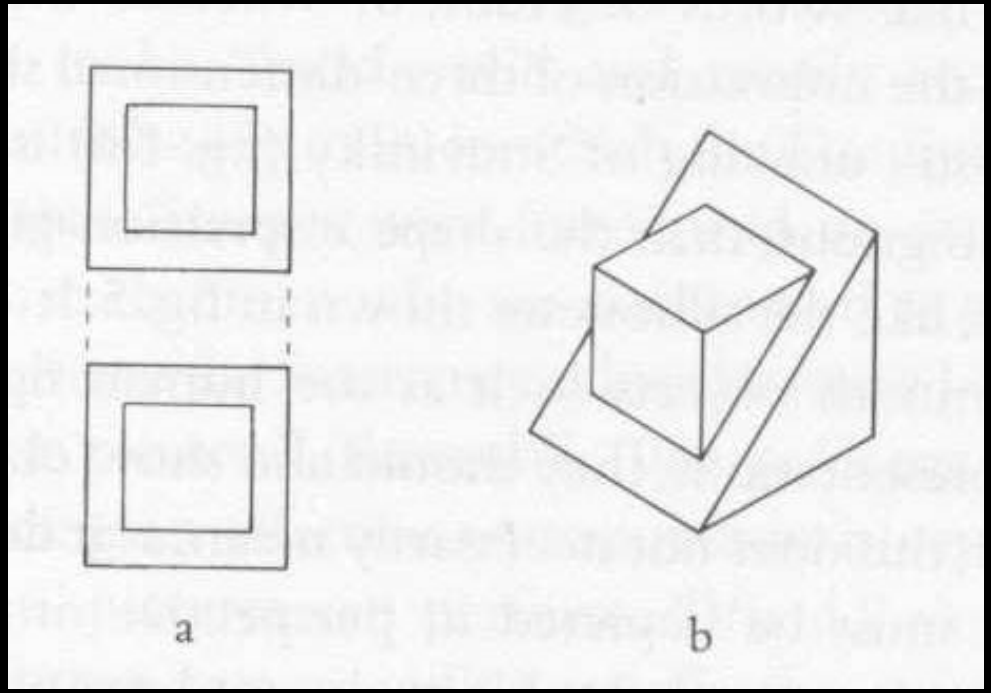
- Child development
- No cultural judgment!

Context

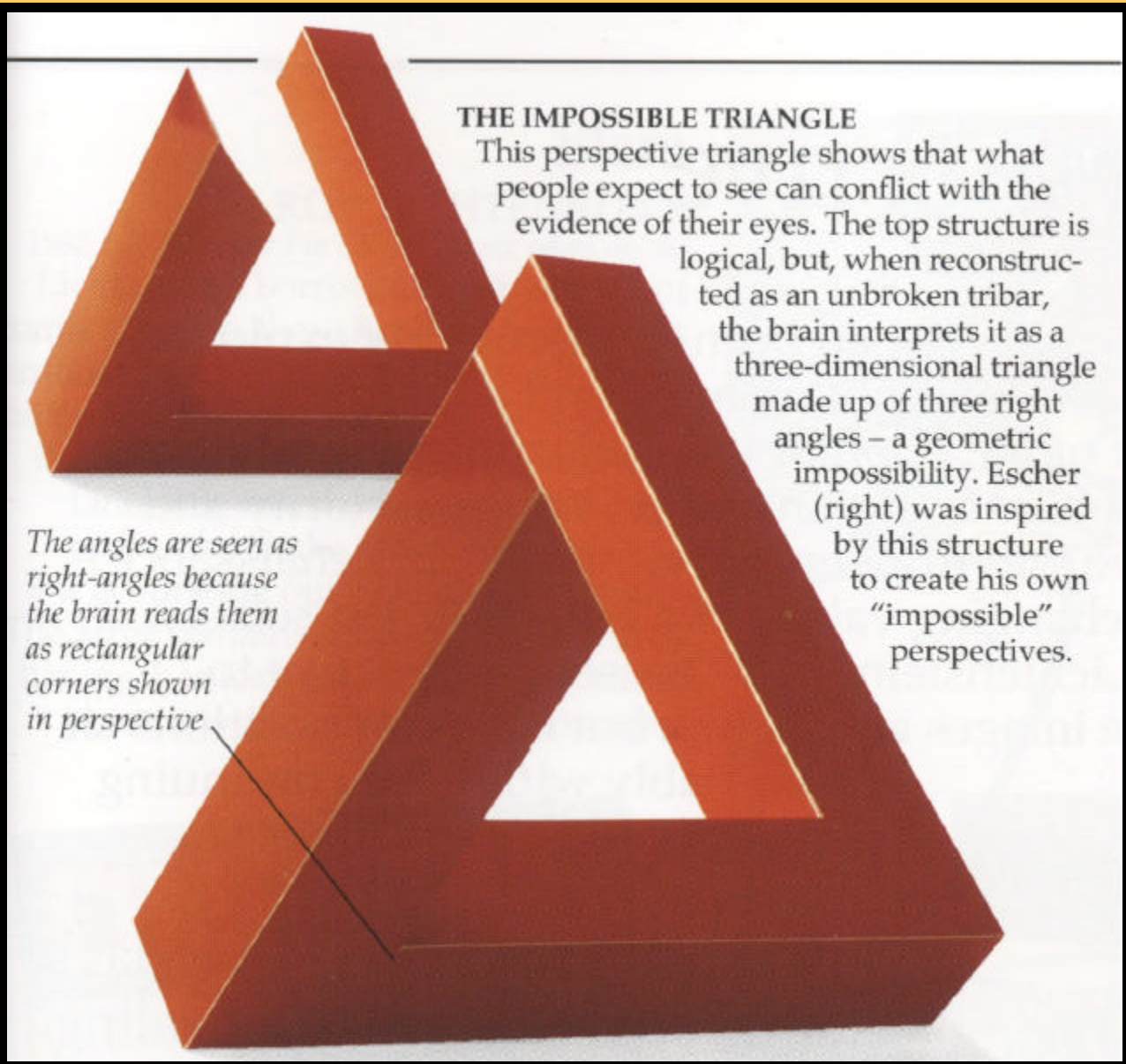
- Importance of the notion of front/top/side
- Presence of lines and planes or not
- Orthogonals
  - Lines orthogonal to the picture plane
  - I.e. lines that converge in the center of the image in central perspective
- Picture plane/curved picture

Efficient shape representation

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



Generic vs. accidental viewpoint



Generic vs. accidental viewpoint

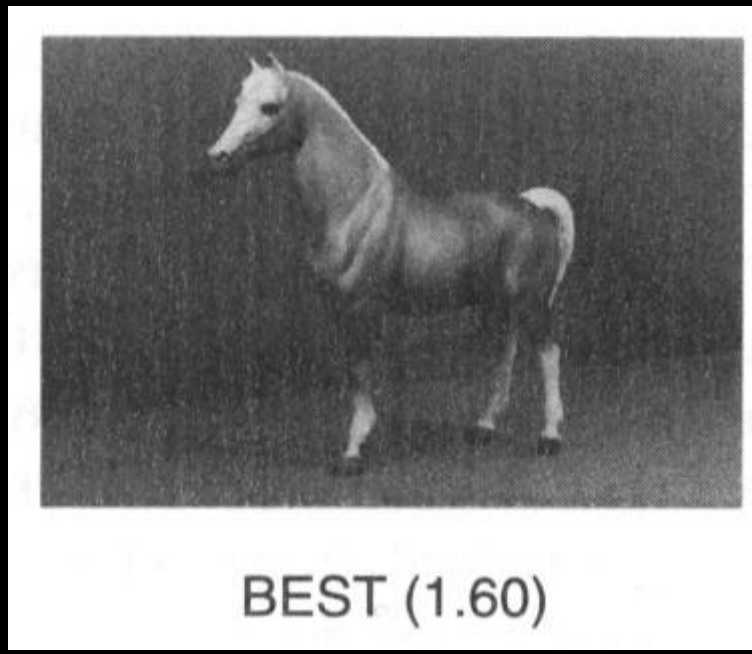
- Accidental alignment of trash and sea

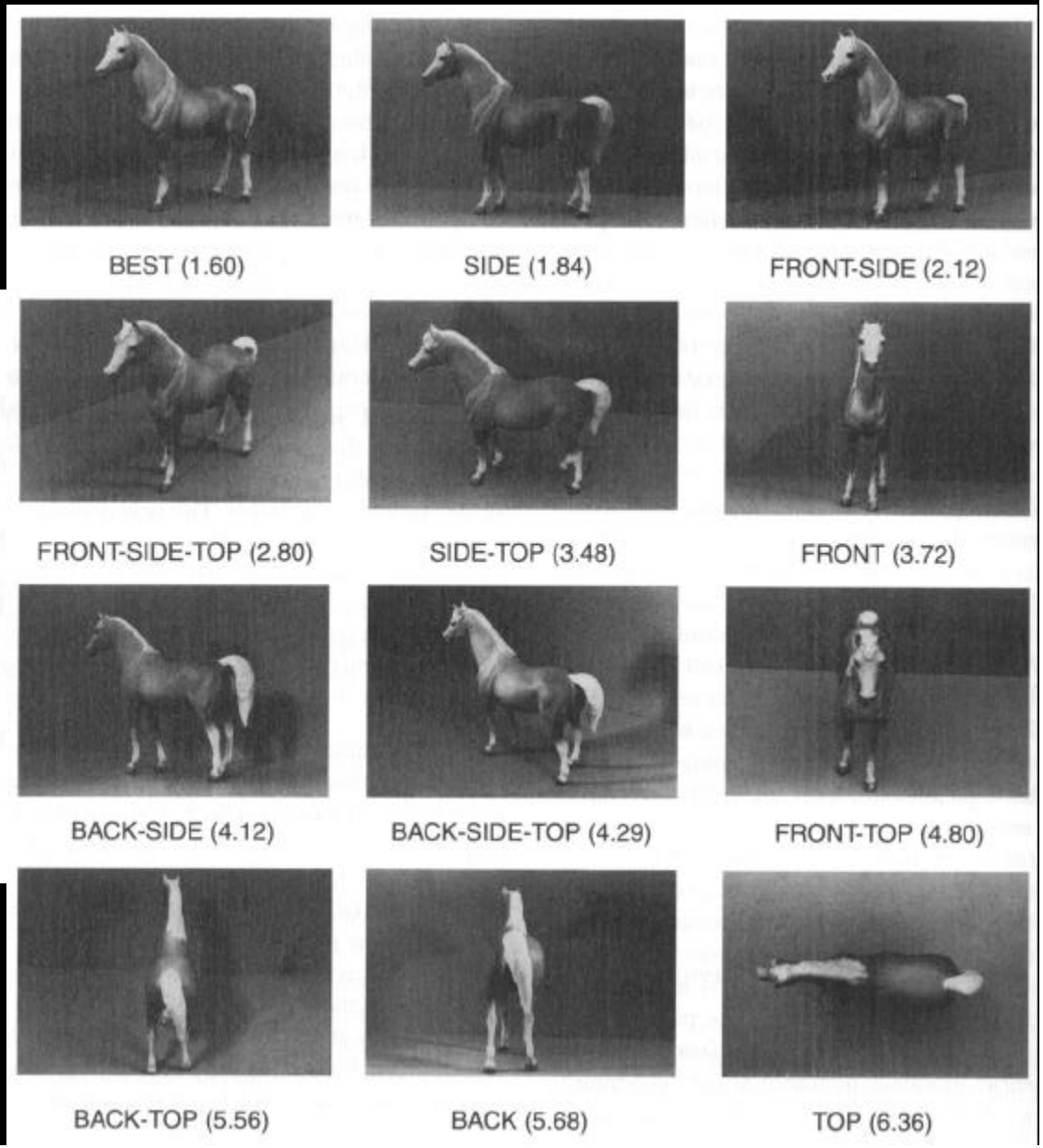
Photo
Peter Turner

Generic vs. accidental viewpoint

Canonical view

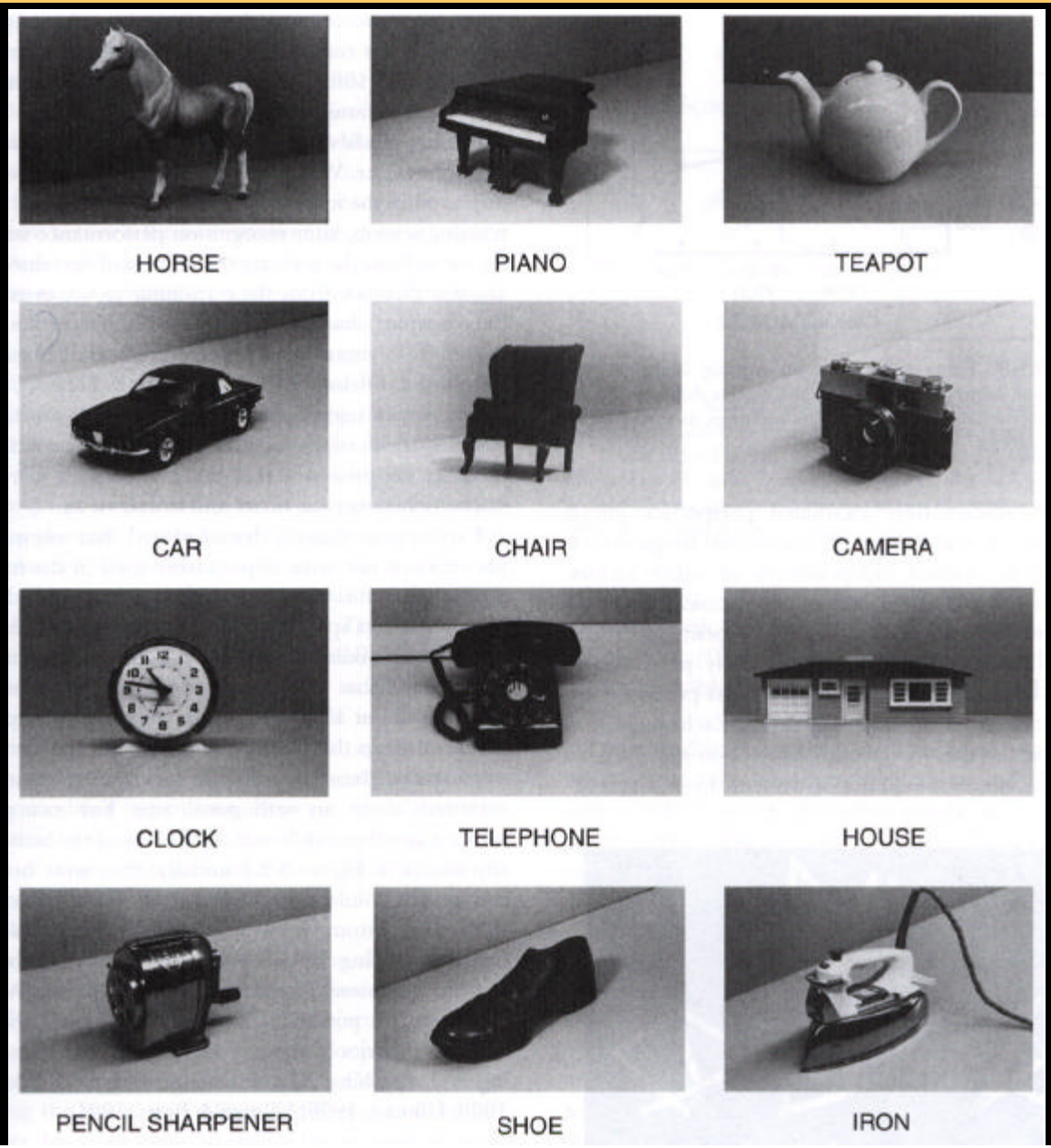
- Rate views





Canonical view

- Rate views
- Features must be salient
- General view
- Front view
- ¾ up view

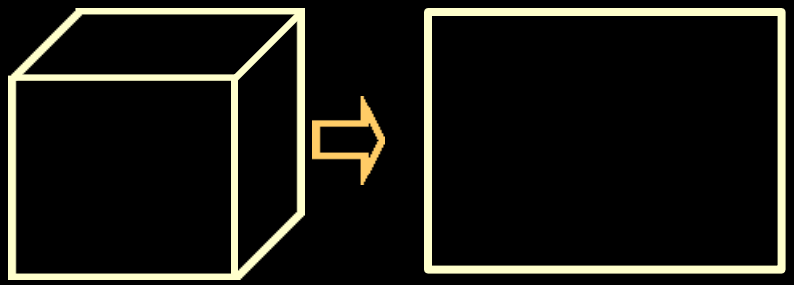


Invariants

- Invariants
  - Alignments
  - Angles
  - Shape
  - Symmetry
- Property mapping
- Each system here assumes a unified space. Can be mixed up though

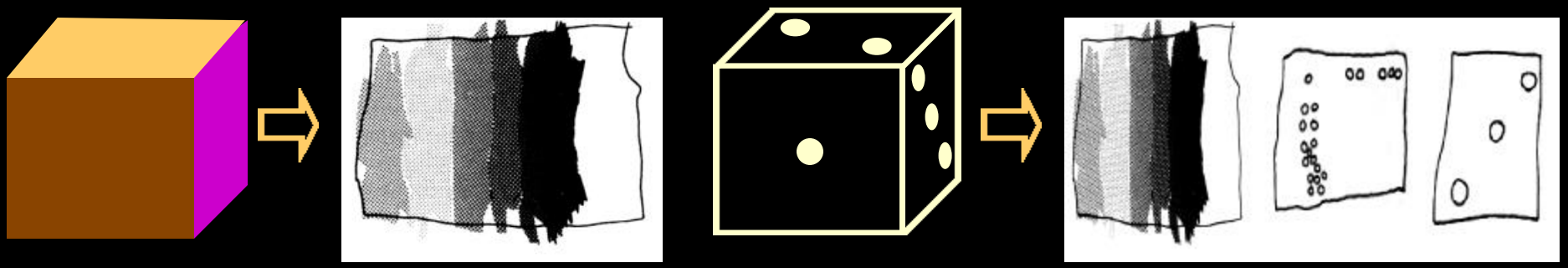
3D and 2D attributes

- Show a dice to children (~6-7)
- They usually draw a rectangle
- The rectangle can stand for one face



