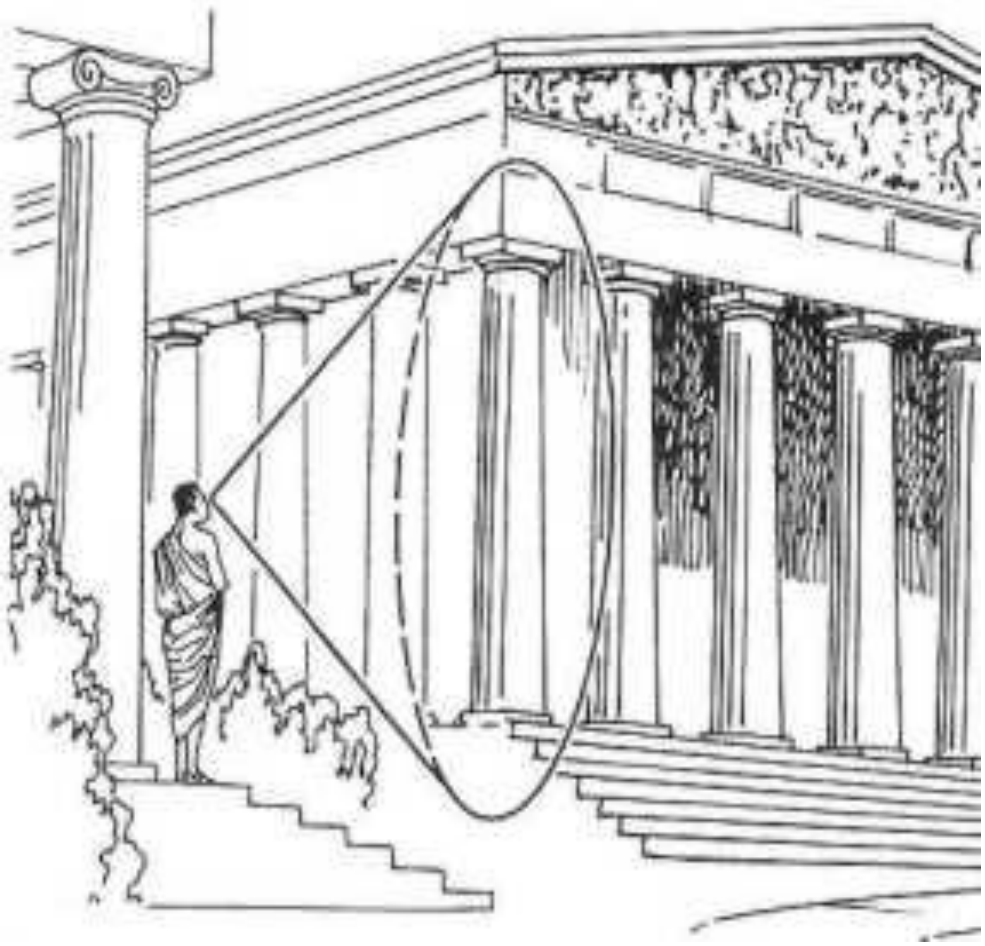
The Little Circle

At Florida International University

THE DISCOVERY OF THE REAL PROJECTIVE PLANE



- Practical perspective drawing is taught as a set of rules – no appeal to Geometry
- Ancient predecessors – Euclid's *Optics.*
- Euclid postulates that objects are perceived by straight rays which converge in the eye – the visual system forms a *pyramid*
- Euclid made no attempt to deal with the problem of artistic representation

