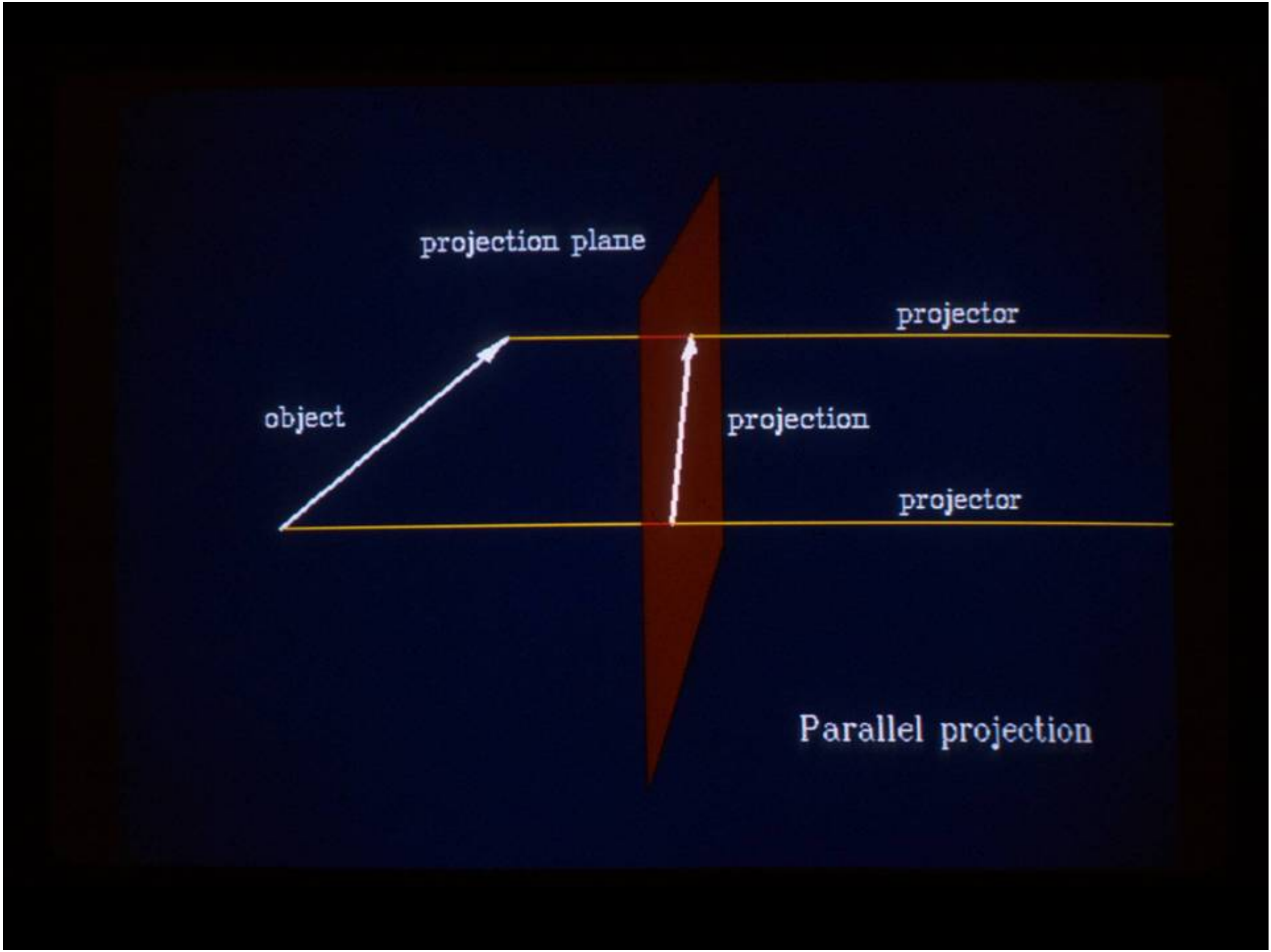