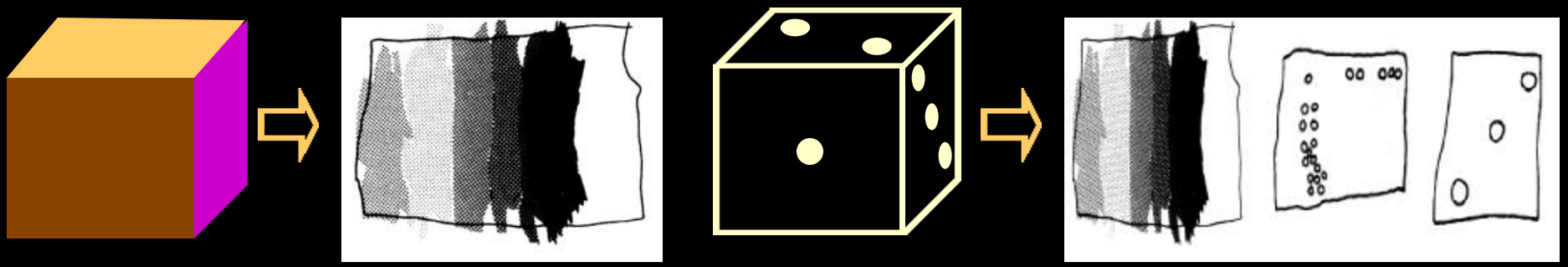
3D and 2D attributes

- Show colored or numbered dice to children (6-7)
- The still draw a rectangle
- But different colors or many points



3D and 2D attributes

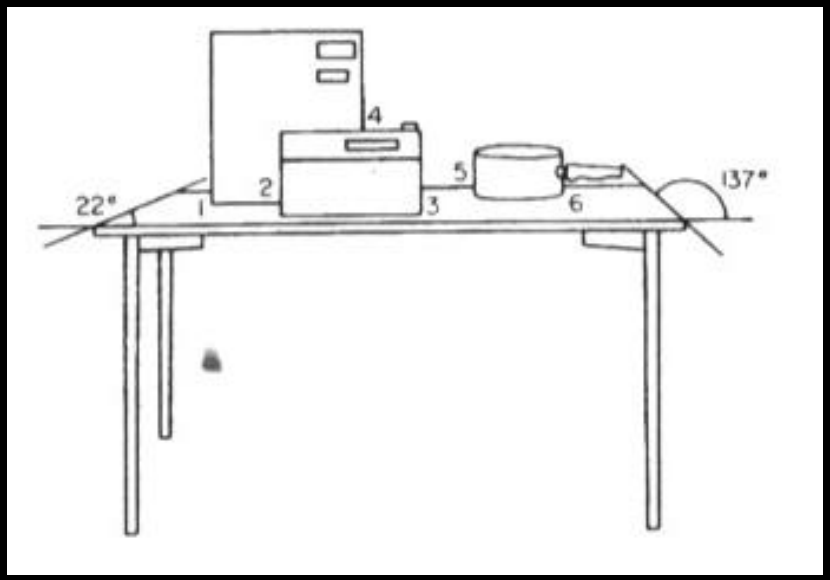
- Show colored or numbered dice to children (6-7)
- The still draw a rectangle
- But different colors or many points
- The rectangle stands for the whole dice
- The notion of 3D object with corners is translated as a 2D object with corners



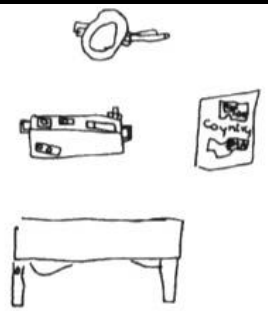
Evolution of children's drawings

- Asked to draw a table

Child's view



Class of drawing
& average age



7.4

9.7

11.9

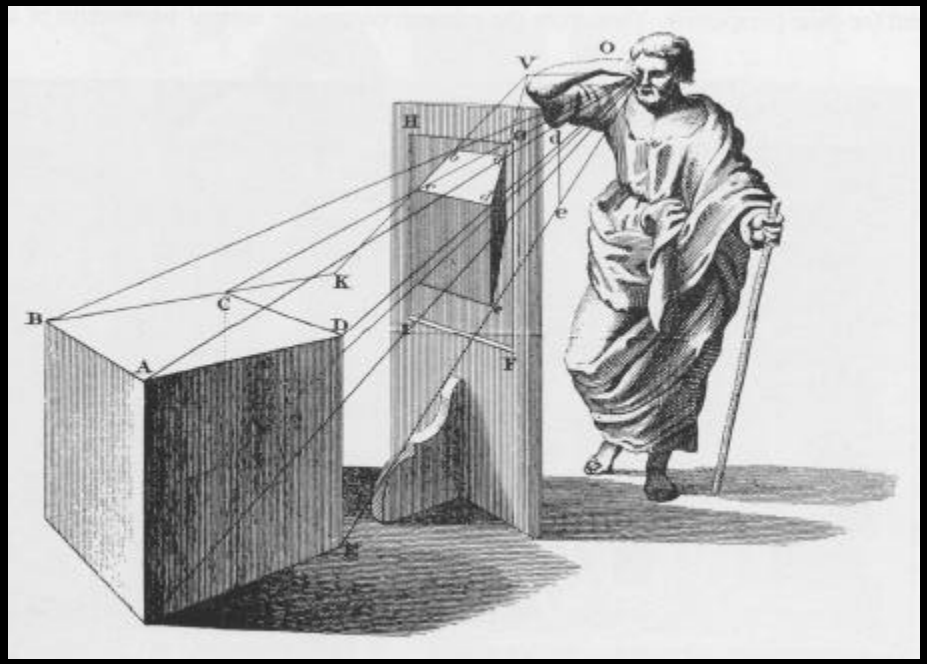
13.6

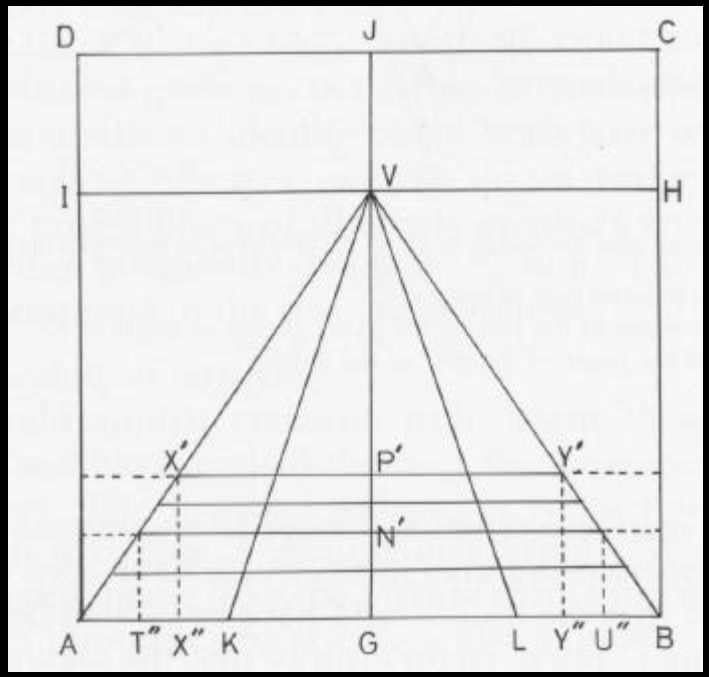
14.3

13.7

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

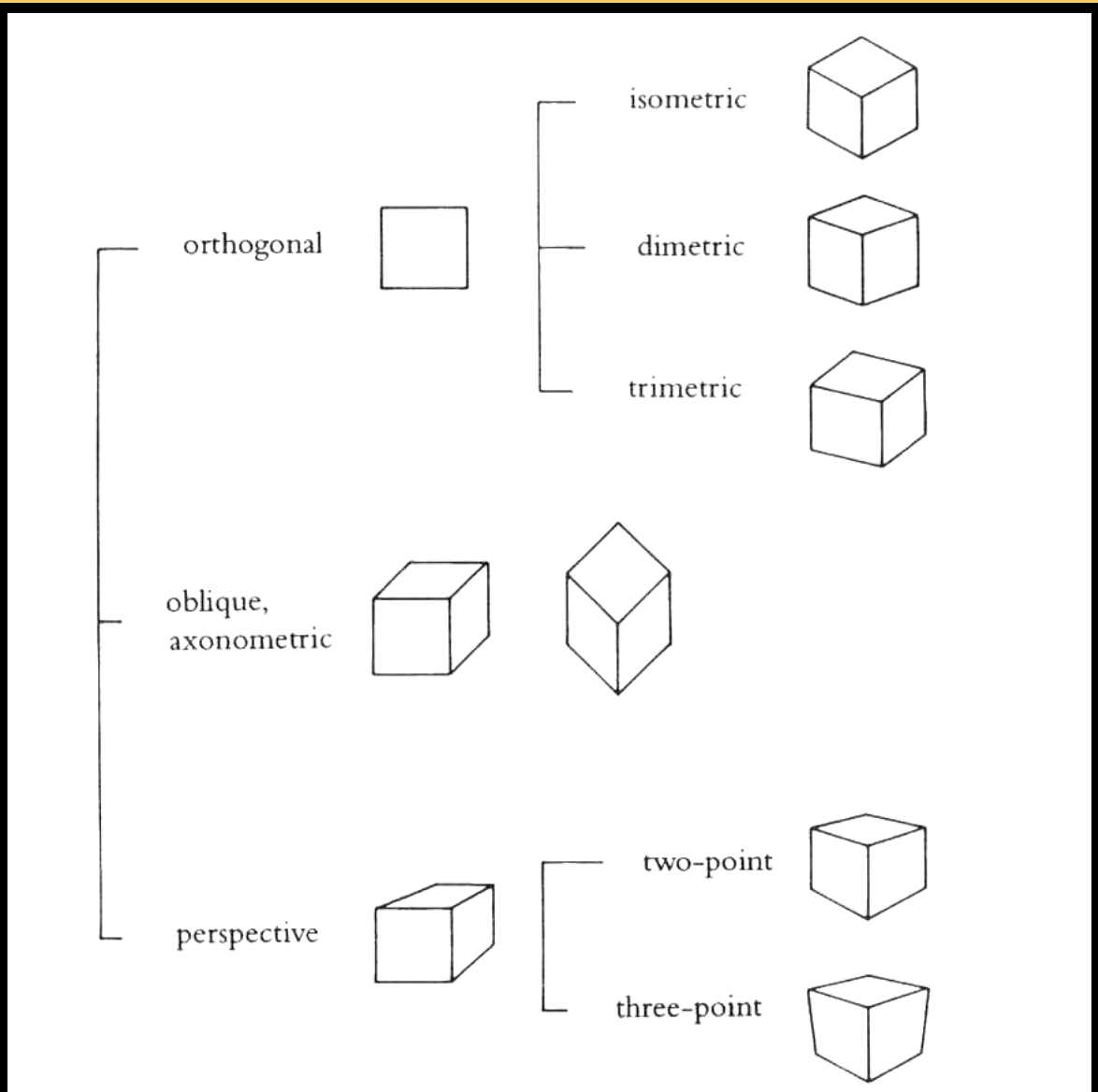


FIG. 2.1. Classification scheme for projection systems, based on primary geometry. Adapted from British Standard 1192 (1969).

Willats's classification

- Secondary geometry

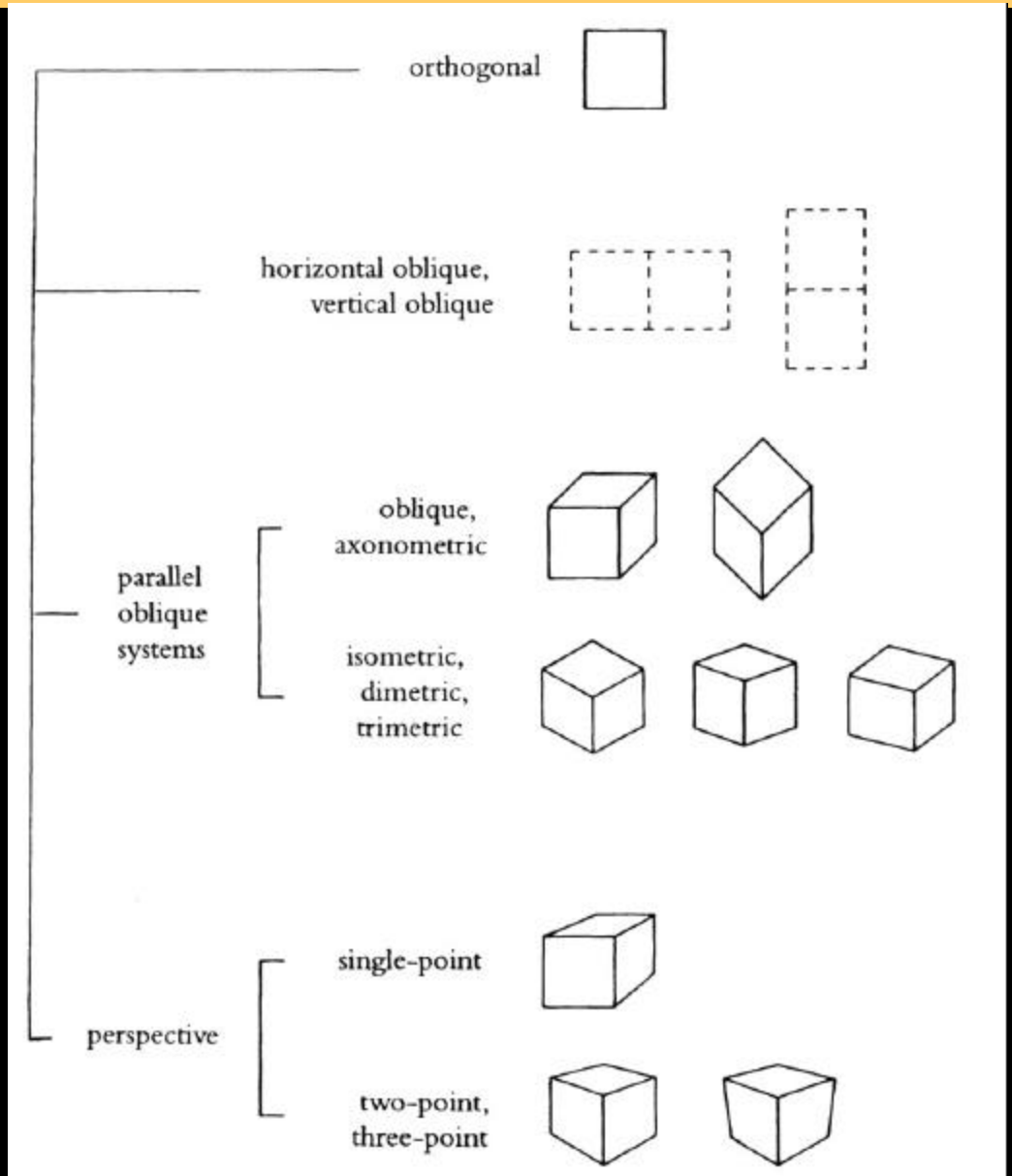


FIG. 2.2. Classification scheme for projection systems, based on secondary geometry.

Classification of drawing systems

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

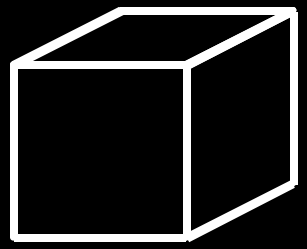
Classification of drawing systems

- 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
    - Naïve perspective
    - Expressionist perspective
    - Importance-driven
    - Cell panorama
  - Curved projections
    - Panorama
    - Fish-eye
  - Topological
  - Split views, fold-out
  - Multiple viewpoints

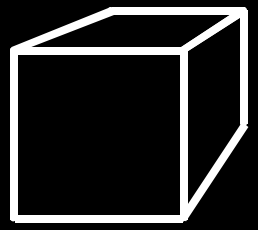
Linear projections

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

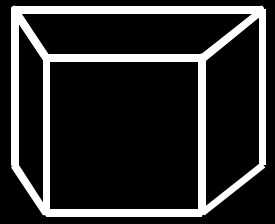
- Parallel



- Linear perspective



- Divergent perspective



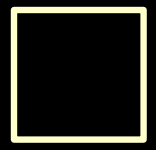
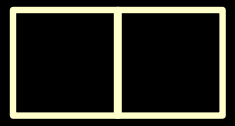
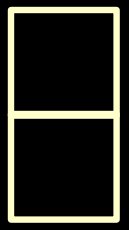
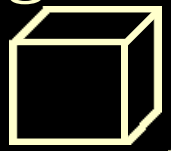
Parallel projections

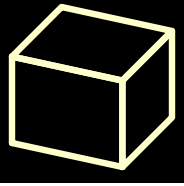
- No foreshortening
- Can represent true shape
- Some are poor shape representations

