

A wireframe landscape rendered in perspective. The foreground features a grid of lines that recede into the distance. In the background, there are jagged, mountain-like shapes also composed of wireframes. The sky is black and filled with numerous small, white dots representing stars. The overall aesthetic is minimalist and technical.

PINHOLE AND PERSPECTIVE PROJECTION

CALEB MCANUFF

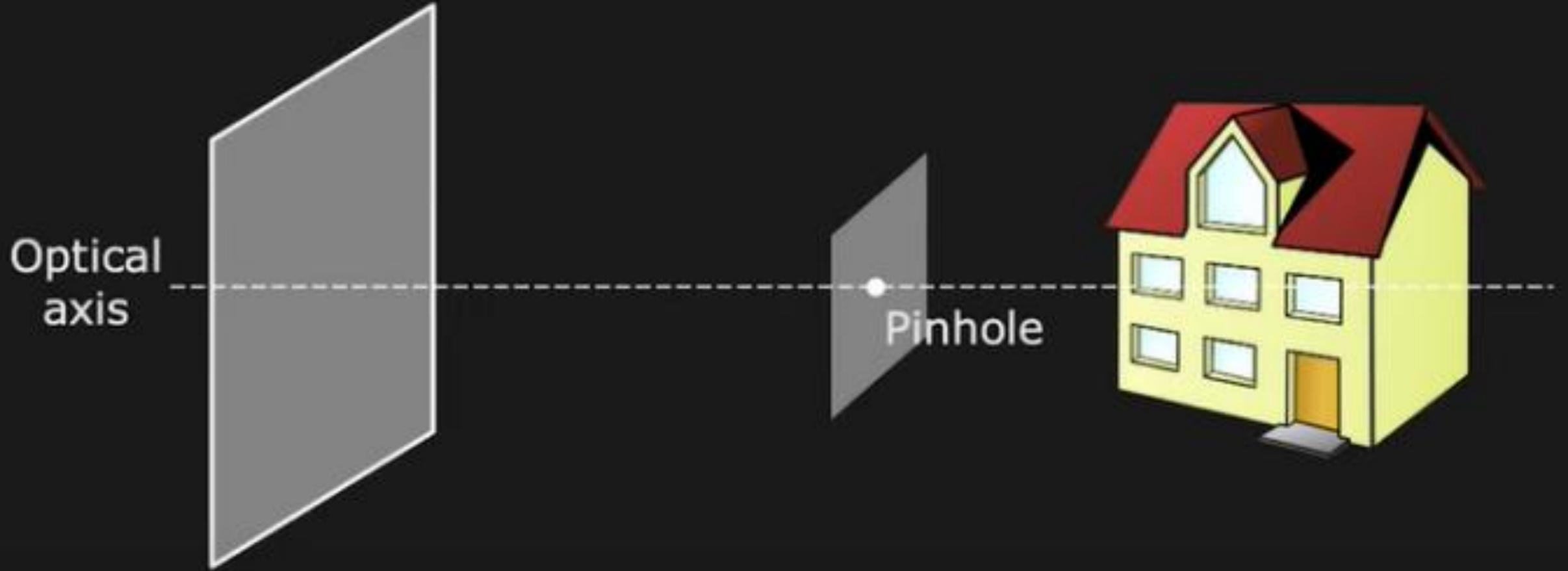
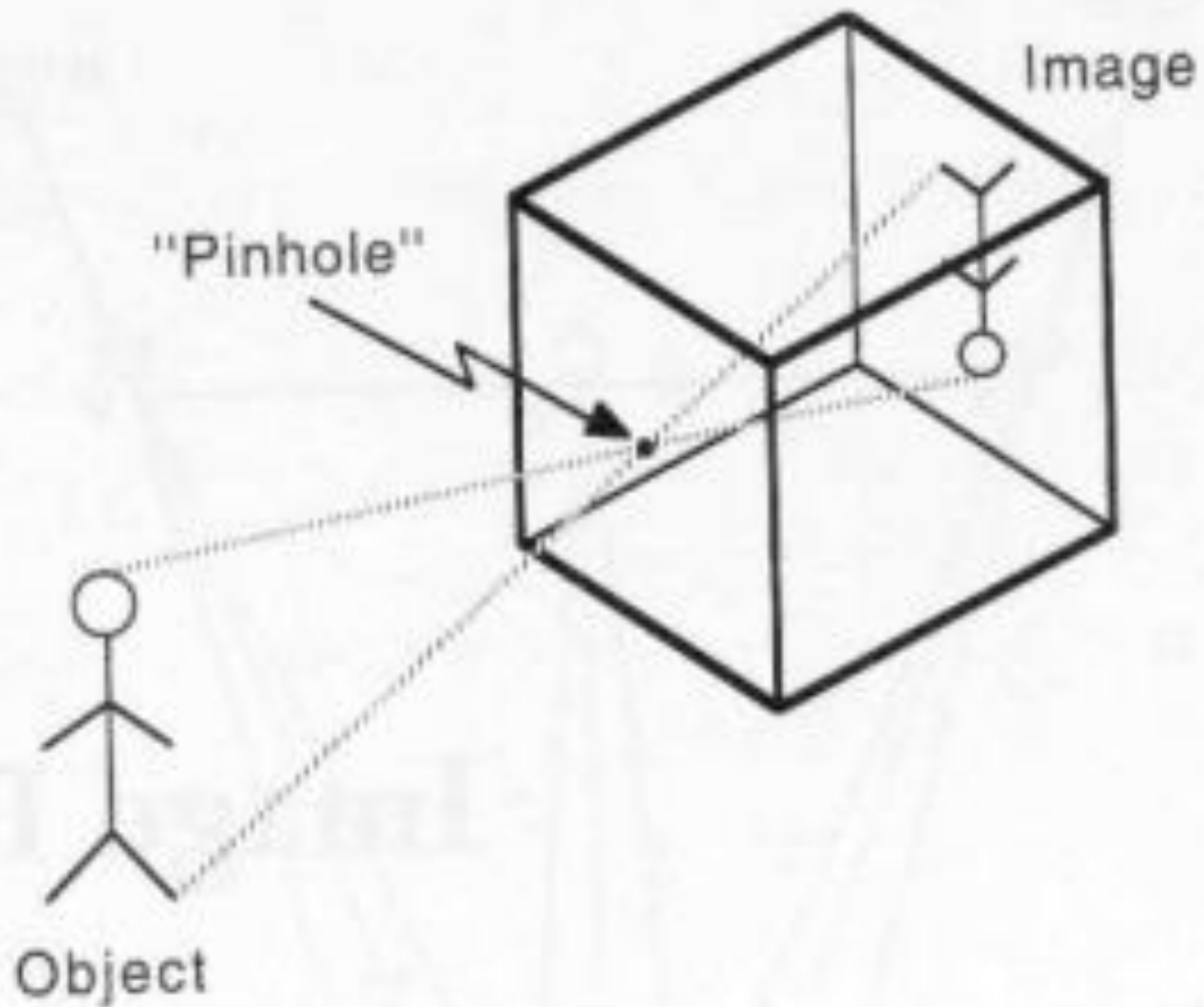