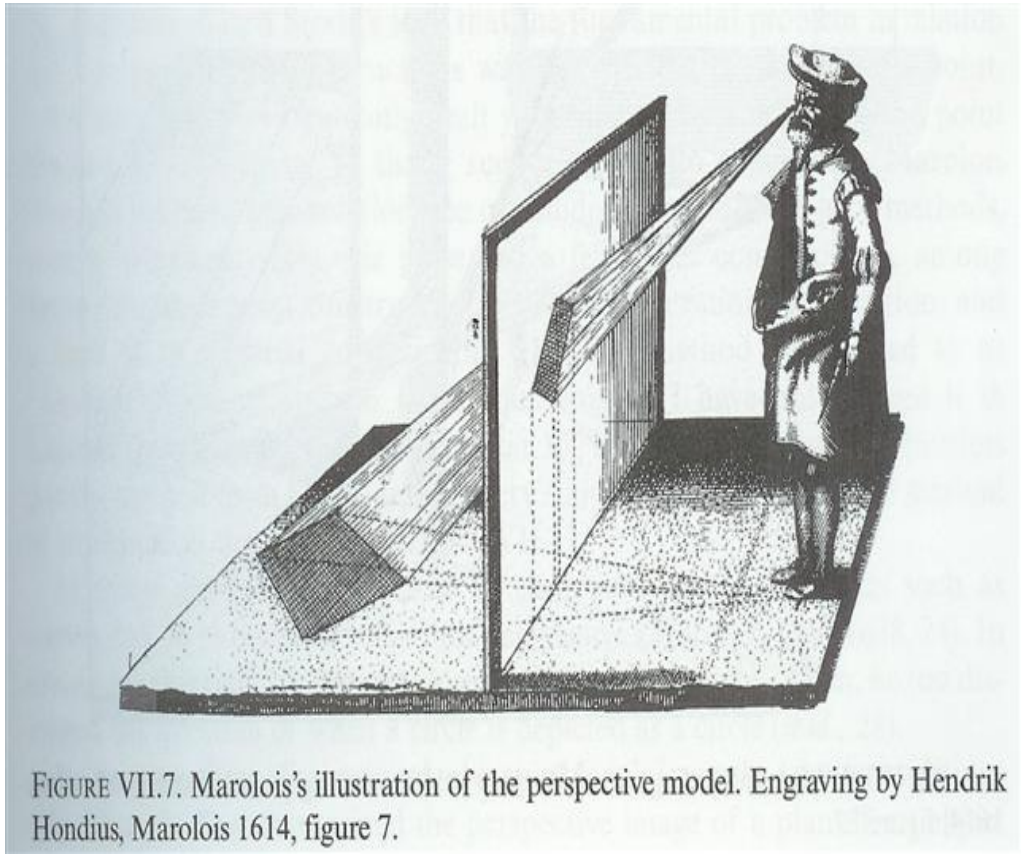
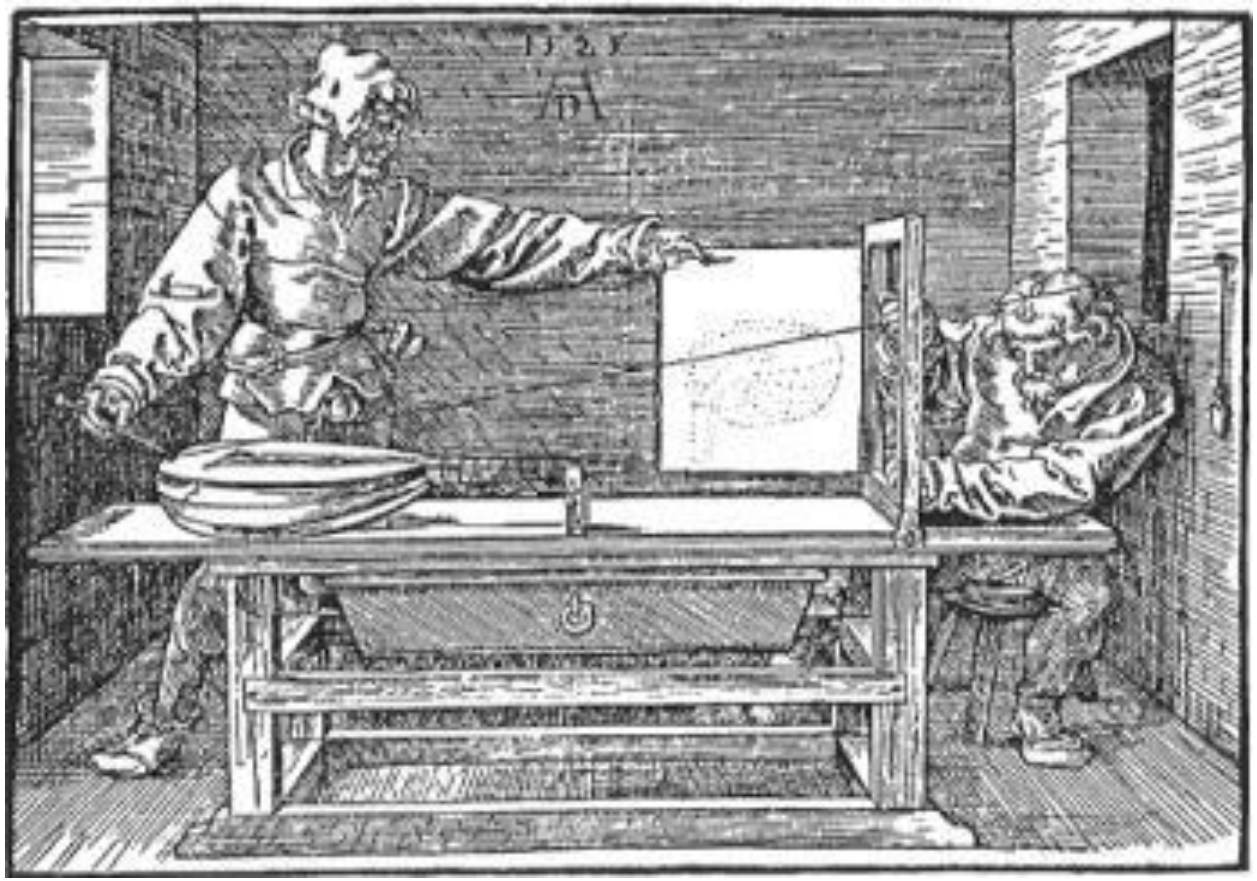


FIGURE VII.7. Marolois's illustration of the perspective model. Engraving by Hendrik Hondius, Marolois 1614, figure 7.

- Brunelleschi: the picture on a canvas is obtained by taking a section, with the canvas, of the pyramid or cone which joins the “one-eyed” artist to the subject
- Perspective is the theory of uniocular (monocular, one-eyed) artist's vision



- The eye of the painter can be replaced by a large needle, driven into a wall, to which is fastened a piece of string with a pointer at the other end.
- The operator aims at the characteristic points of the object, and marks them on a glass plate.
- The perspective is determined by the needle.