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

Parallel projections

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

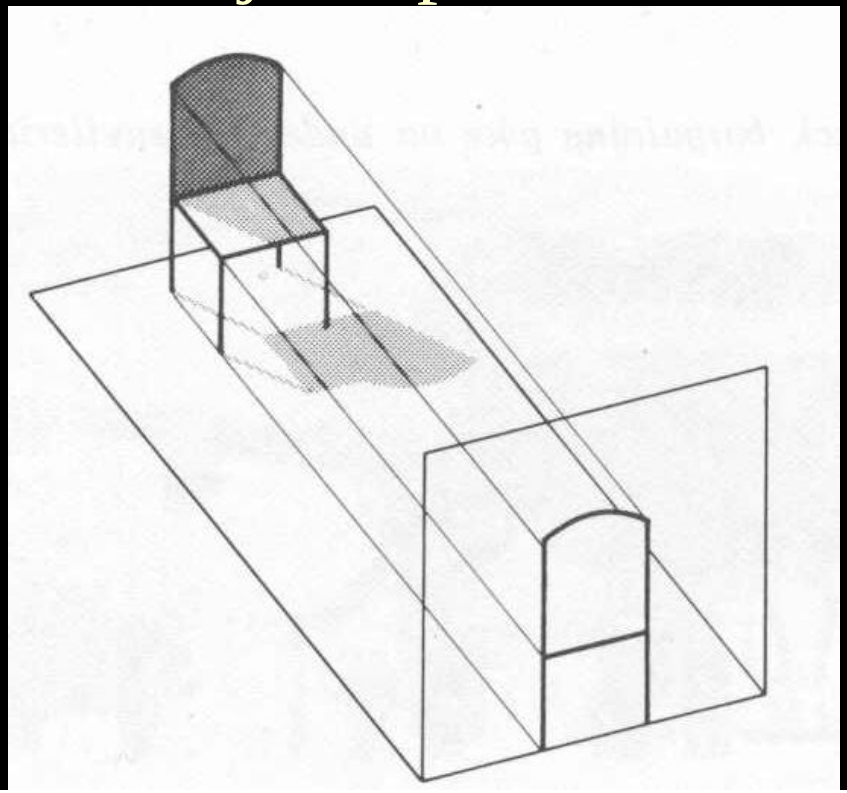





Orthogonal

- Direction
  - Perpendicular to image plane
  - Along one principal direction

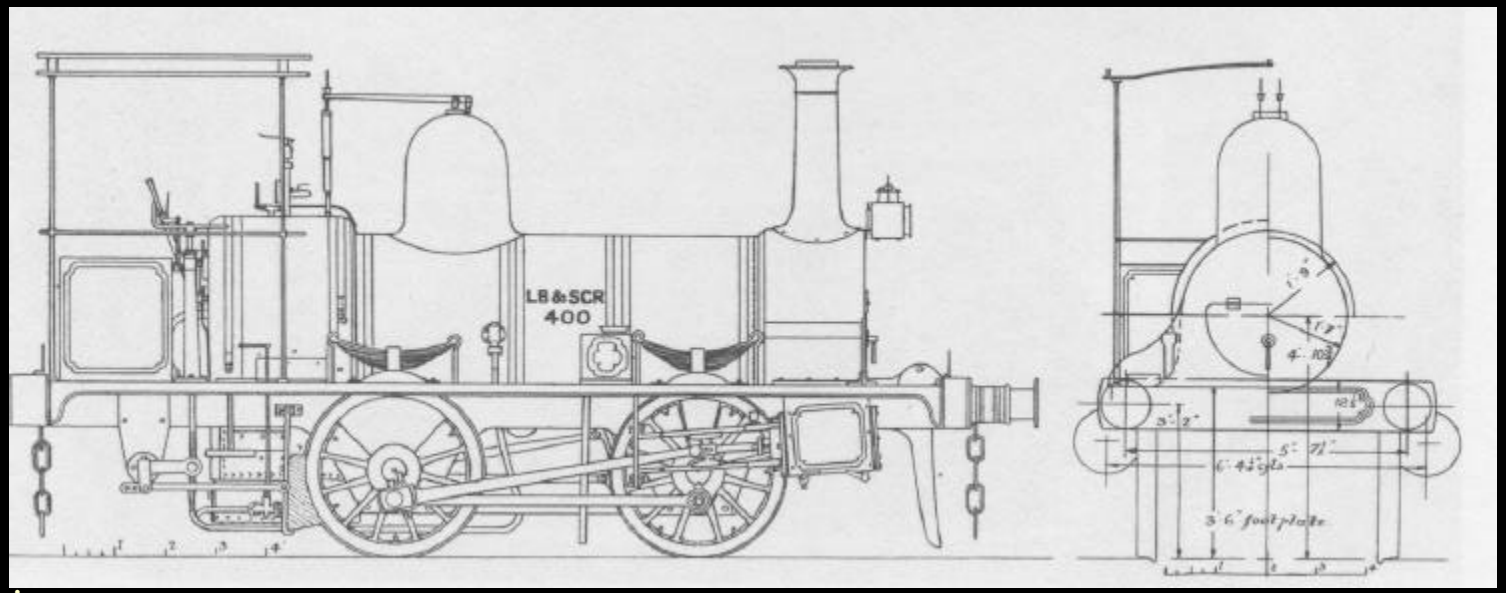
- True shape for objects parallel to image plane



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

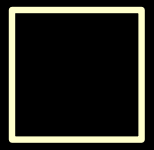
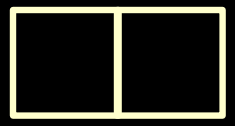
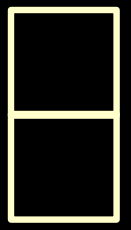
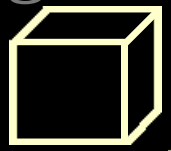
- Telephoto

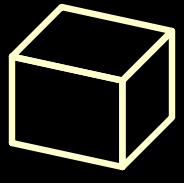
Orthogonal

- Child drawing

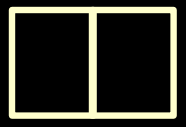
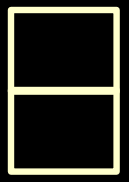
Parallel projections

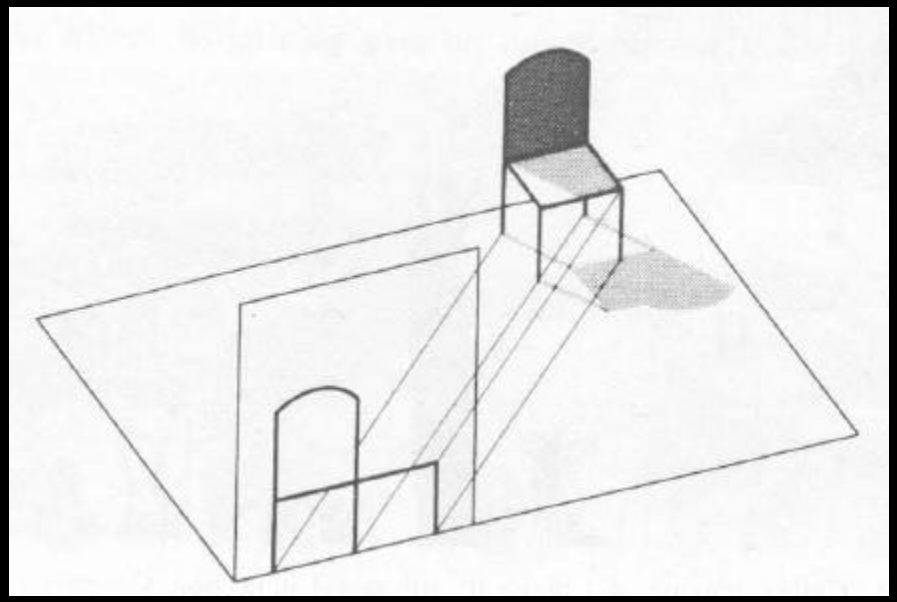
- Orthogonal
- Fold-out oblique
  - Horizontal oblique
  - Vertical oblique
- Non orthogonal
  - Oblique
  - Axonometric
- Orthographic
  - Isometric
  - Others

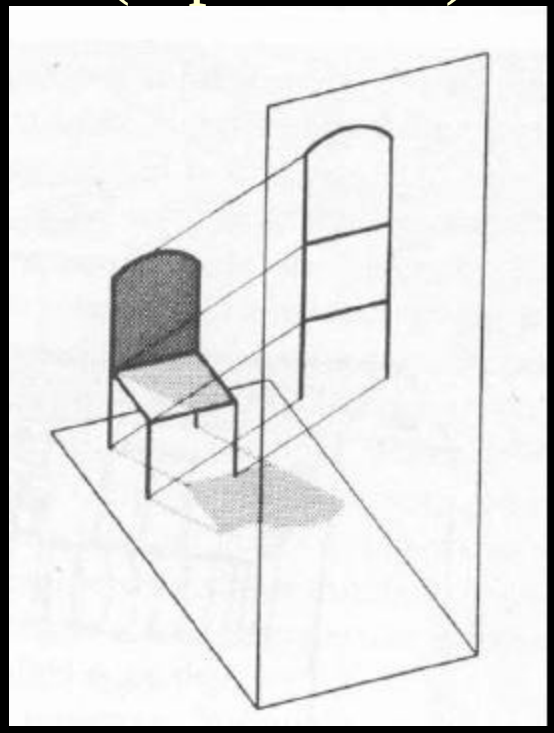





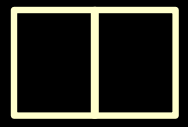
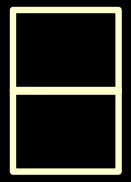
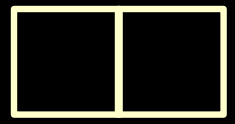
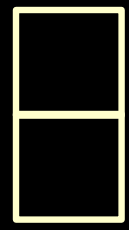
Fold-out oblique

- Horizontal oblique 
- Vertical oblique 
- Direction
  - 45º, parallel to one principal face (top or side)





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

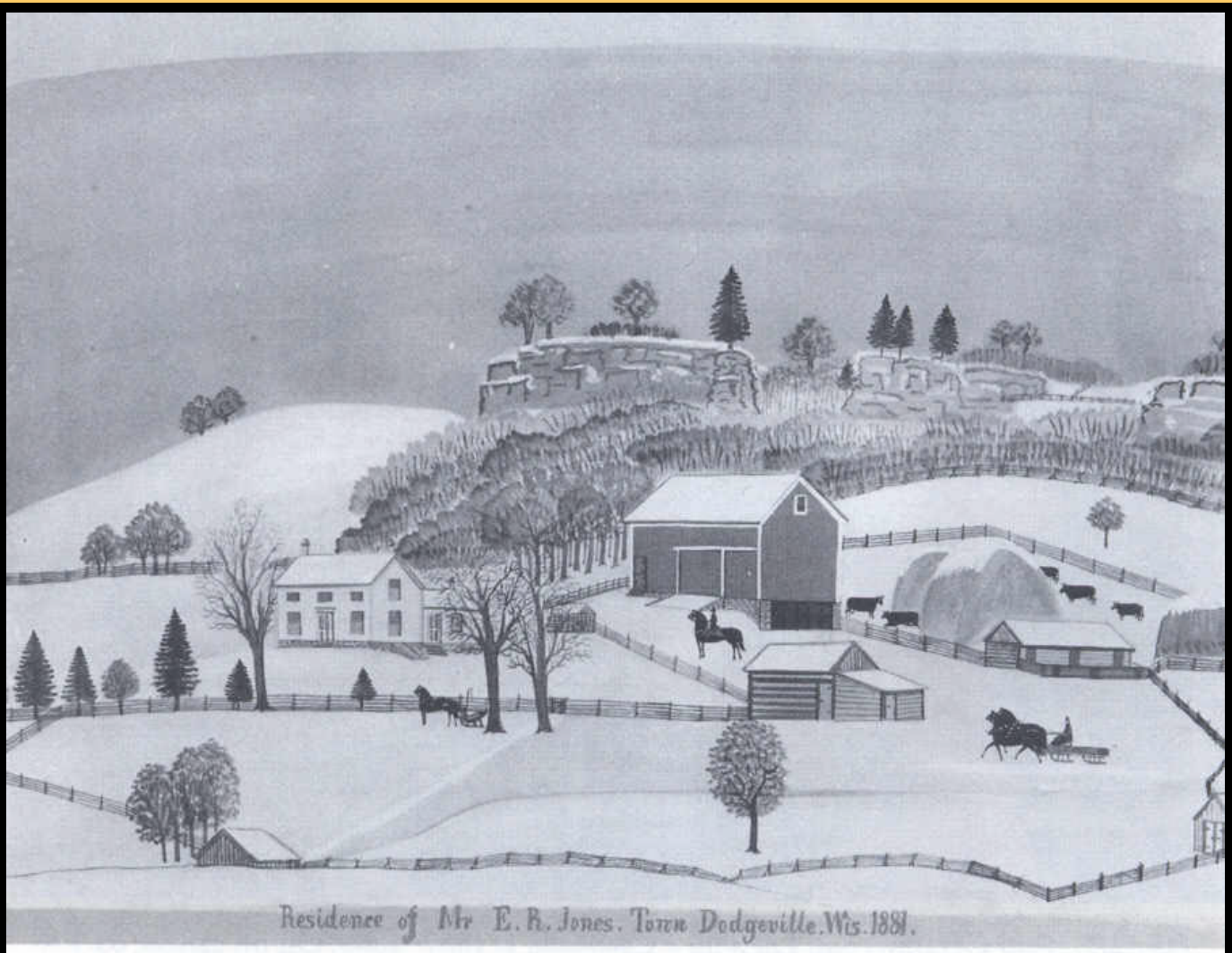


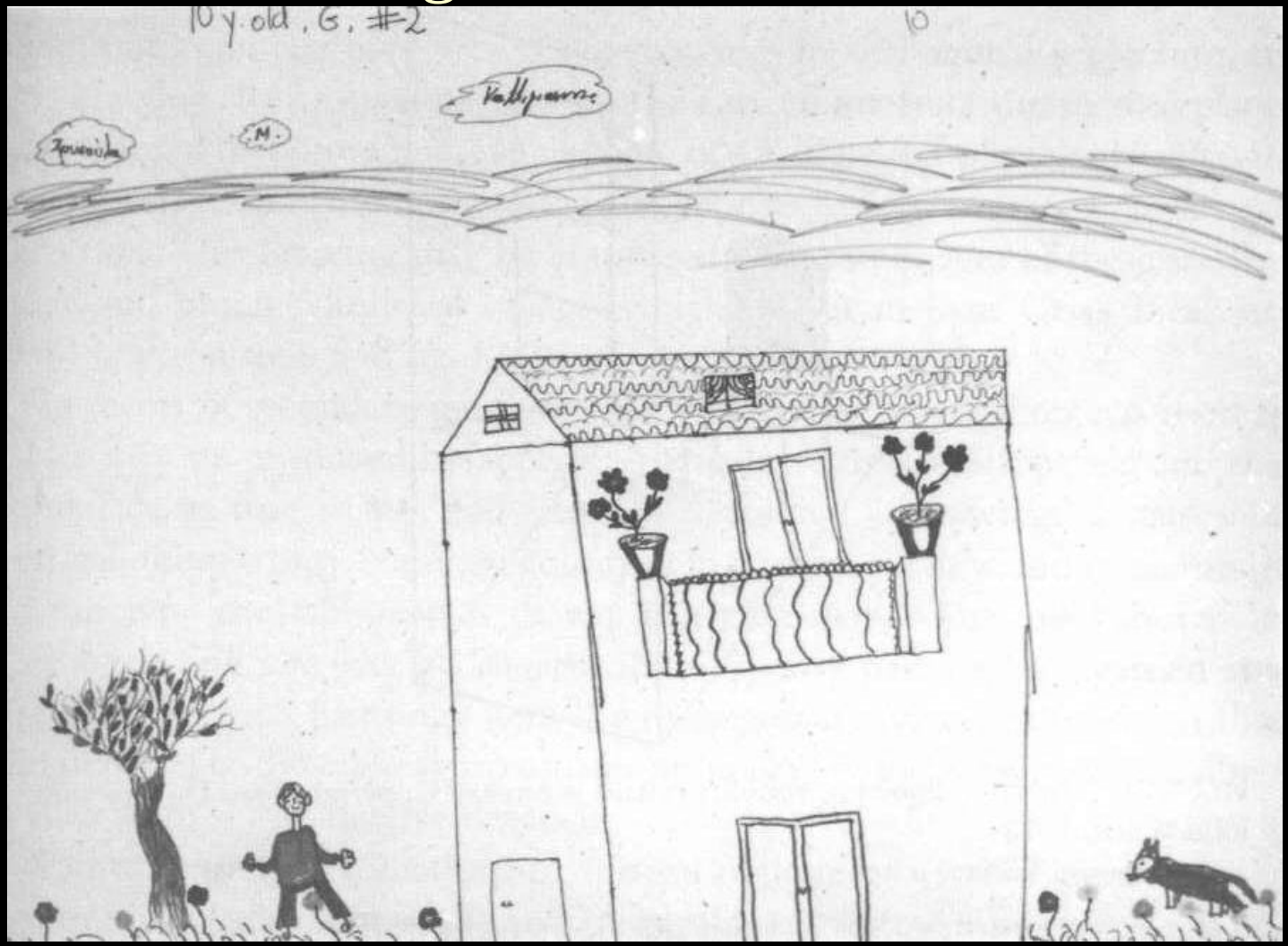
FIG. 2.8. Paul A. Seifert, *Residence of Mr. E. R. Jones,* 1881. Watercolor, 54.6 × 69.9 cm. New York State Historical Association, Cooperstown, New York.