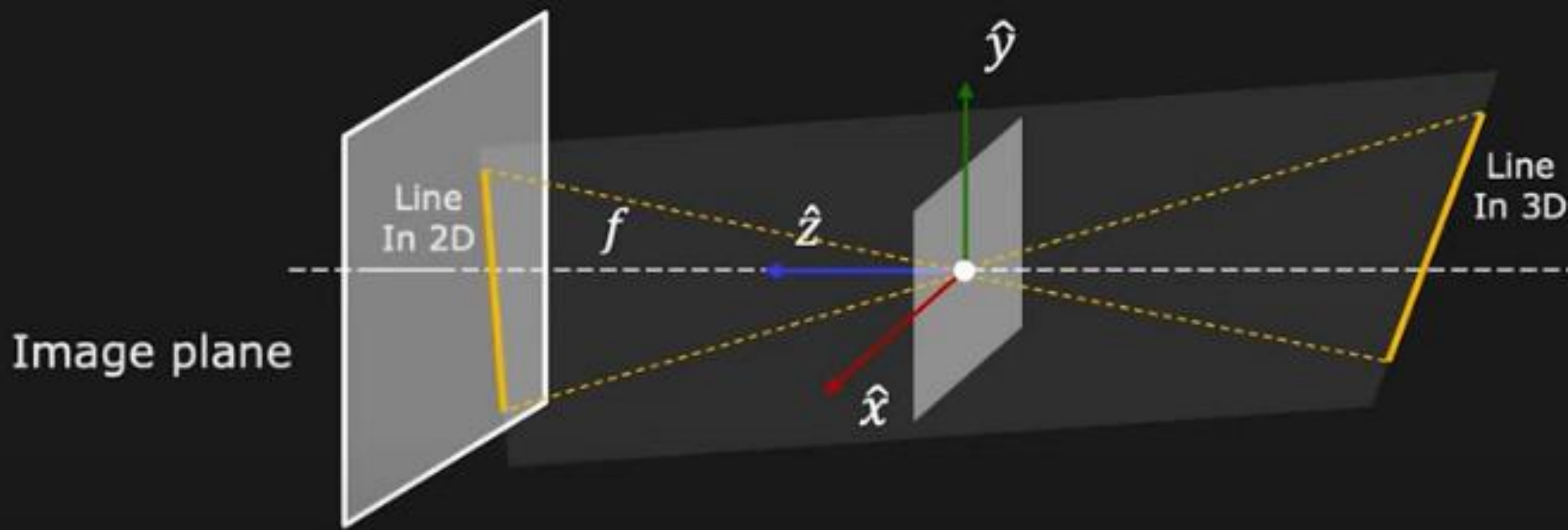
IMAGE FORMATION

- Geometric Relations
- Photometric Relations



PINHOLE MODEL

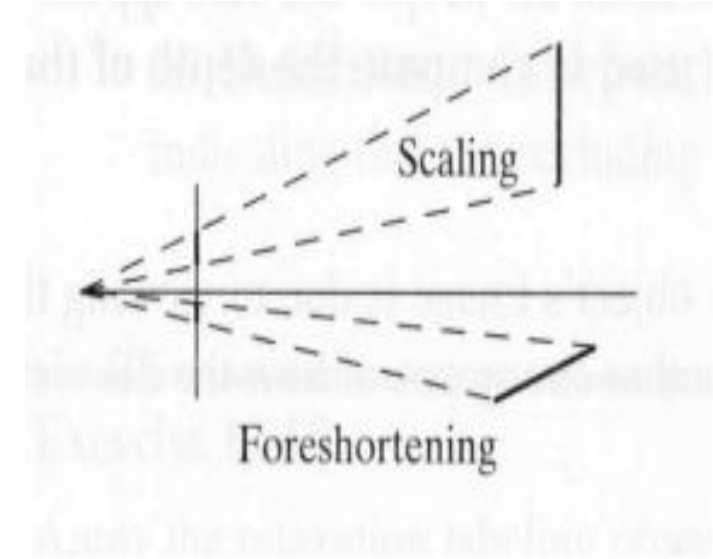
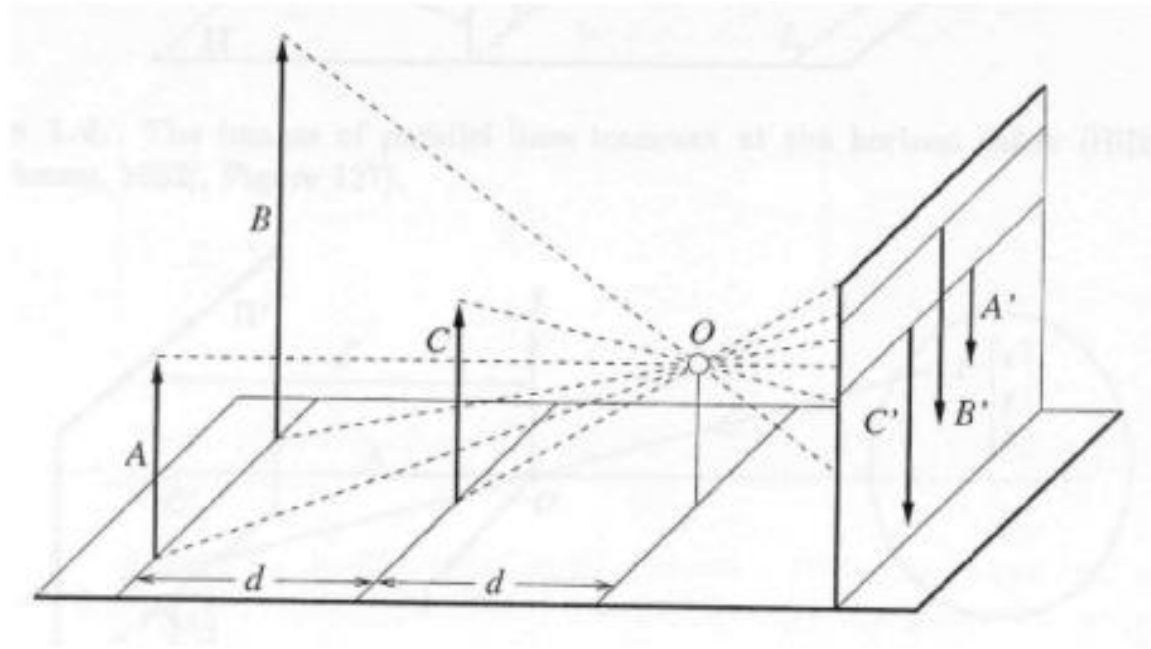
- Simplest Imaging device
- Light enters through a small aperture
- Intersection of light rays with the image plane forms the image of the object