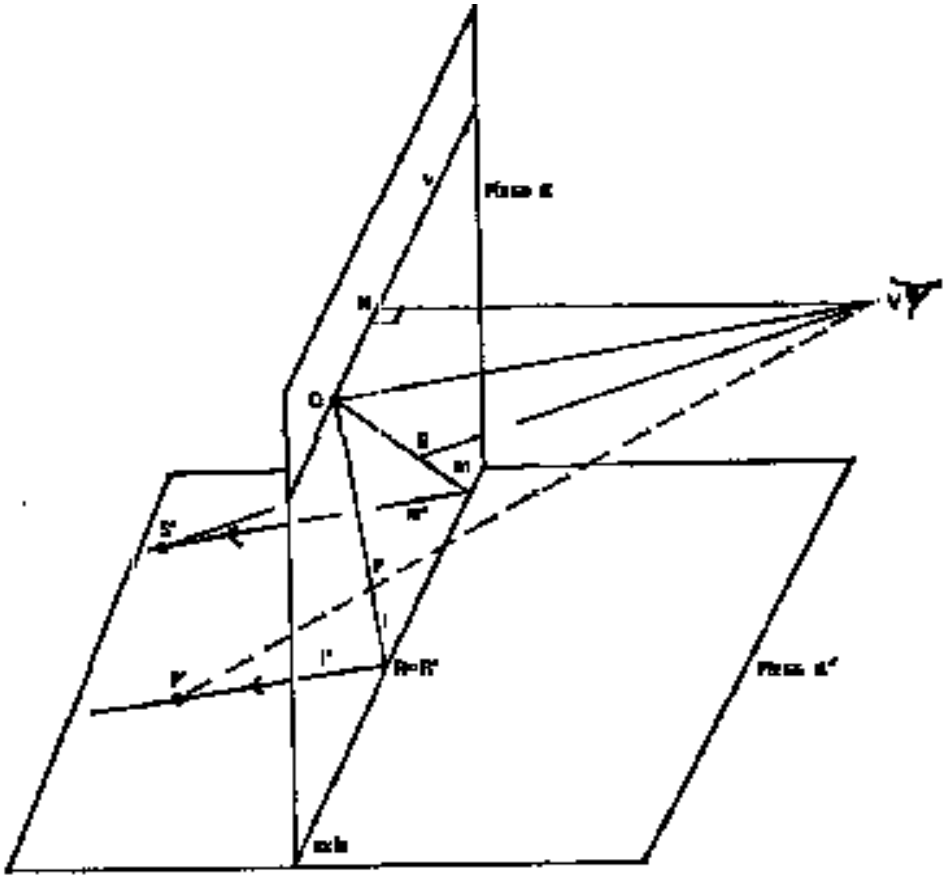
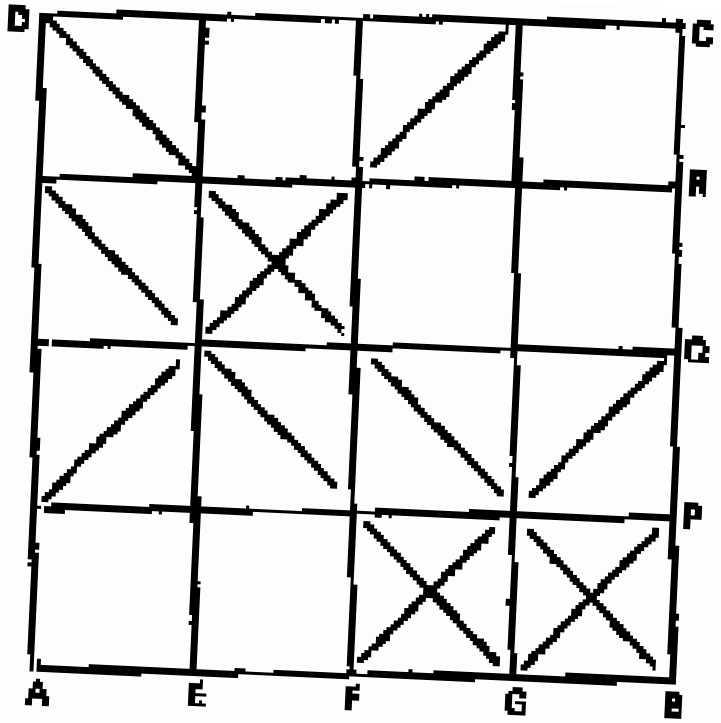


Figure 12

- The eye of the artist: V
- Horizontal plane we wish to depict (\alpha')
- The screen: perpendicular to \alpha' plane - \alpha
- Projection of points of \alpha' to points on \alpha
- Axis of projection – the intersection of the planes
- Vanishing points, vanishing line
- More discussion...



- Tiled floor: orthogonals v/s transversals
- Equidistant transversals – representation on the canvas
- One (wrong) rule-of-thumb method: the intervals on the canvas between a transversal and the next one should diminish by 1/3!