Horizontal oblique

- Icons

Horizontal oblique

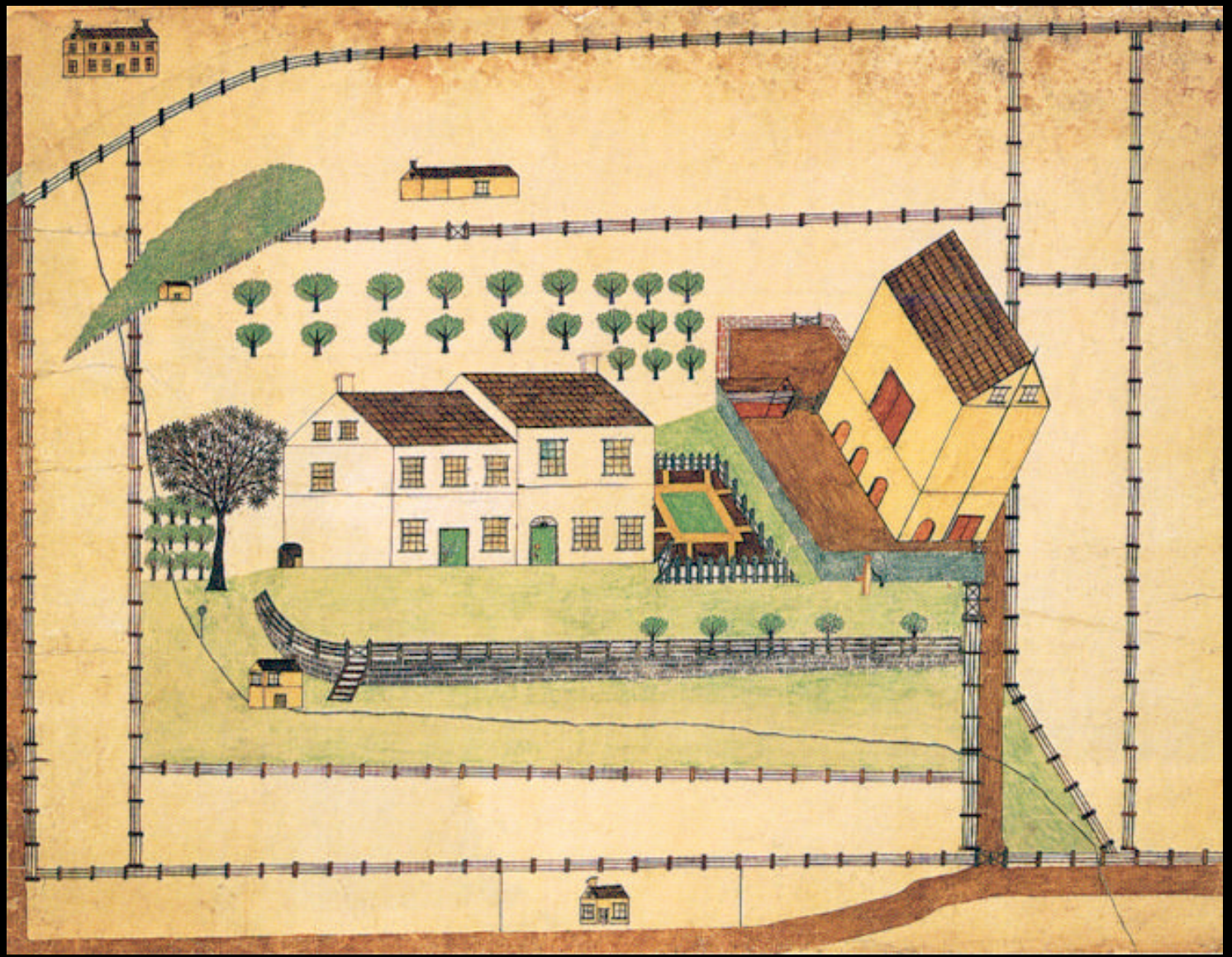
- Child drawing



Horizontal oblique

- Cézanne Still life with a commode, 1887

Pushing the envelope

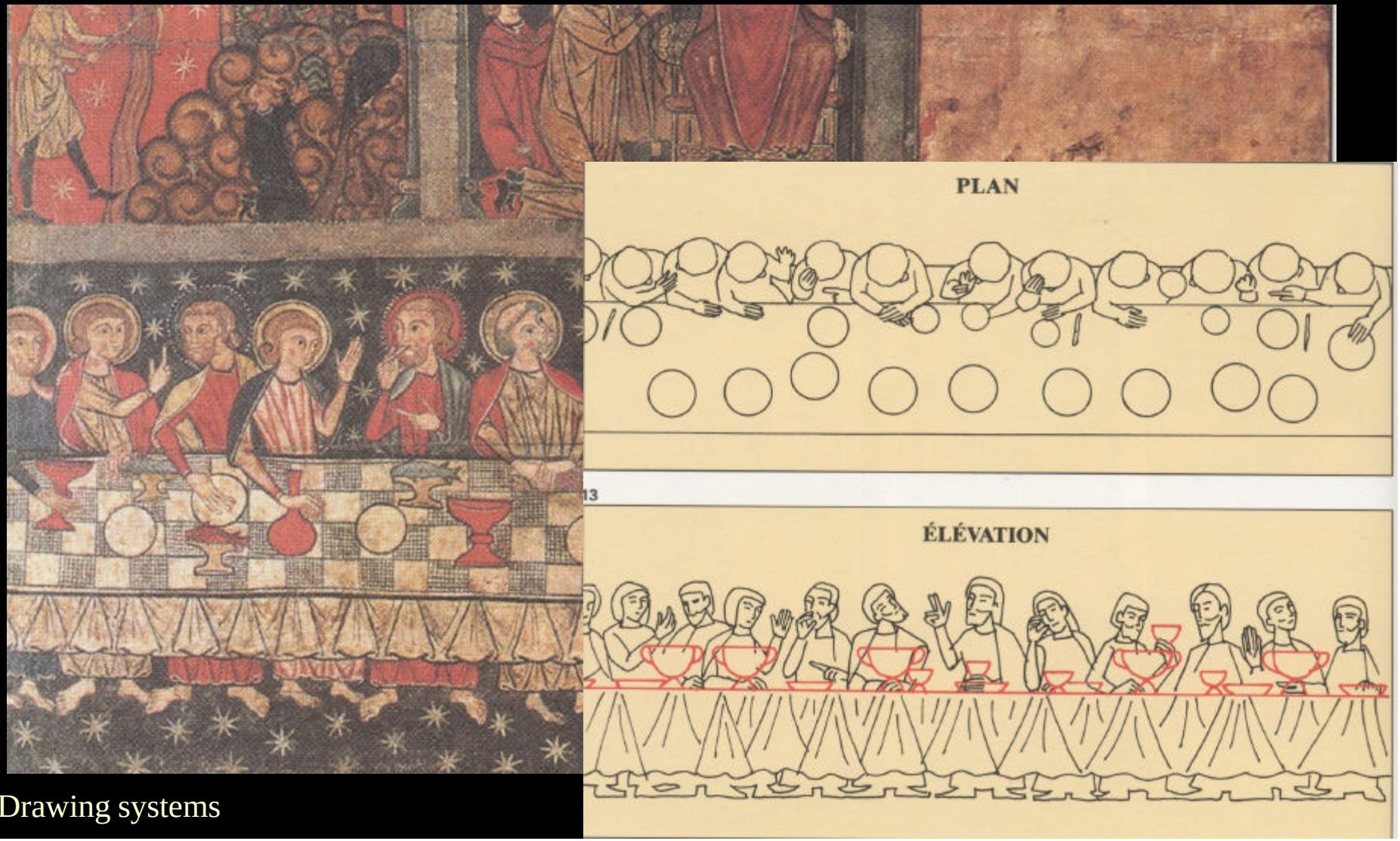


Vertical oblique

- Soriguerola, 13th

Vertical oblique

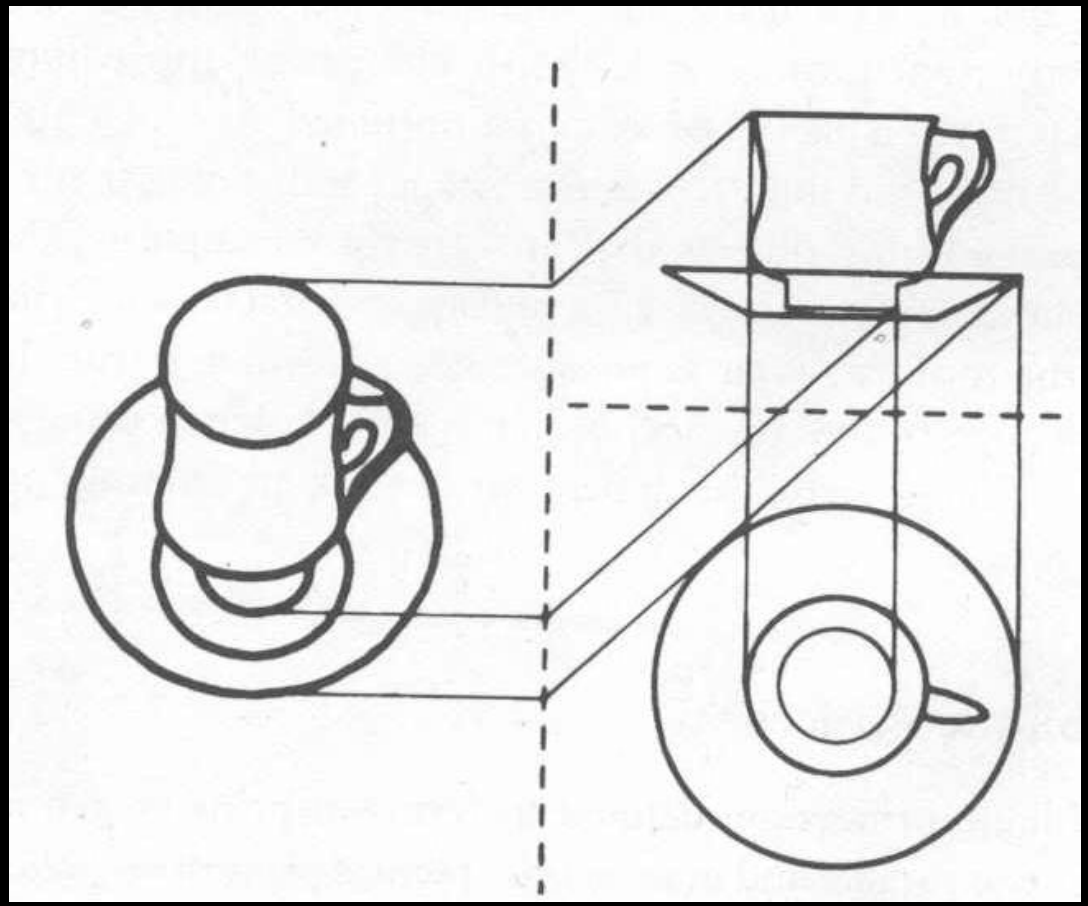
- Soriguerola, 13th



Vertical oblique

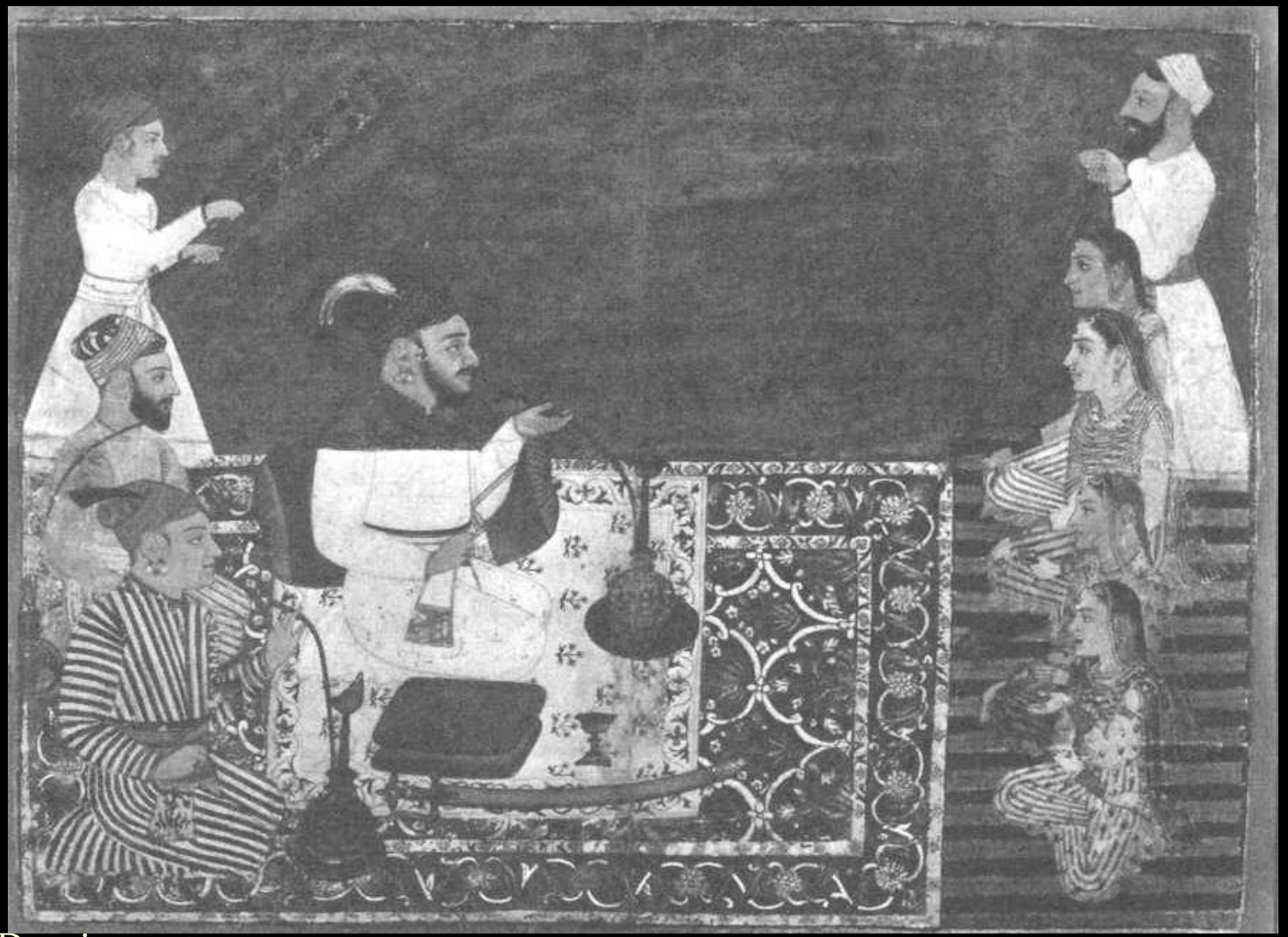
- Juan Gris, *Breakfast*, 1914

Vertical oblique



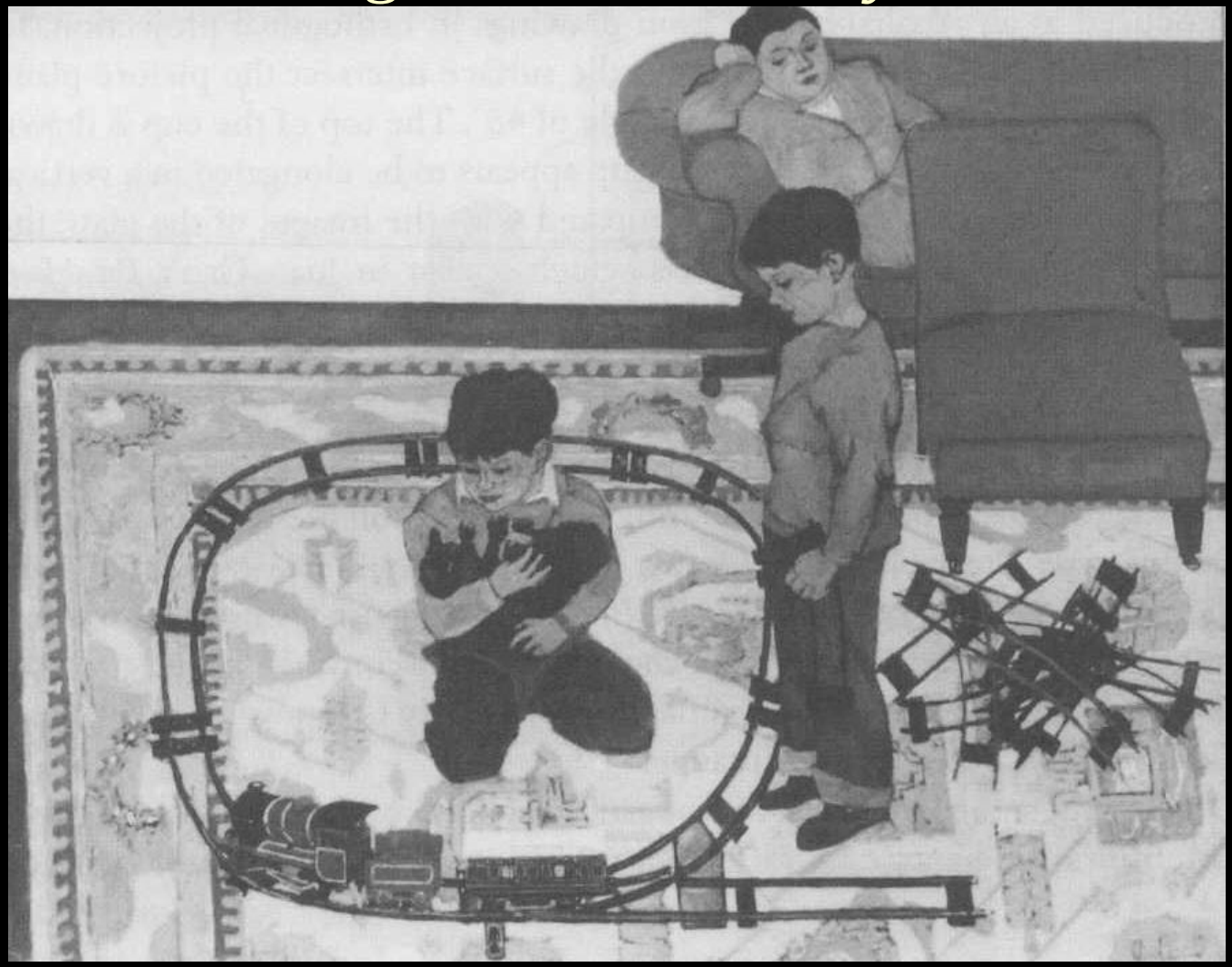
Vertical oblique

- Indian art, 1660



Vertical oblique

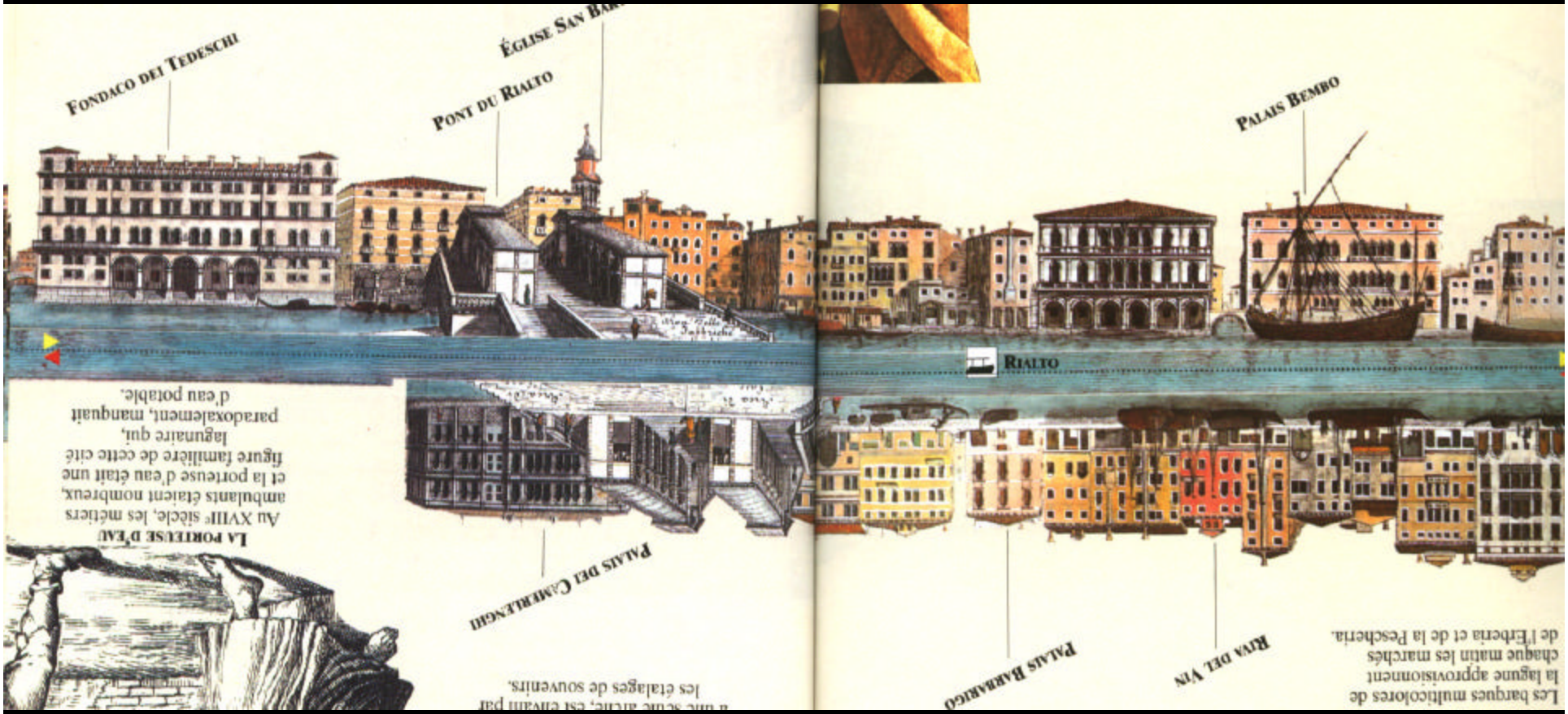
- Claude Rogers, *The Hornby Train*, 1951-53