PERSPECTIVE PROJECTION

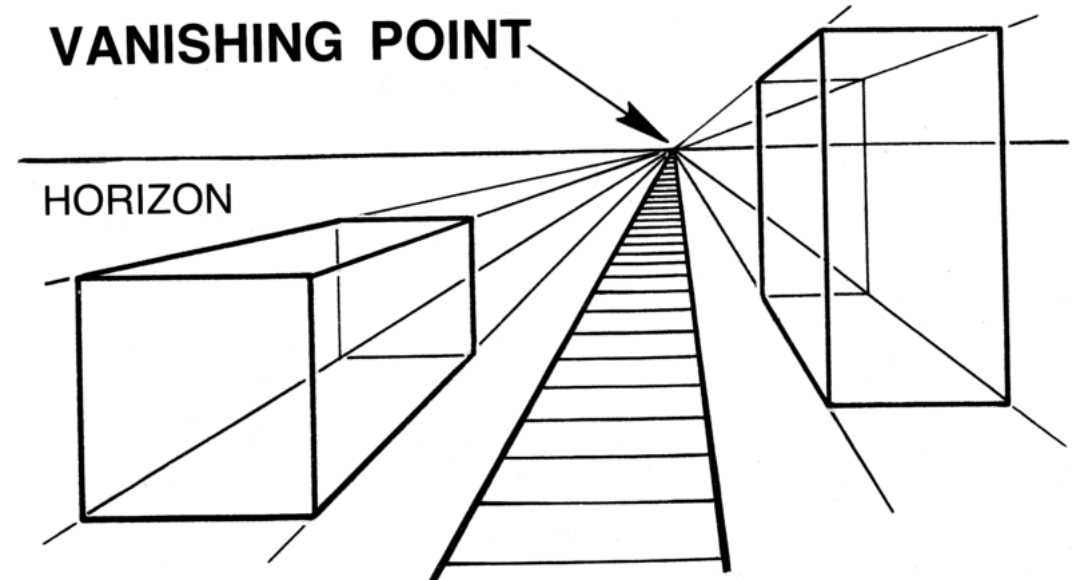
- The process of mapping the 3 dimensional world onto 2 dimensional surface while preserving relative position and distance from the viewer

IMAGE MAGNIFICATION



VANISHING POINTS

- Parallel Lines
- Convergence
- Art and Architecture
- Photography
- Computer Graphics



PINHOLE DIAMETER



$$d = 2\sqrt{f\lambda}$$

APPLICATIONS & LIMITATIONS

- Astronomy
- Art
- Computer Graphics and Animation
- Surveillance
- Limitations: Image quality, impractical, distortion, complexity

SUMMARY

- Pinhole Projection: A simple method showing how light passing through an aperture can form an image
- Perspective Projection: Mapping a 3D object onto a 2D screen
- Applications: photography, cinematography, computer graphics.
- Limitations: Diffraction, and distortion

REFERENCES

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- <https://vnav.mit.edu/material/11-ImageFormation-notes.pdf>
- https://www.youtube.com/watch?v=_EhY31MSbNM (Lecture)