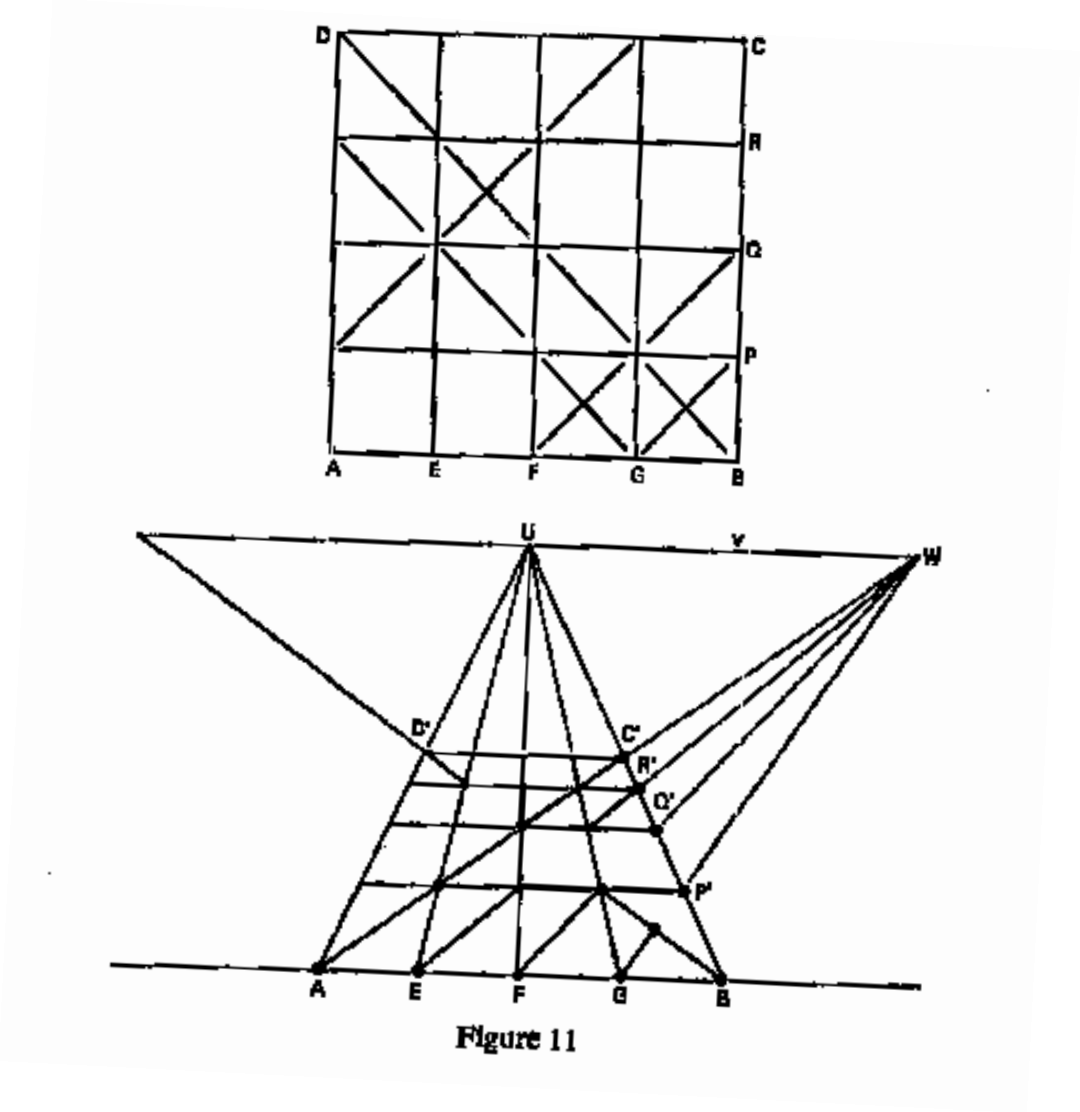
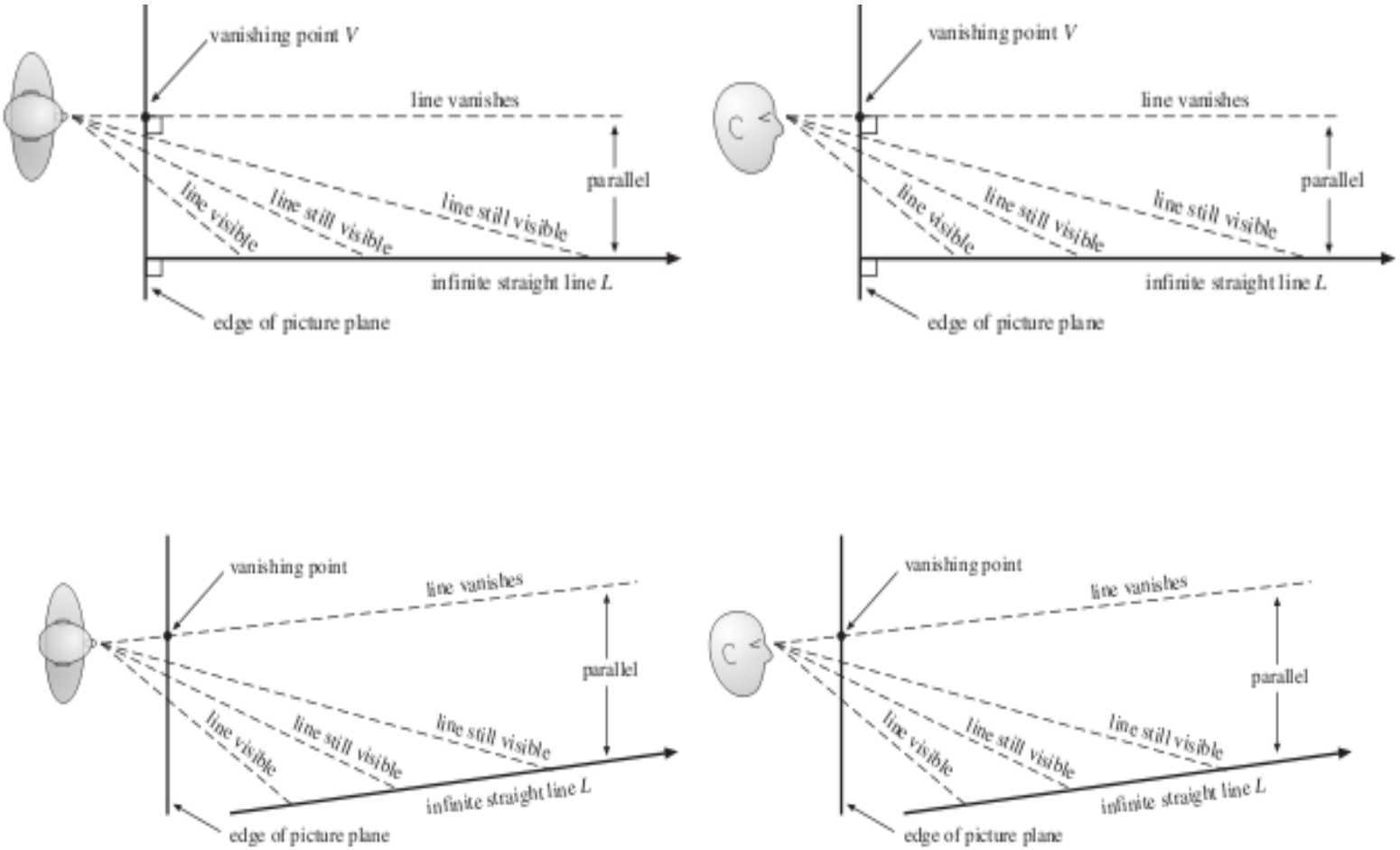