Vertical oblique

- Andre Kerstesz,
  Tulipe Melancolique

Pushing the envelope

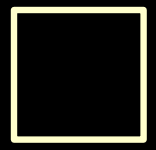
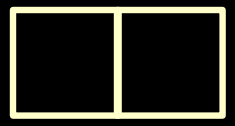
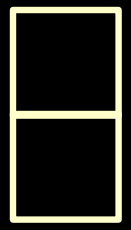
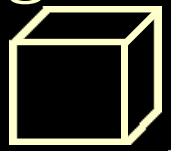


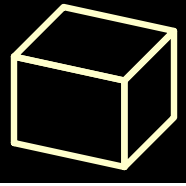
Pushing the envelope

- Non-linear
- Locally linear

Parallel projections

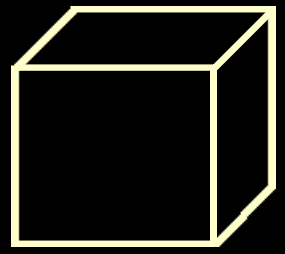
- Orthogonal
- Fold-out oblique
  - Horizontal oblique
  - Vertical oblique
- Non orthogonal
  - Oblique
  - Axonometric
- Orthographic
  - Isometric
  - Others

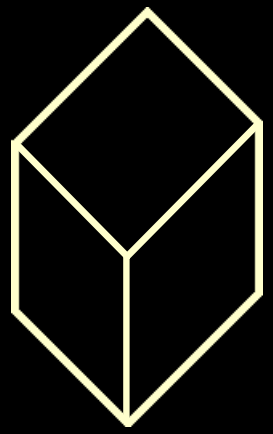



Non orthogonal

- Direction
  - non orthogonal to picture plane
- Oblique
  - Picture plane parallel to front
  - True shape for front face

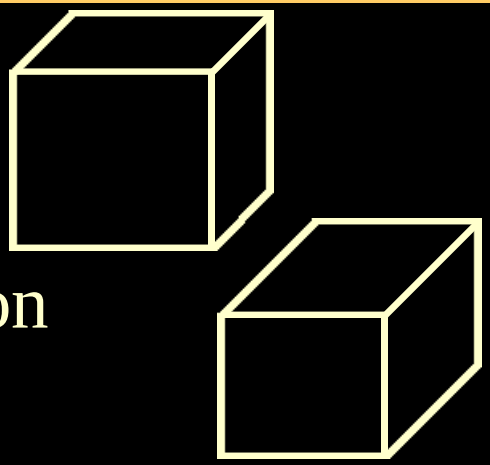


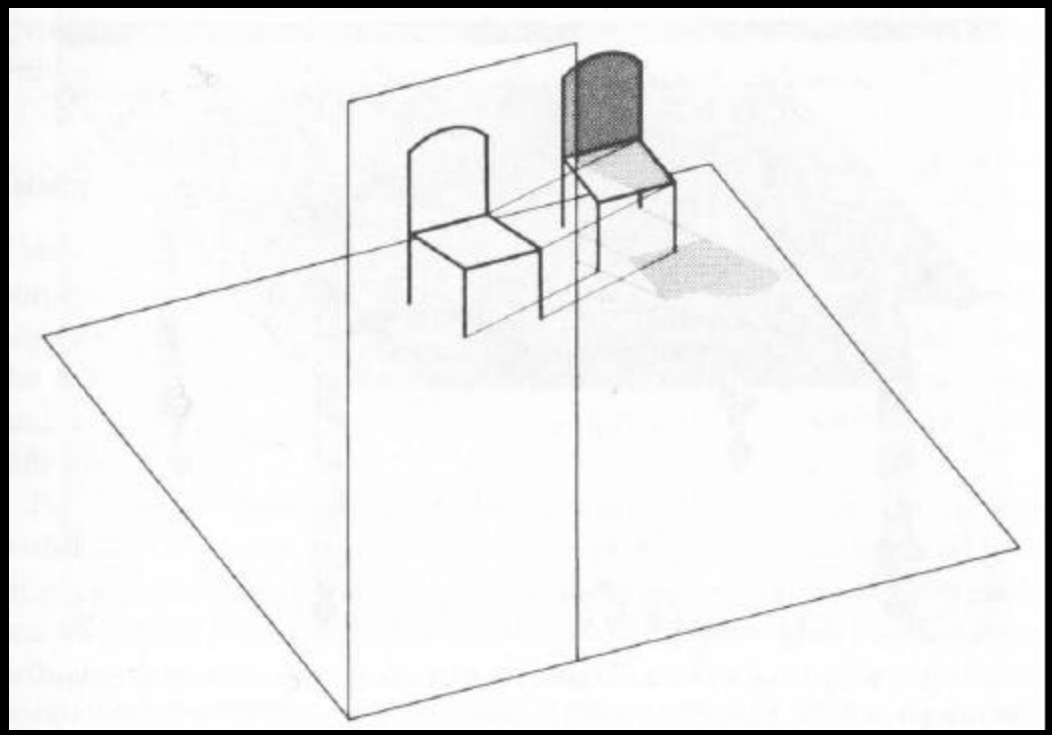
- Axonometric
  - True shape for top face
  - True distance for up direction
  - Direction 45º of the picture plane



Oblique

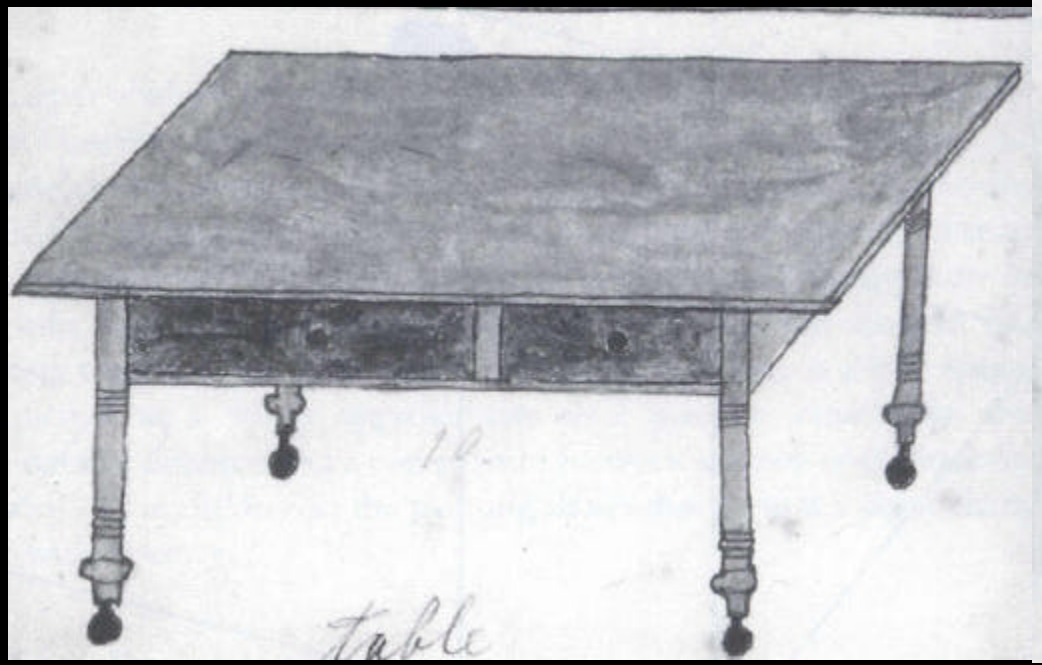
- Picture plane parallel to front
- True shape for front face
- Can use true distance for 3rd direction

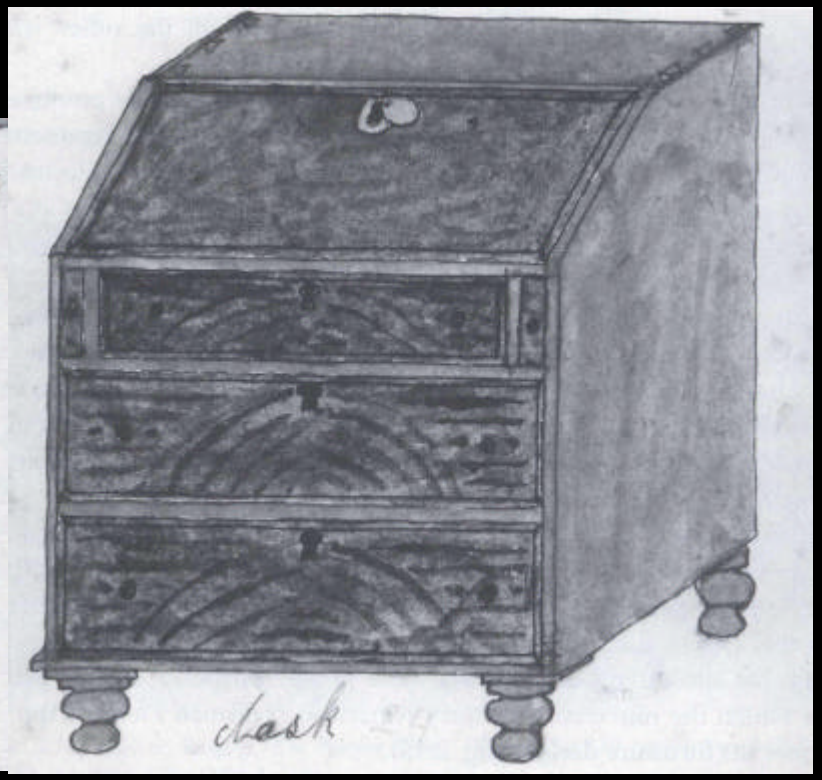




Oblique

- Henry Lapp, 19th century





Oblique

- Lady Wenji's Return to China, 12th century

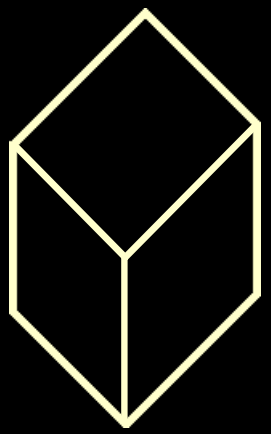
Oblique

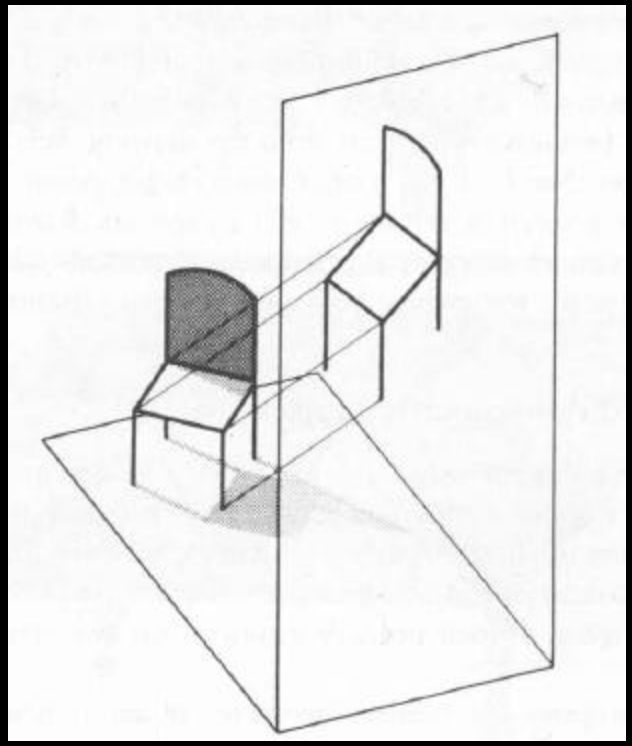
Oblique

- *Phoenix and Achilles*, 350-340 BC

Axonometric

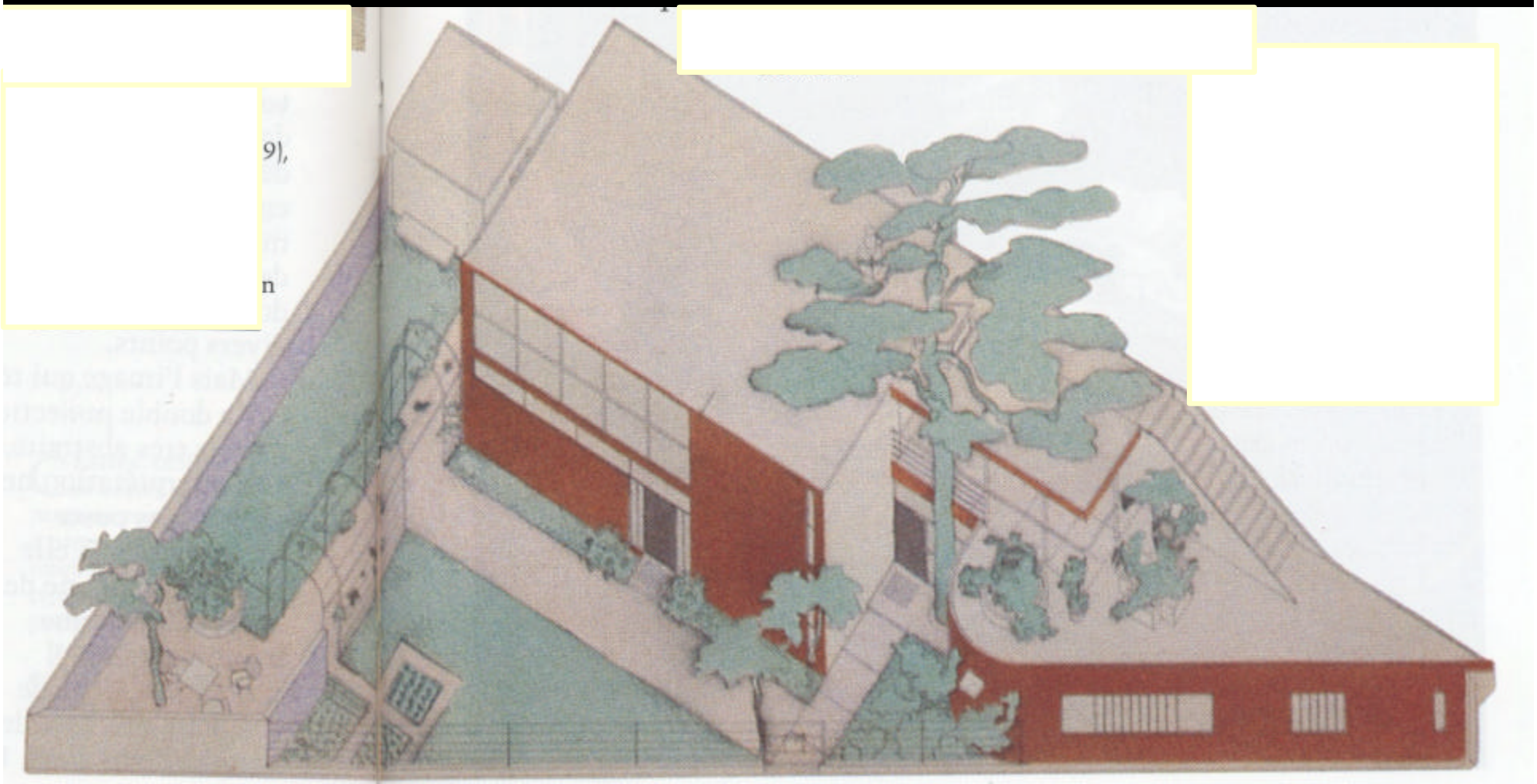
- Axonometric
  - True shape for top face
  - True distance for up direction
  - Direction 45º of the picture plane





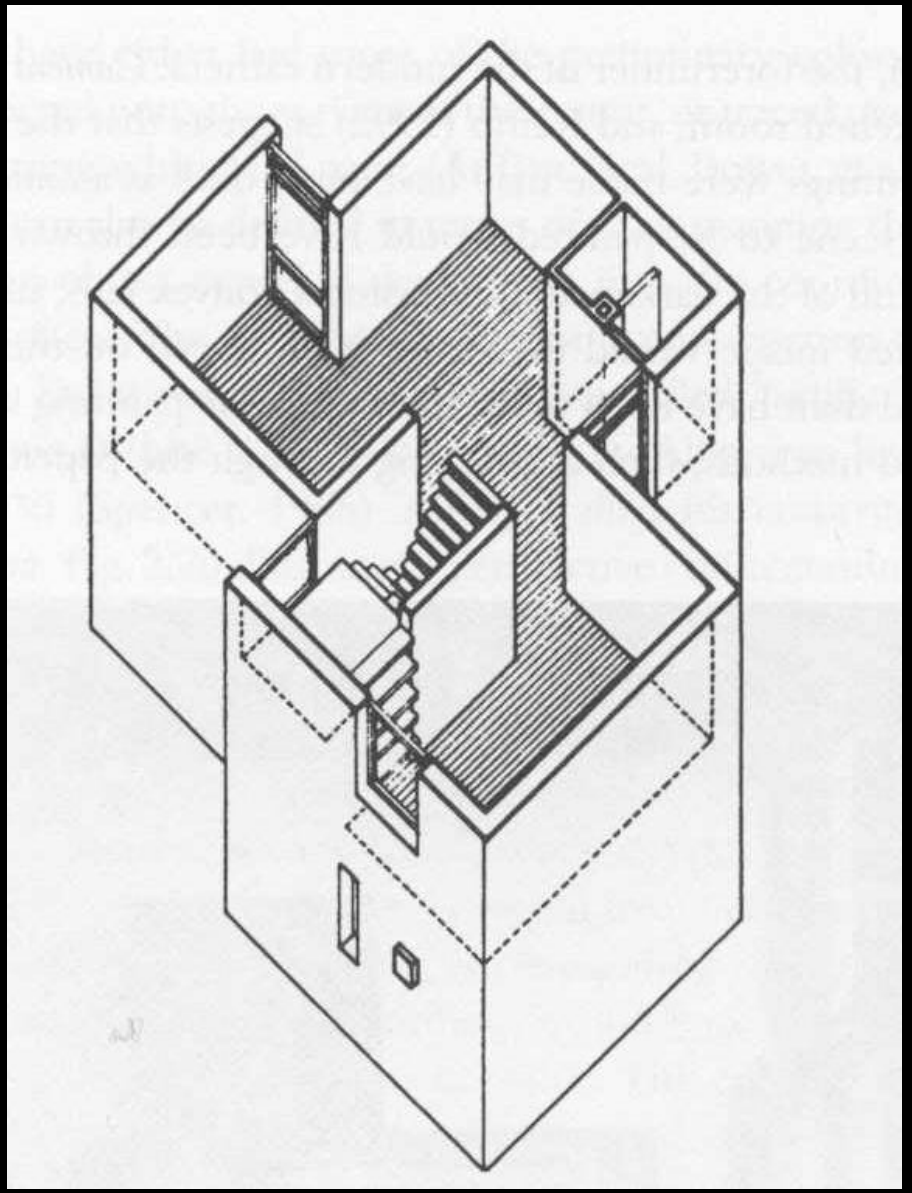
Axonometric

- Le Corbusier was a big fan



Axonometric

- James Stirling, 1953

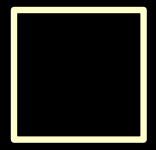
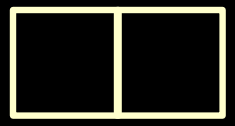
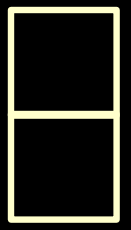
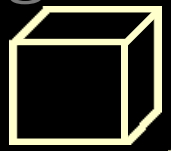


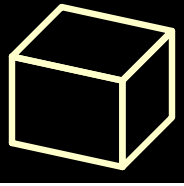
Axonometric

- Juan Gris, *Breakfast*, 1914

Parallel projections

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

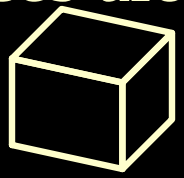





Orthographic

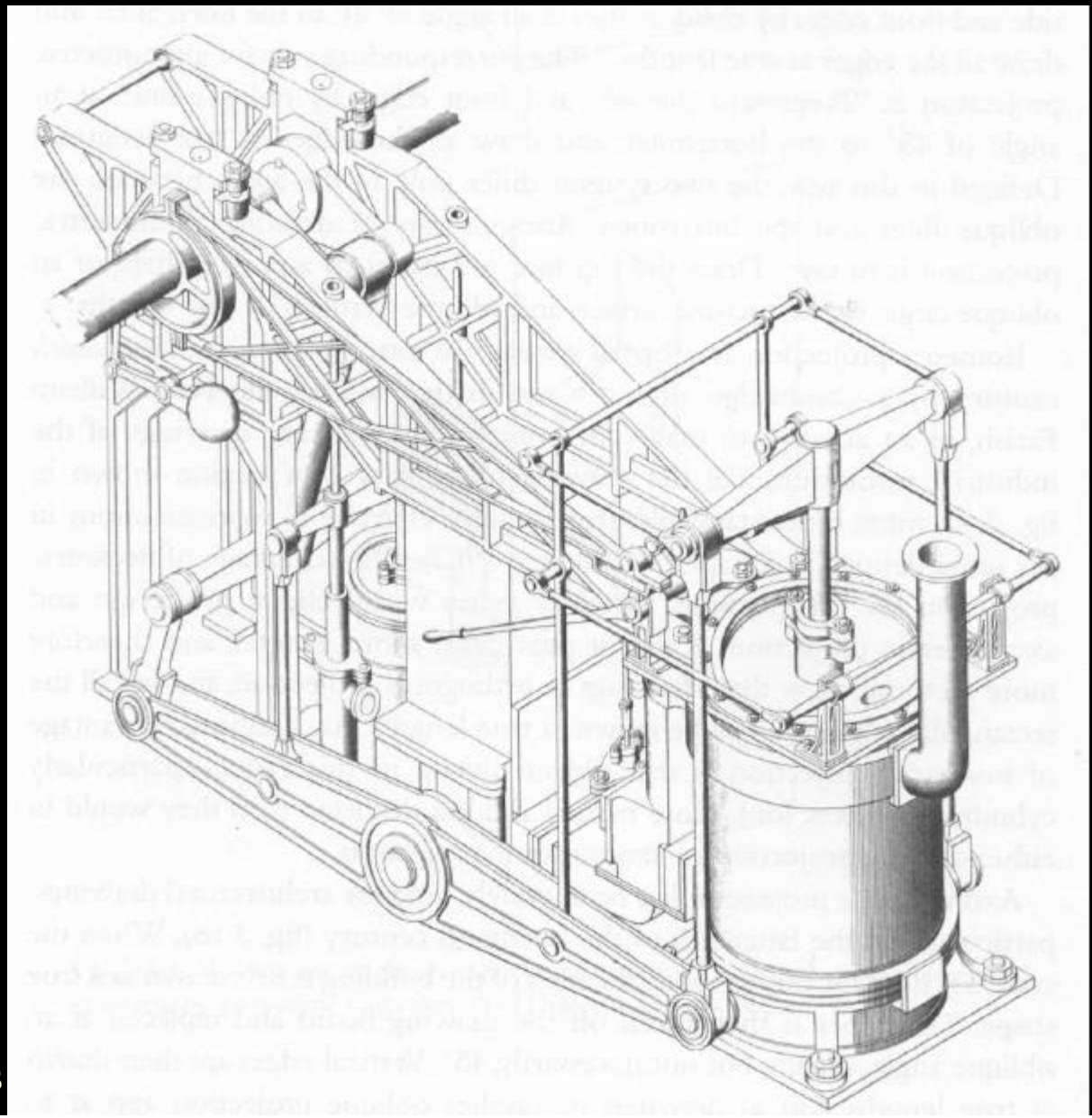
- Direction
  - Orthogonal to picture plane
  - Along no principal direction
- Isometric

  - Direction along the average of the principal directions
  - True distances along 3 directions
- Others



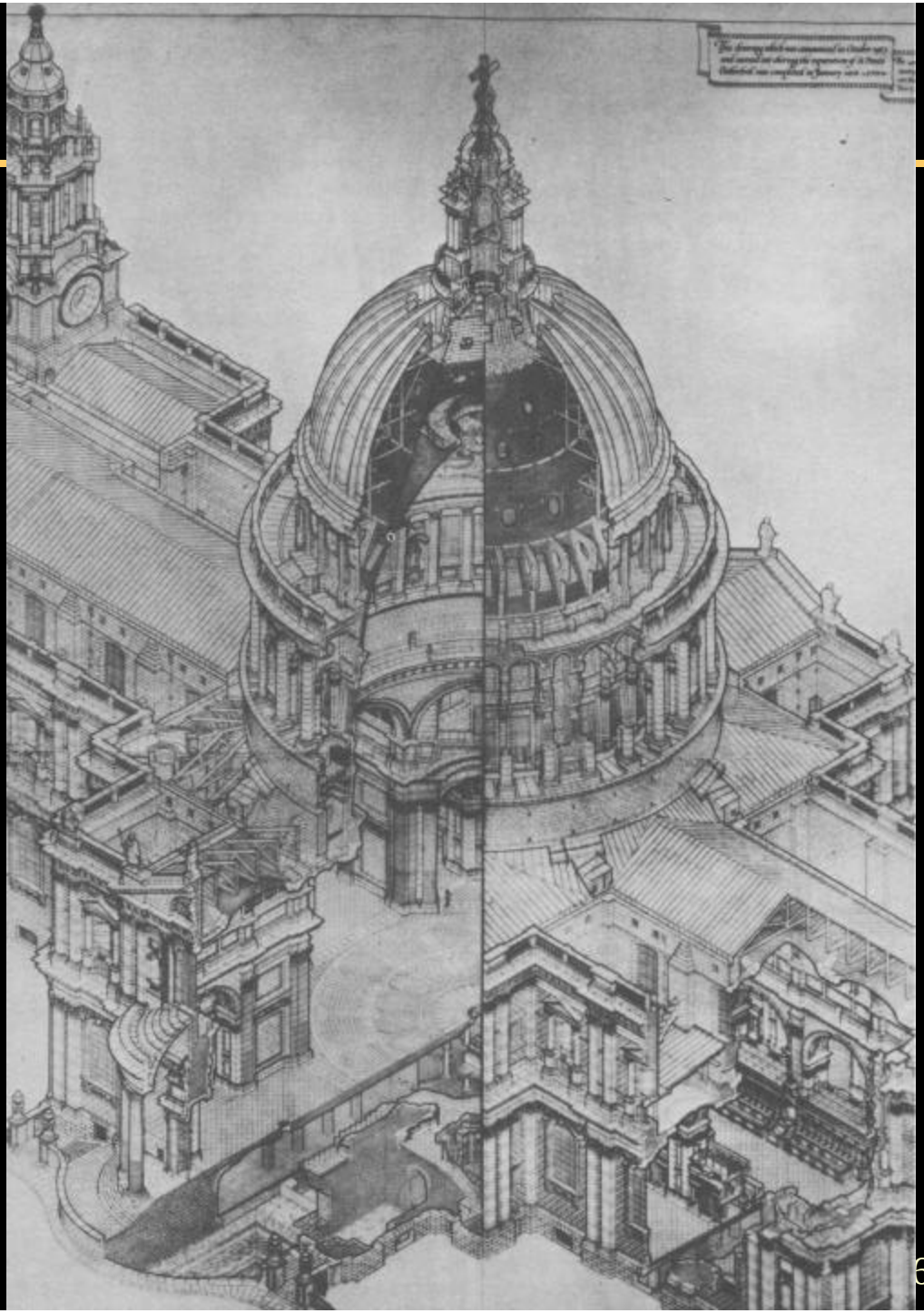
  - Generic orthographic

Isometric



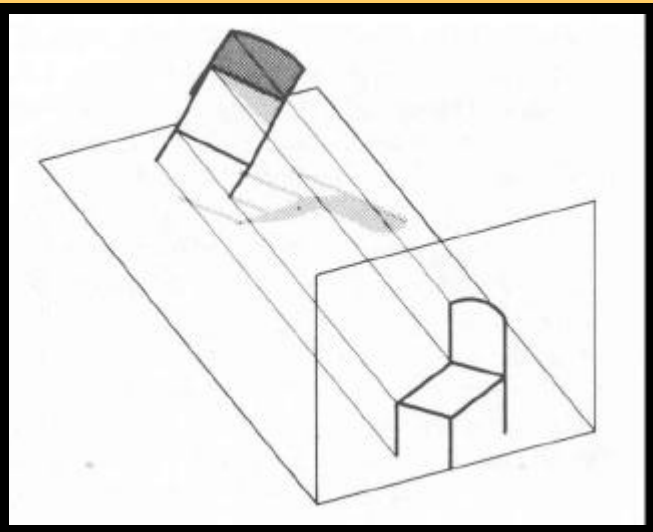
Isometric

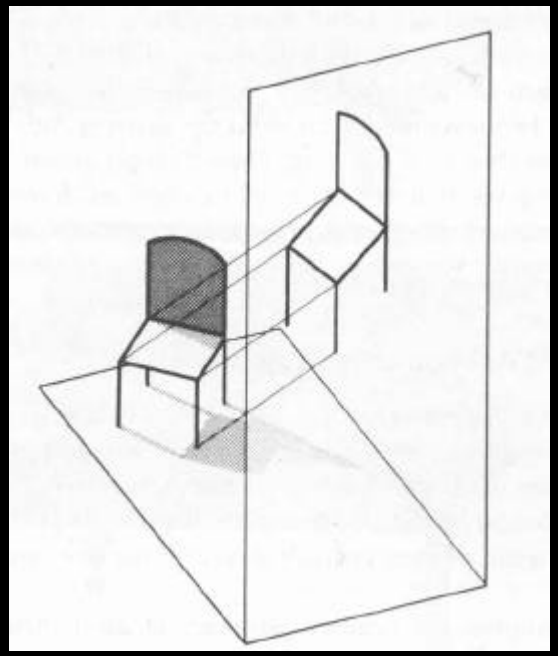
- Brooks-Greaves
  St Paul's Cathedral
  1928



Isometric vs. Axonometric

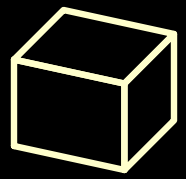
- Isometric
  - No true shape
  - True distances in 3 directions
  - Little distortion
  - Direction average 2 principal directions
- Axonometric
  - True shape for top face
  - True distance for up direction
  - Direction 45º from picture plane





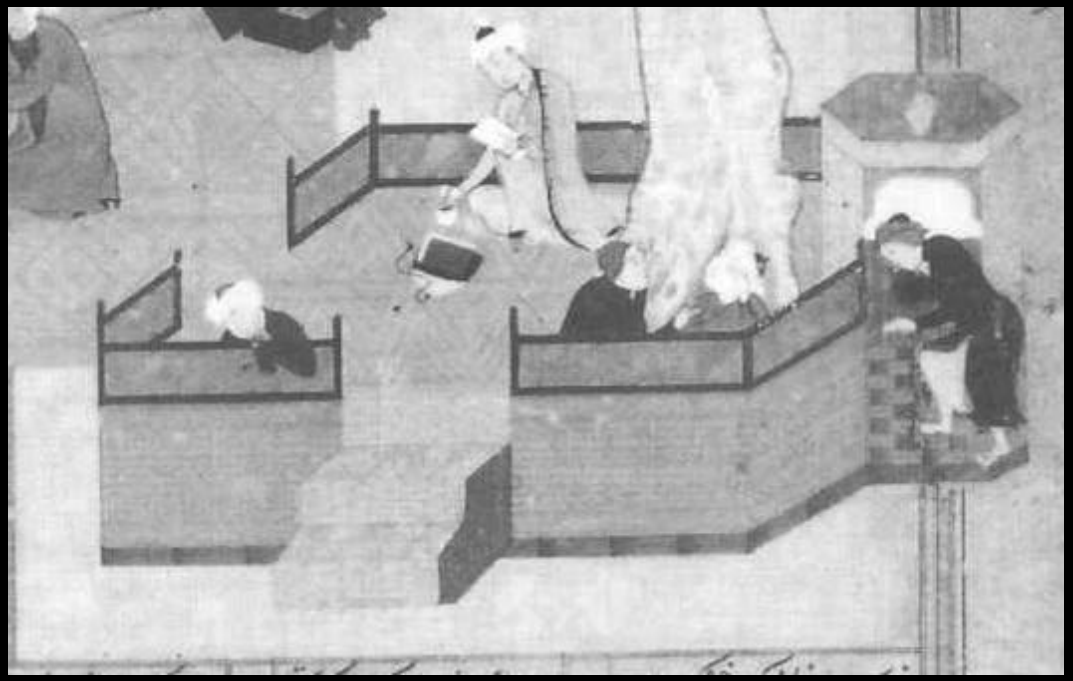
General Orthographic

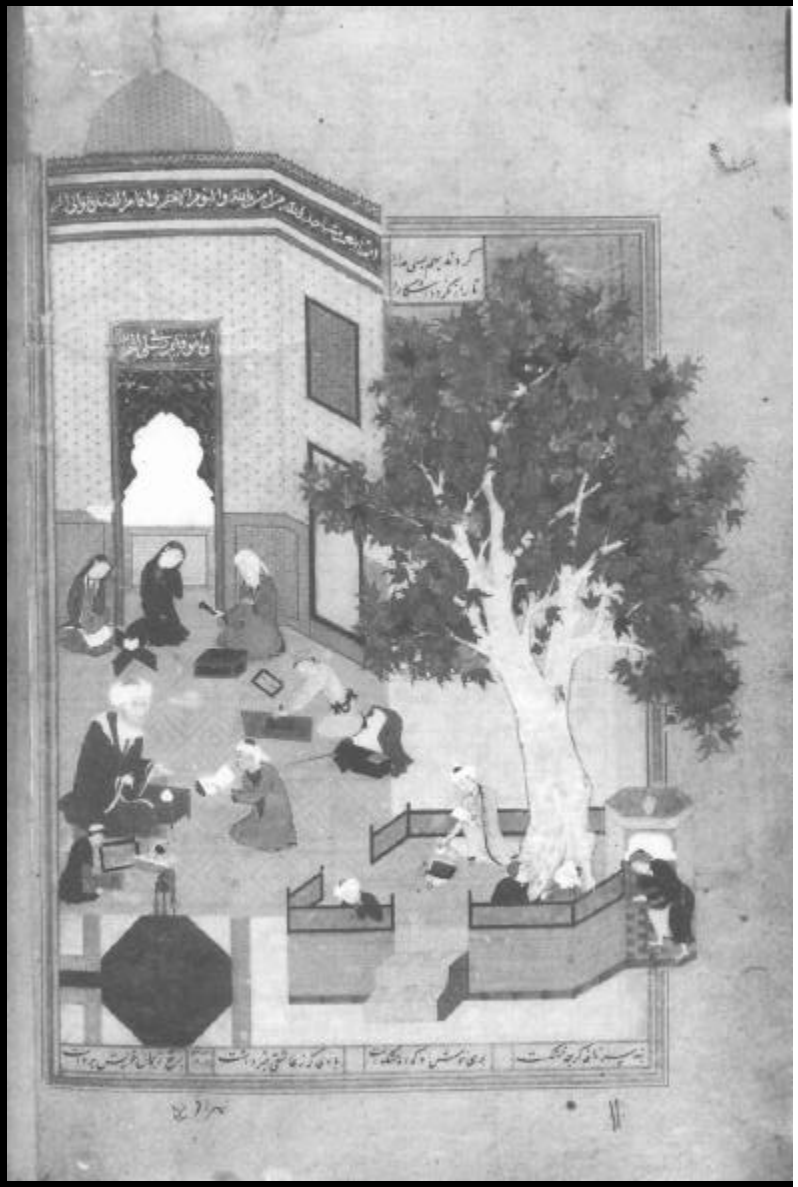
- Seldom used!