Figure 11

- Using the theory of orthogonals, vanishing points, vanishing line one gets the right solution.



Vanishing points

Theorem 3.1: The Vanishing Point Theorem. If two or more lines in the real world are parallel to one another, but not parallel to the picture plane, then they have the same vanishing point. The perspective *images* of these lines will *not* be parallel. If fully extended in a drawing, the image lines will intersect at the vanishing point.

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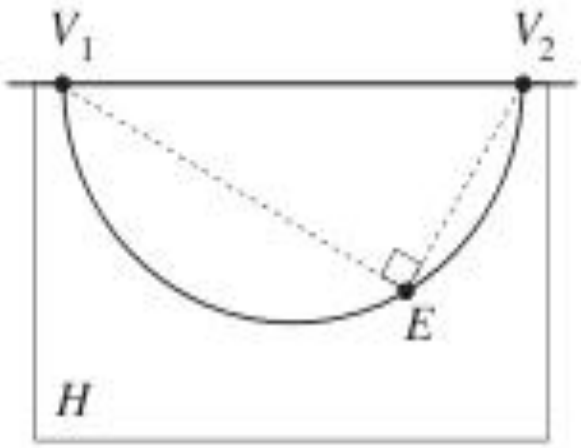
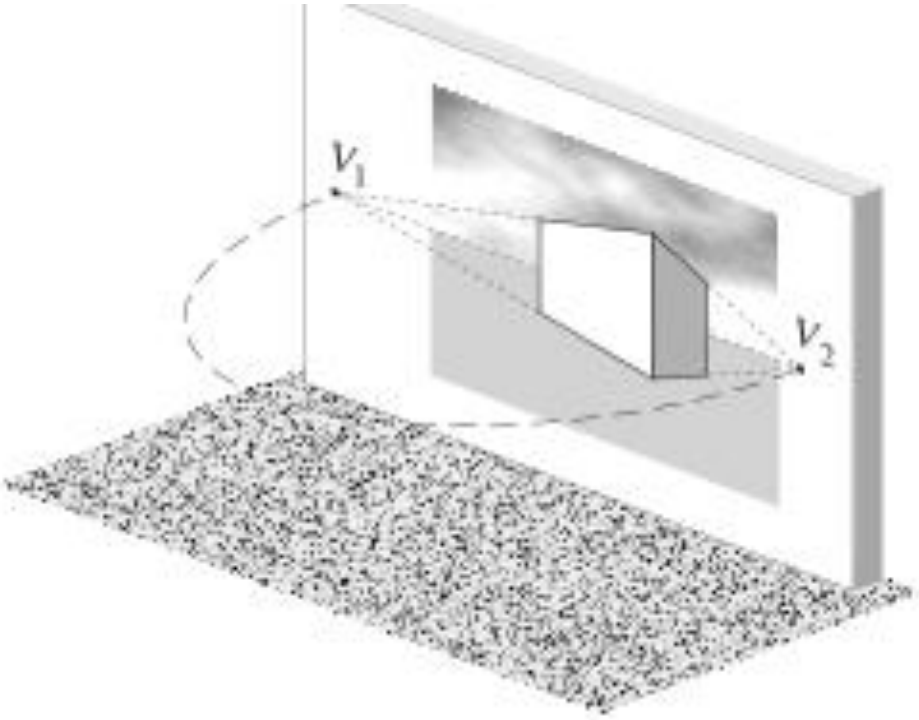
Theorem 5.1. The viewpoint E for a standard two-point perspective painting (drawing, photograph) with vanishing points V_1 and V_2 lies on a semicircle with endpoints V_1 and V_2. The plane of the semicircle is perpendicular to the picture plane.