Mixed parallel system

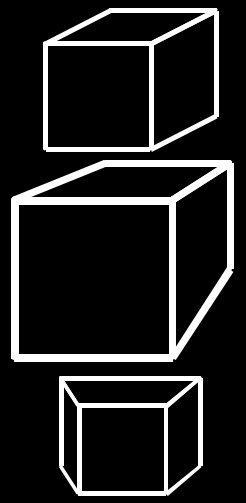
- Persian miniature, 1494
- Oblique+vertical oblique





Classification of drawing systems

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



Linear perspective

- Foreshortening
- The spectator is “immersed”
- Potential distortions

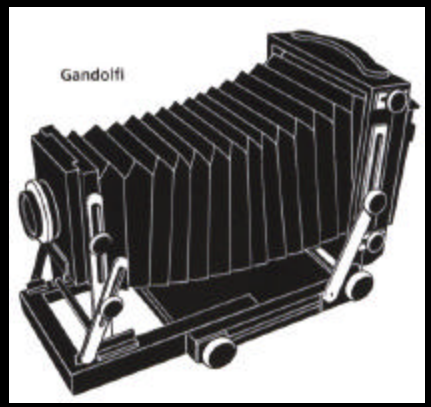
- One point
- Two points
- Three points

1-point perspective

- Central focus
- Preserves horizontals and verticals

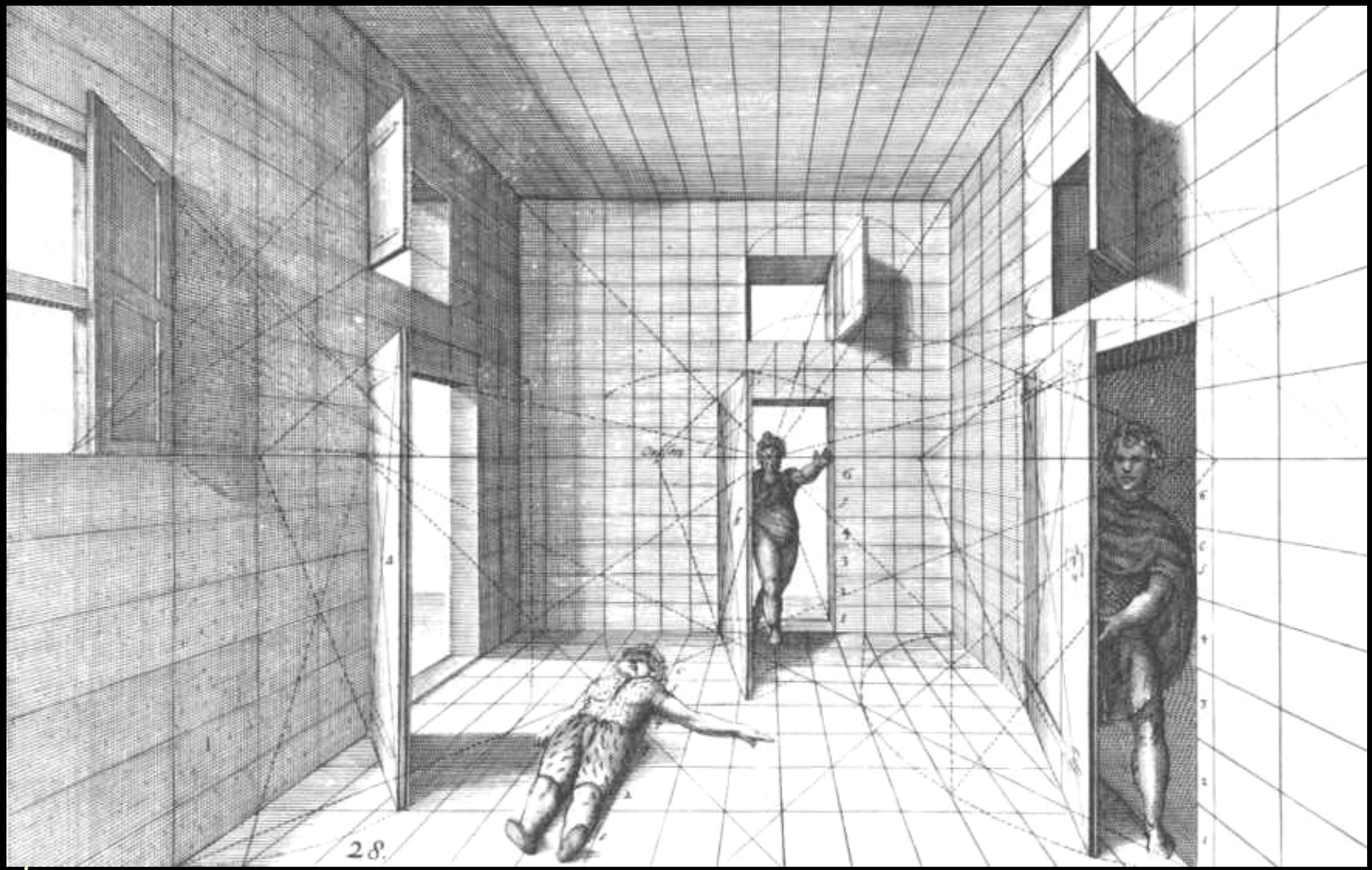
1-point perspective

- 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

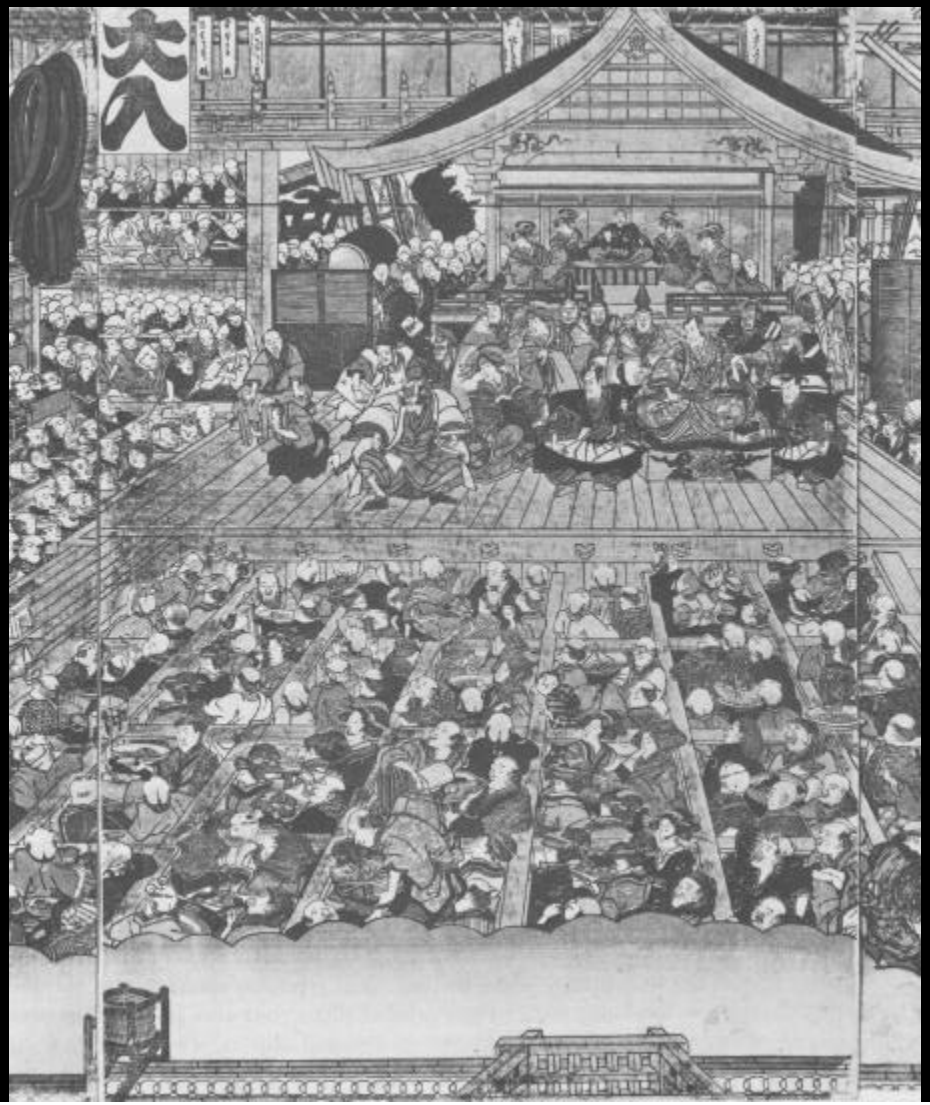
- *Interior of St Bavo's church at Haarlem*, Pieter Jansz Saenredam, 1648

1-point perspective

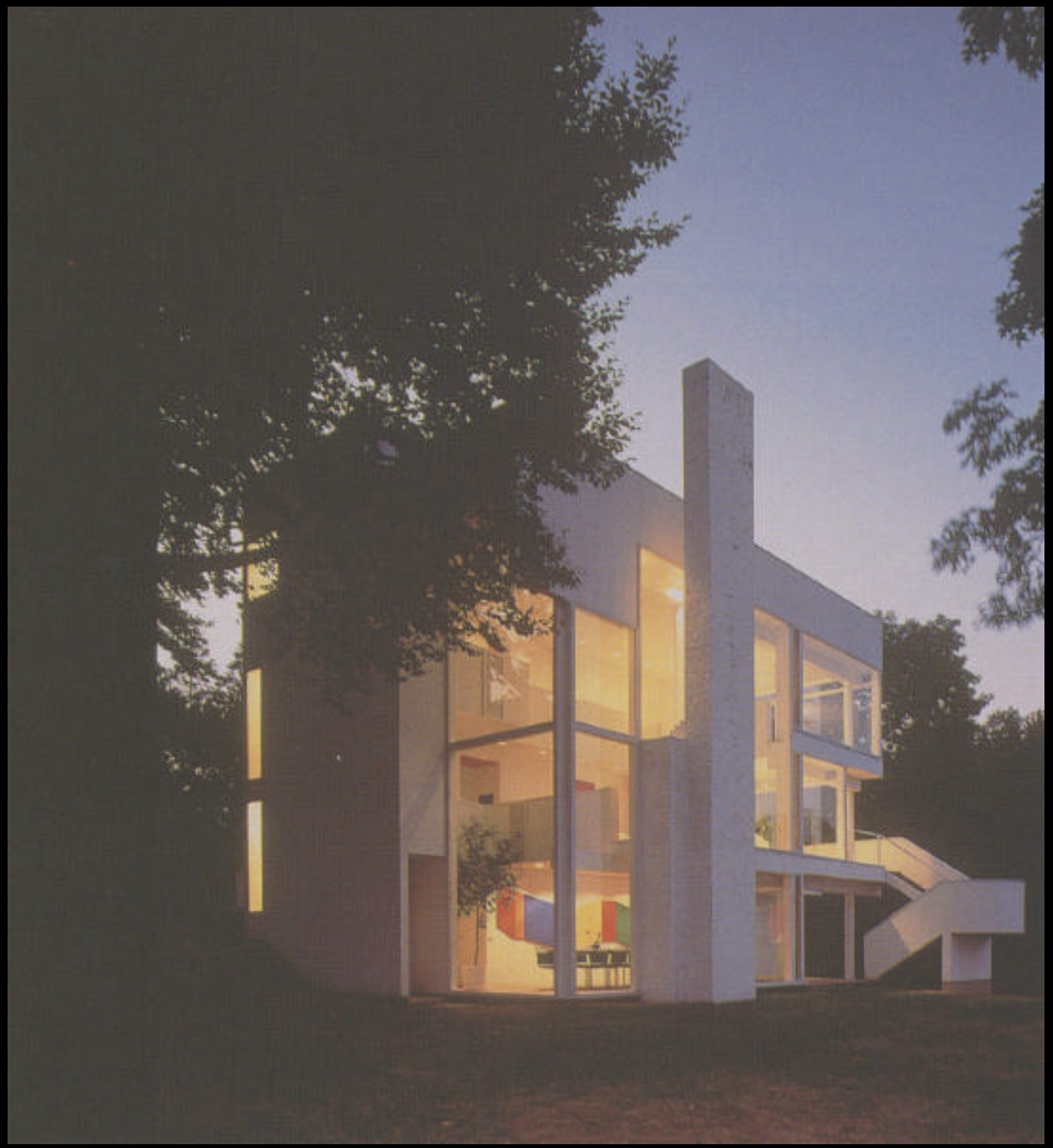
The Avenue Middelharnis, Meindert Obbema 1689

1-point perspective

Western perspective in a Japanese picture



2-point perspective

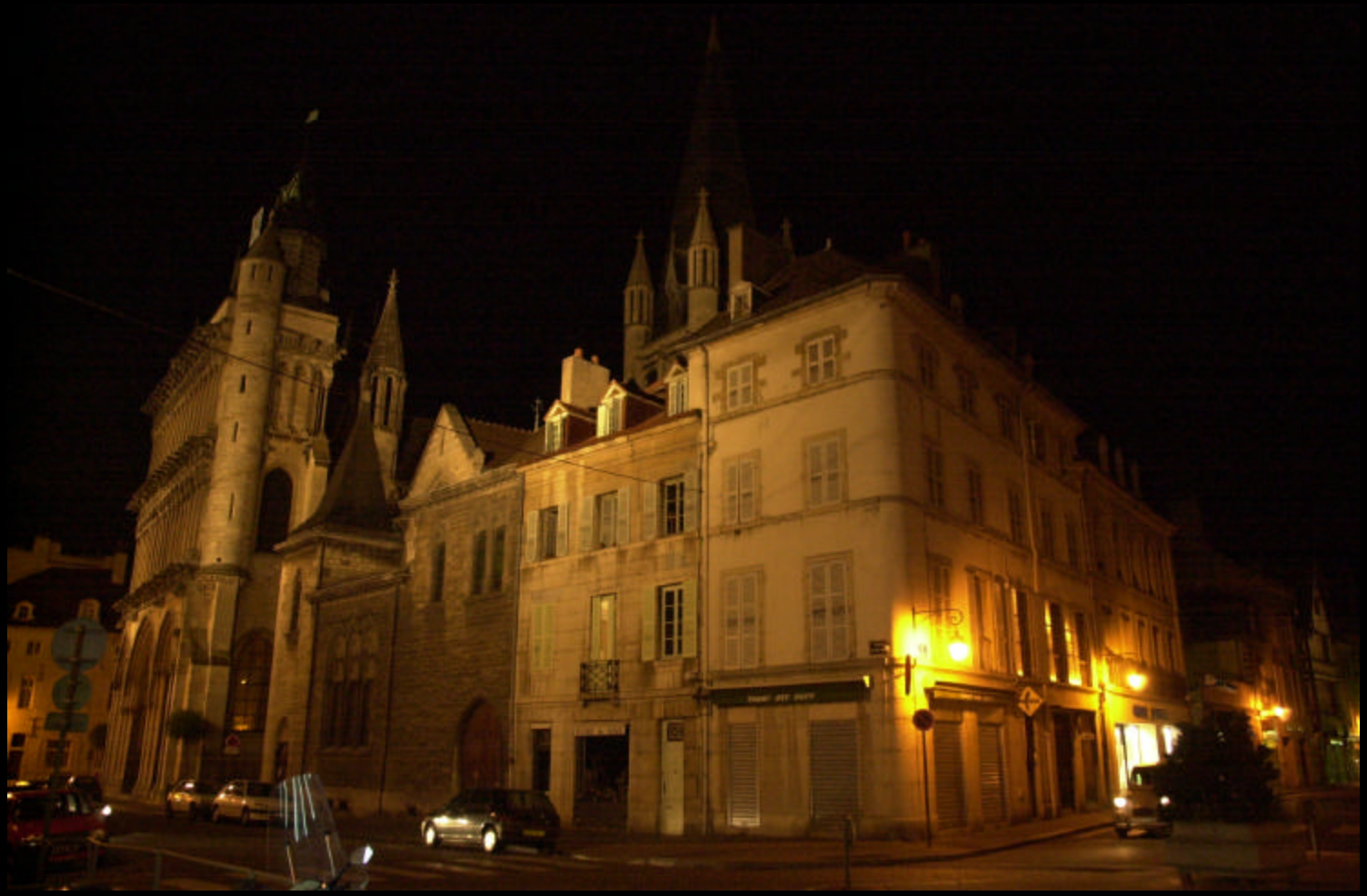


2-point perspective

- 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

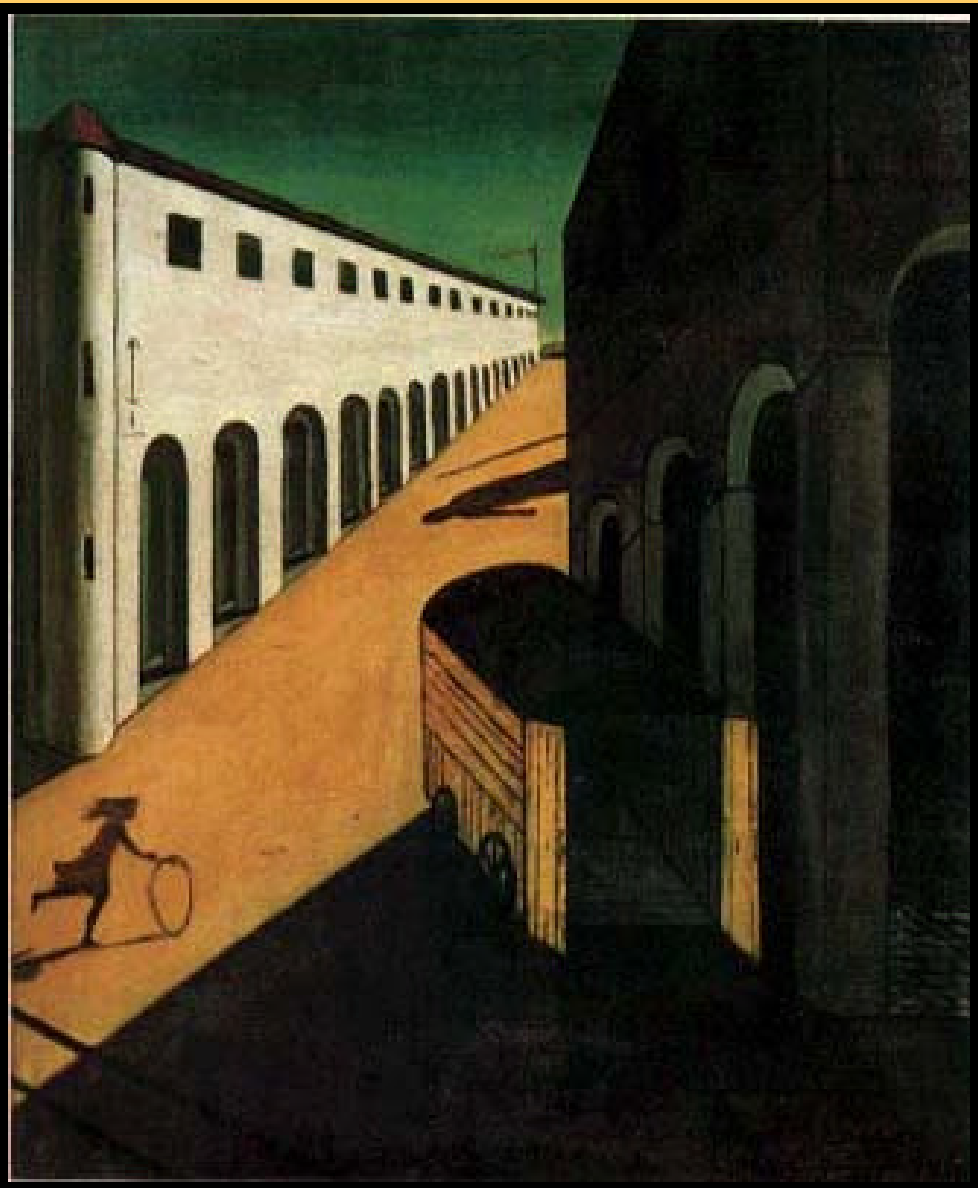
3-point perspective

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

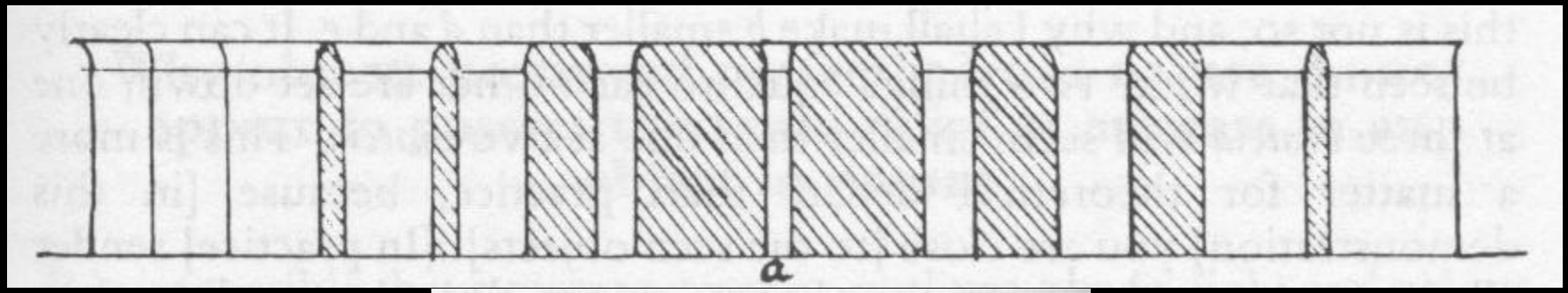


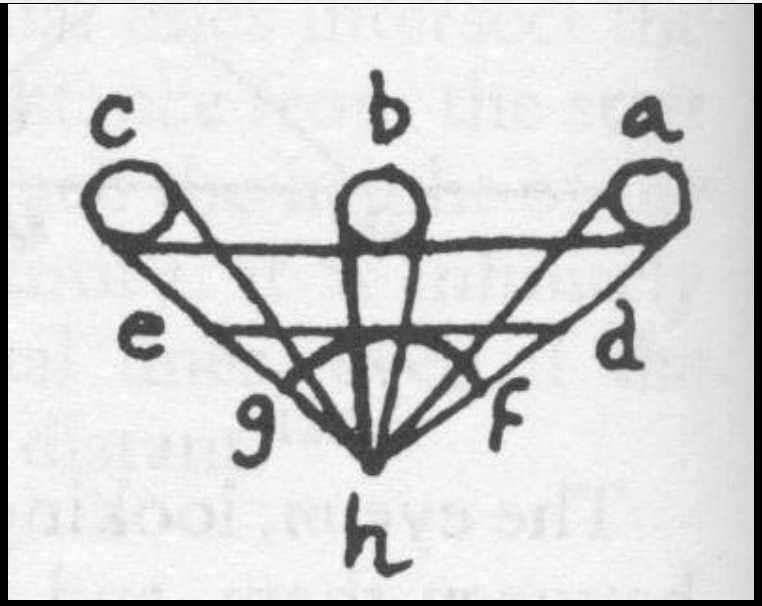
Perspective anomaly and expression

- Giorgio de Chirico
  Les Muses Inquietantes
  1925

Perspective distortion

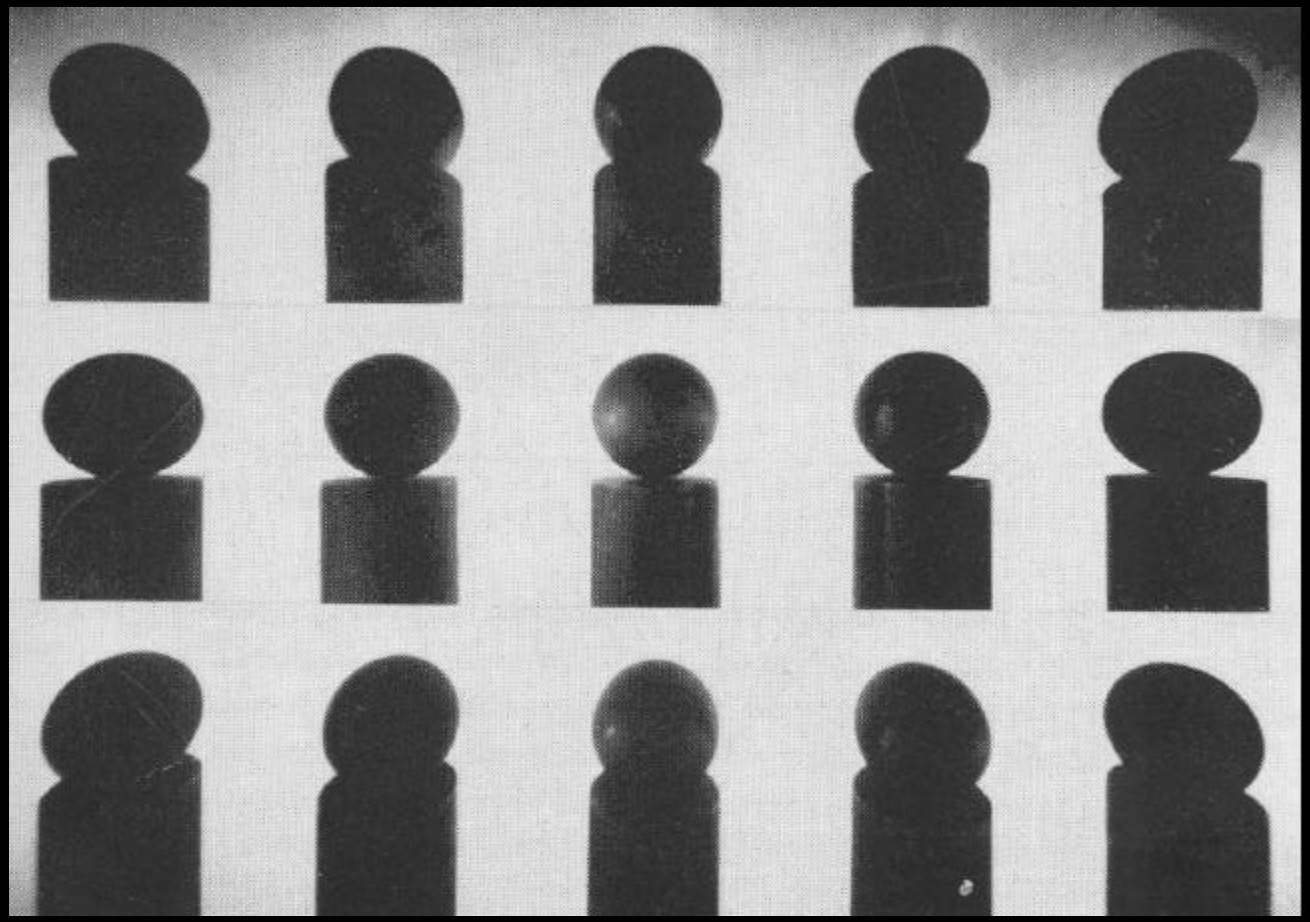
- Wide angle projection
- Does not preserve subjective size





Perspective distortion

- Wide angle projection
- Does not preserve subjective size



Perspective distortion

- Wide angle projection
- Distorts shape

Perspective distortion

- Portrait: distortion with wide angle

Wide angle

Standard

Telephoto

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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  - Linear perspective
  - Divergent perspective
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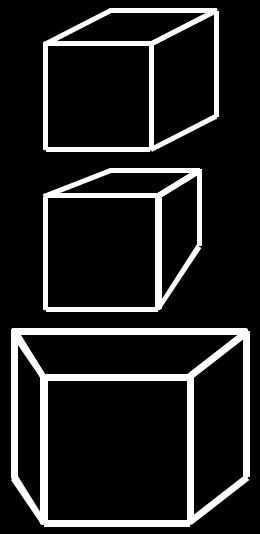
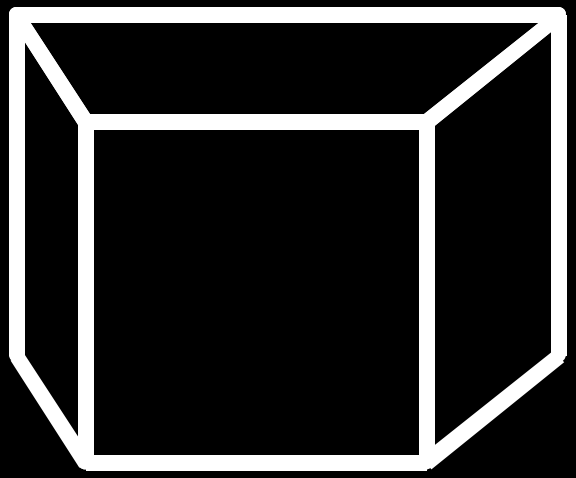


Divergent perspective

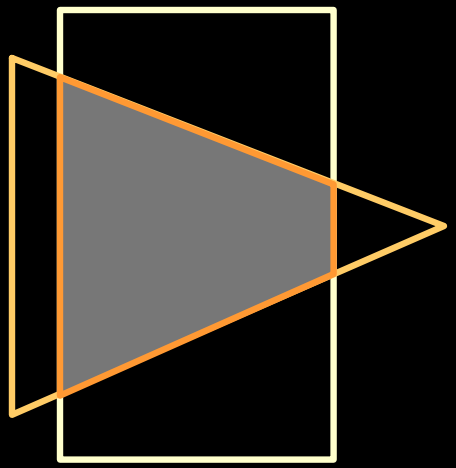
- A.k.a. inverted perspective
- Subject of quarrel,
  hard to include in a theory



- 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

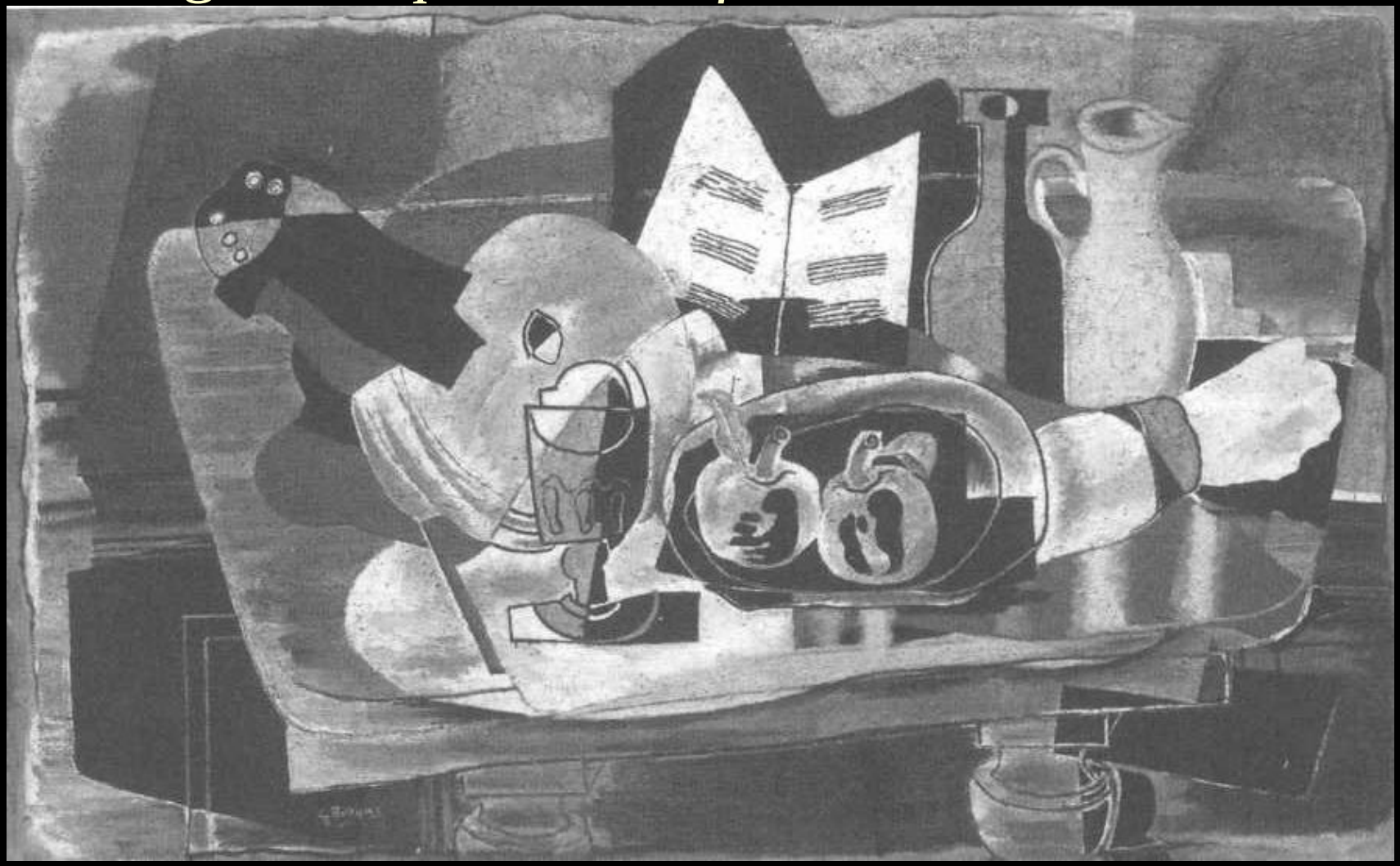
- Andrei Rublev, The Holy Trinity, 1408~1425

Divergent perspective

- Hasadera Enji (Japanese)

Divergent perspective

- Georges Braque, *Still Life: The Table, 1928*

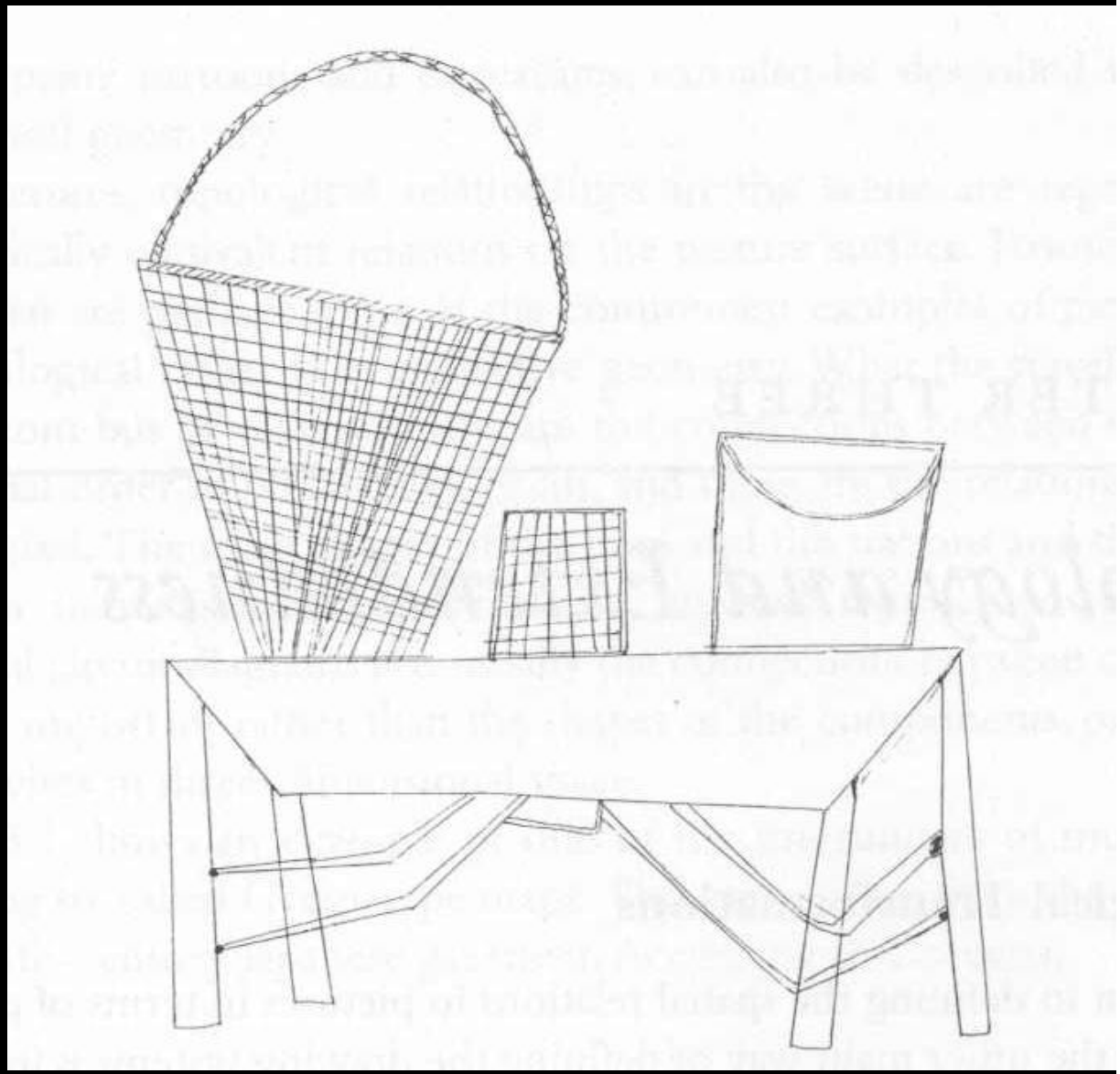


Divergent perspective

- David Hockney, *Chair*

Divergent perspective

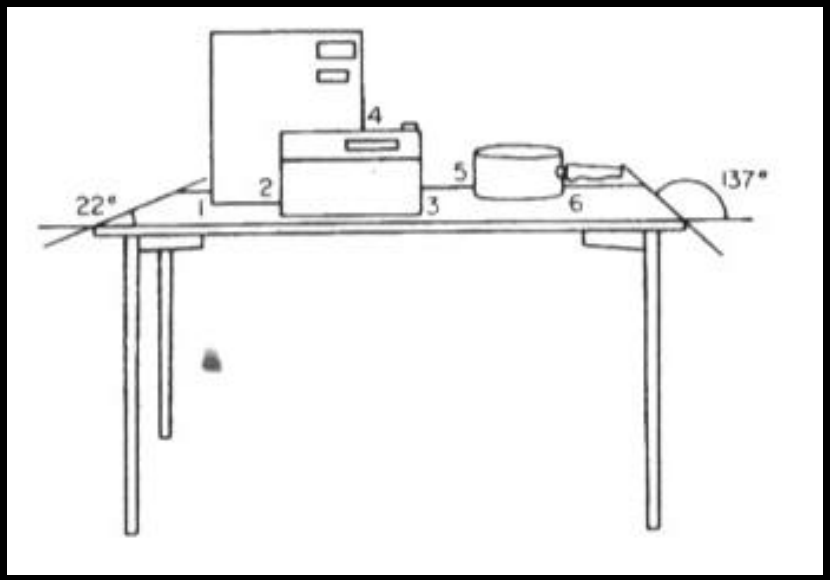
- Child drawing (Kenyan here)



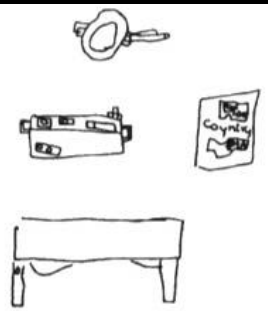
Evolution of children's drawings

- Asked to draw a table

Child's view



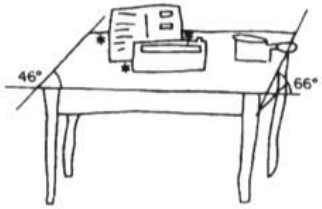
Class of drawing
& average age



7.4

9.7

11.9



13.6

14.3

13.7