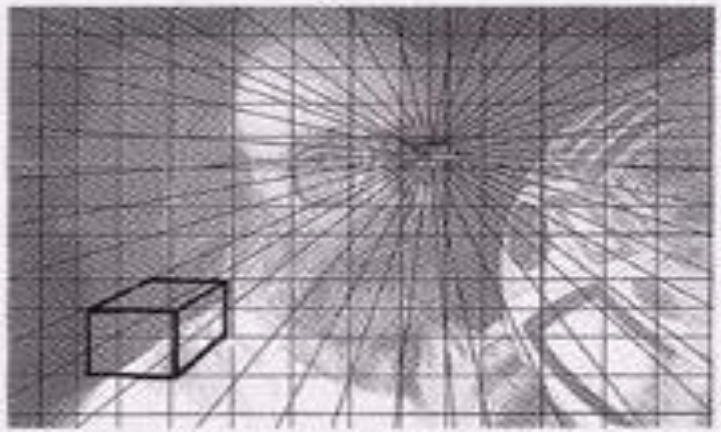


top view



- Remember: the box is rectangular, the vanishing points correspond to mutually perpendicular directions

1



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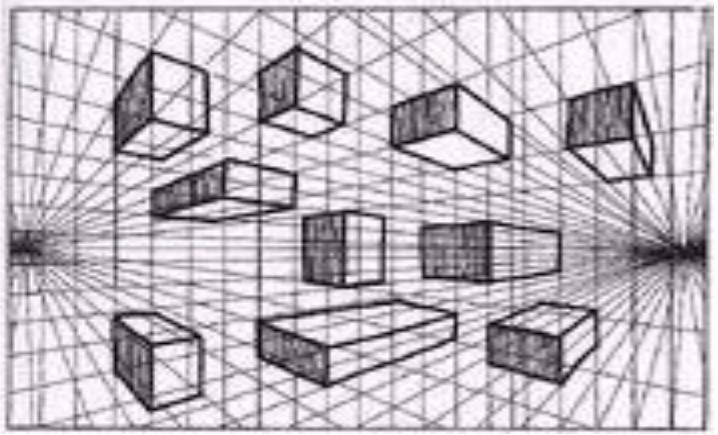

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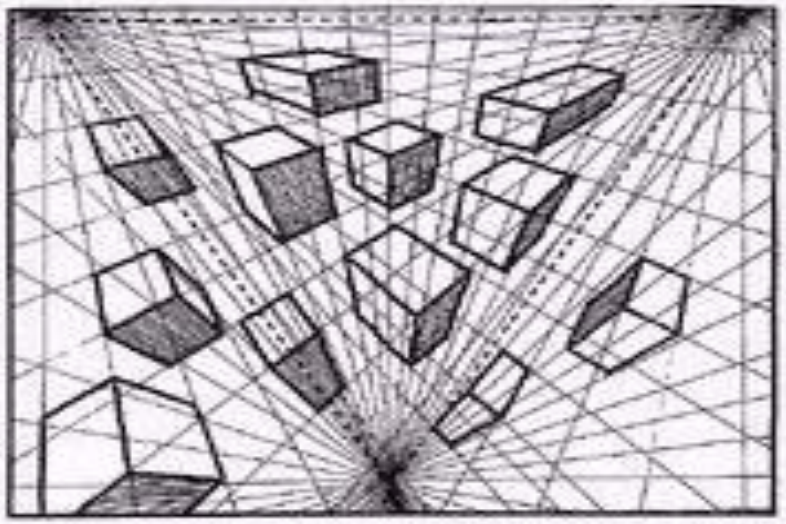
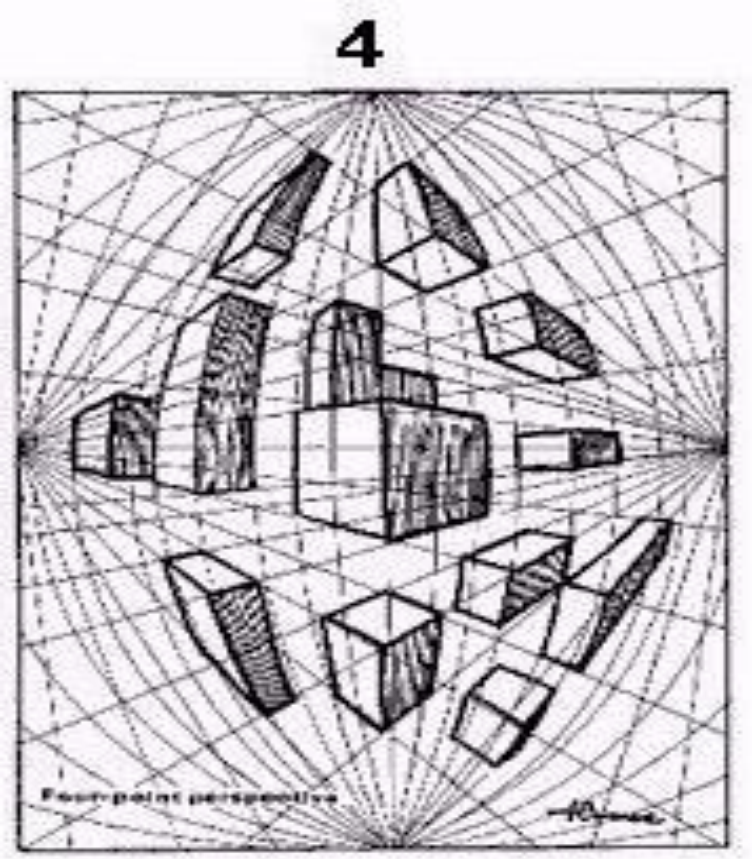
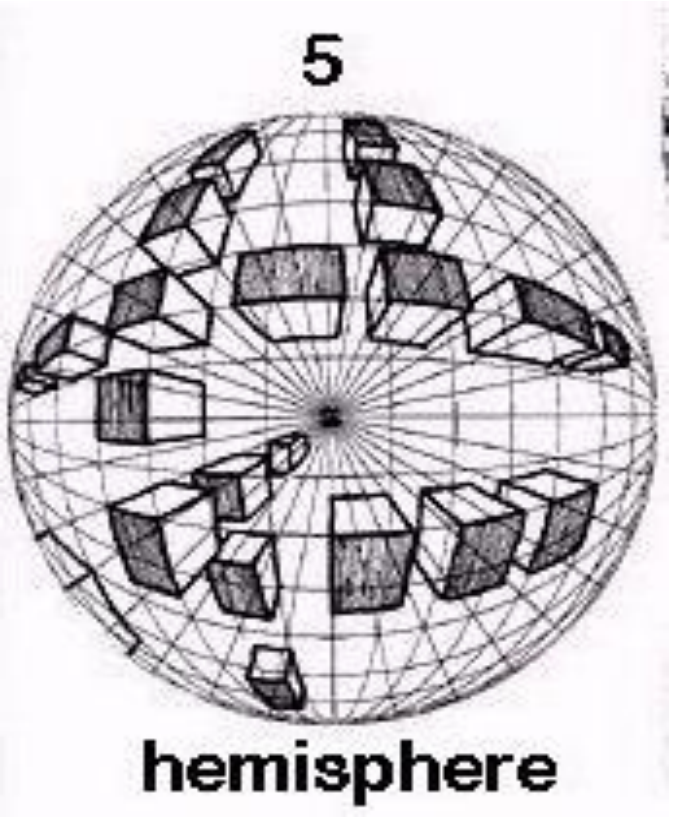
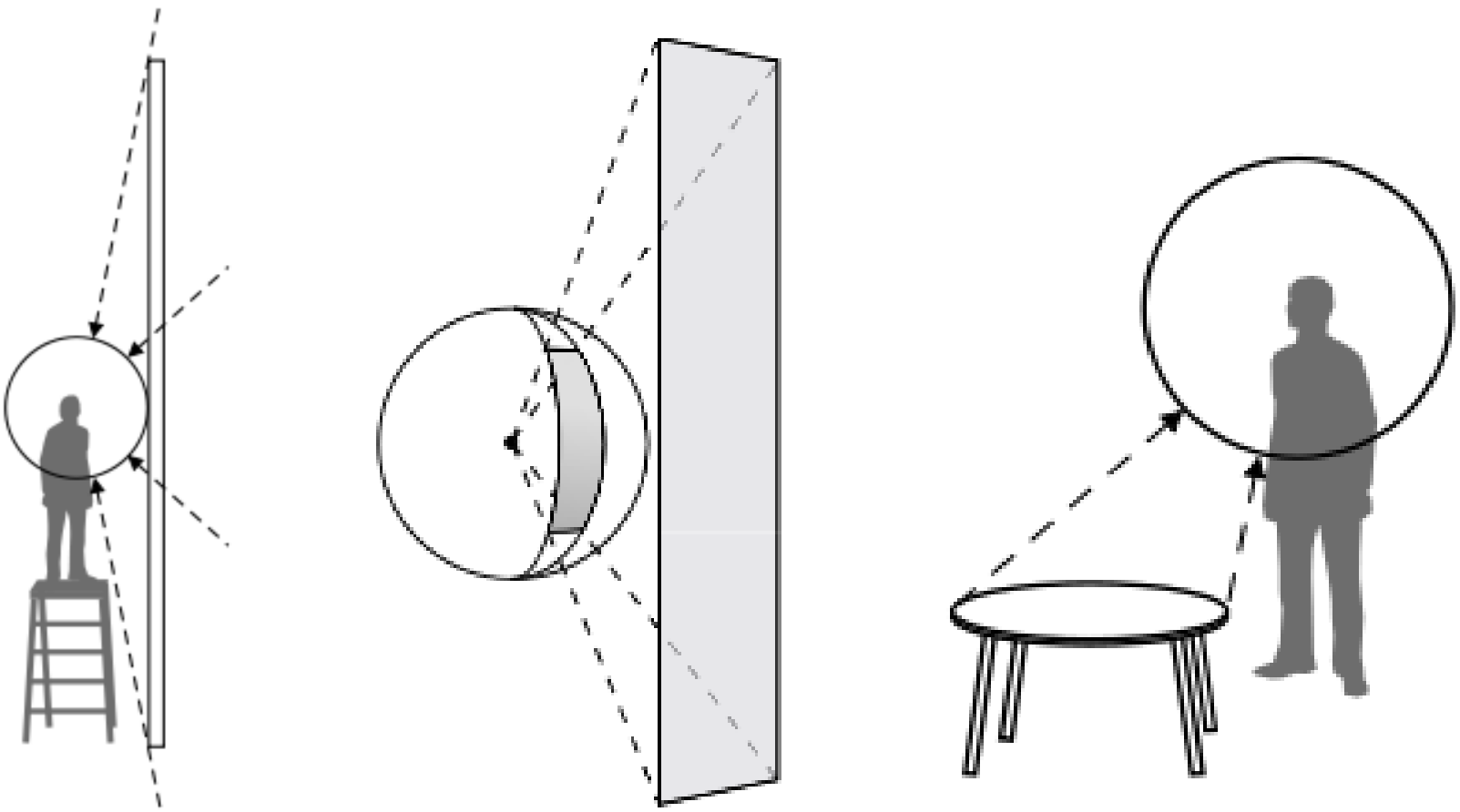




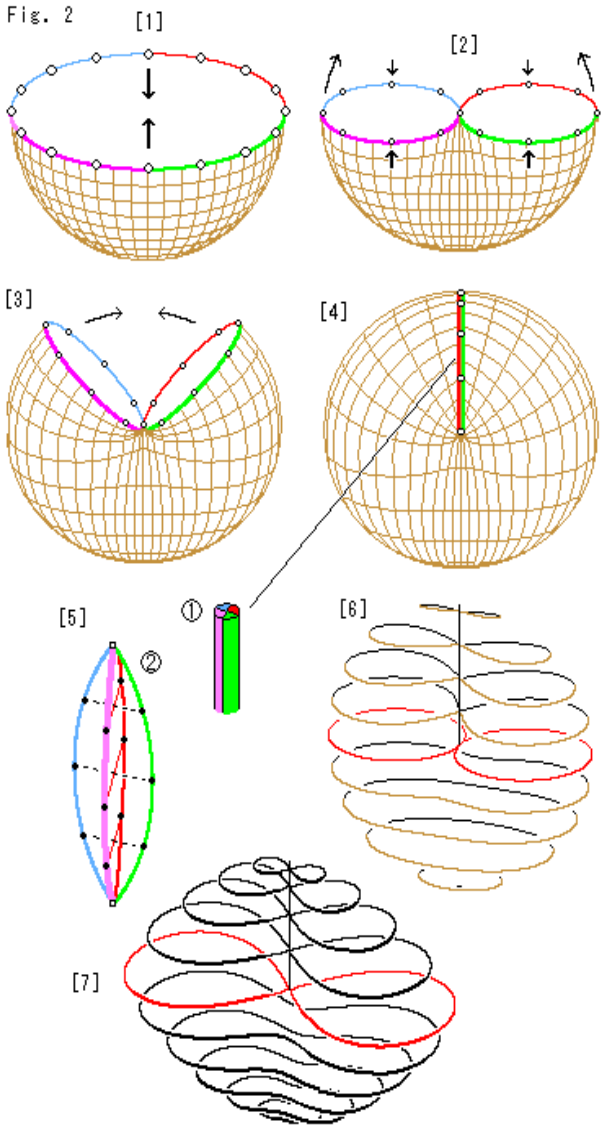
Four-point perspective

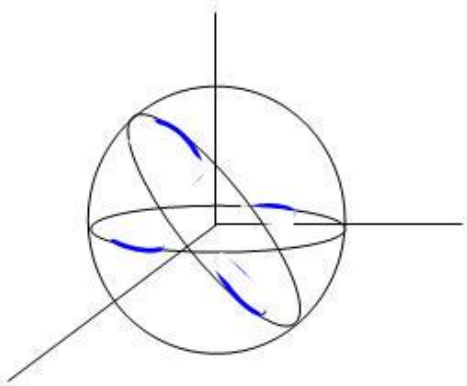


Five-point perspective

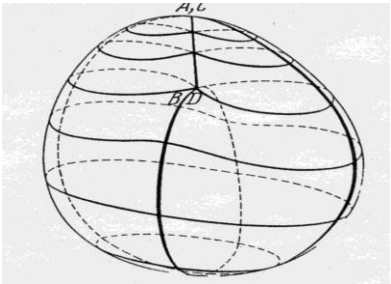


Projections on the sphere – conformality, the transition to the projective plane





The point: incident geometry



The projective plane via a cross-cap