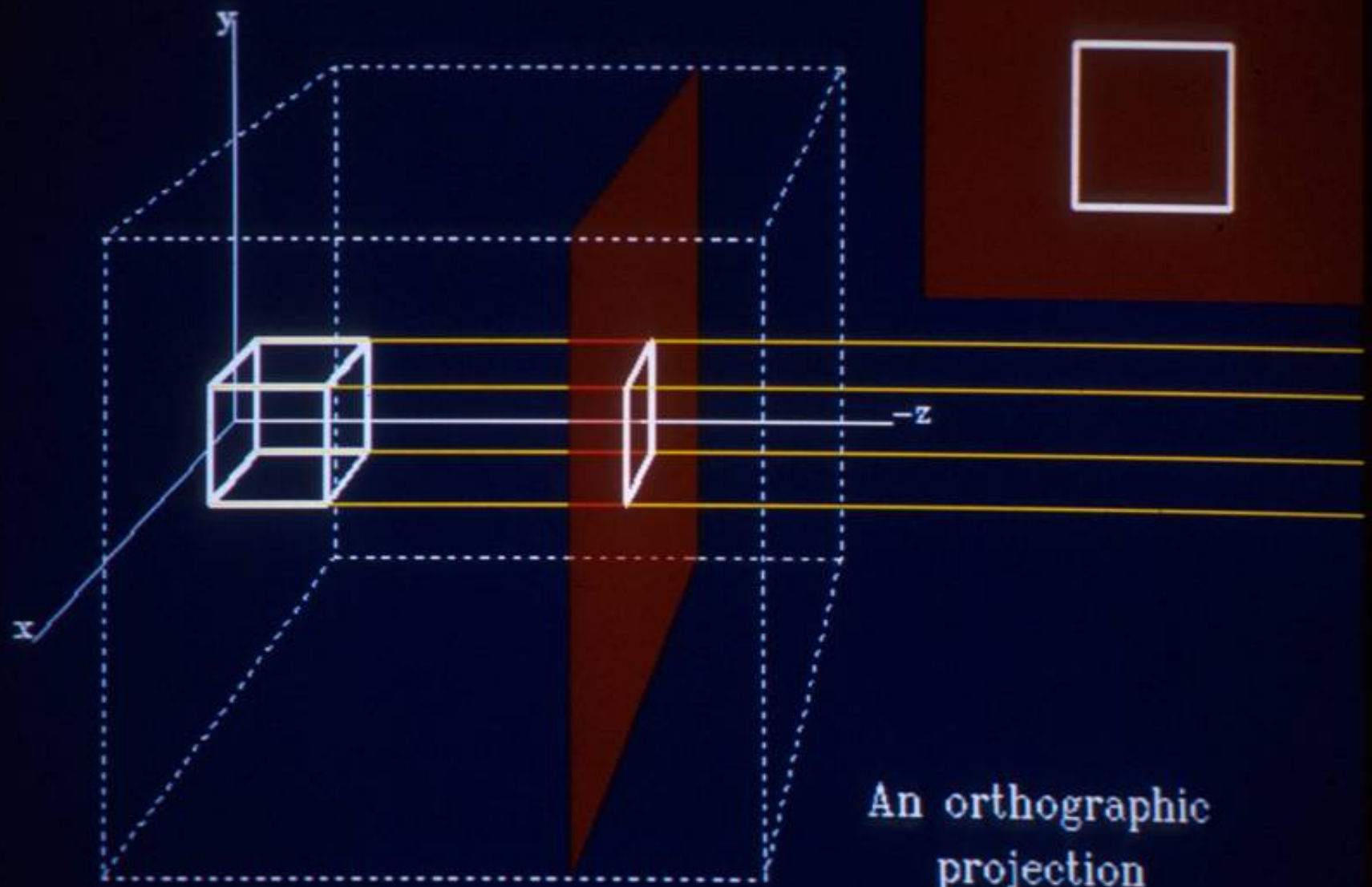
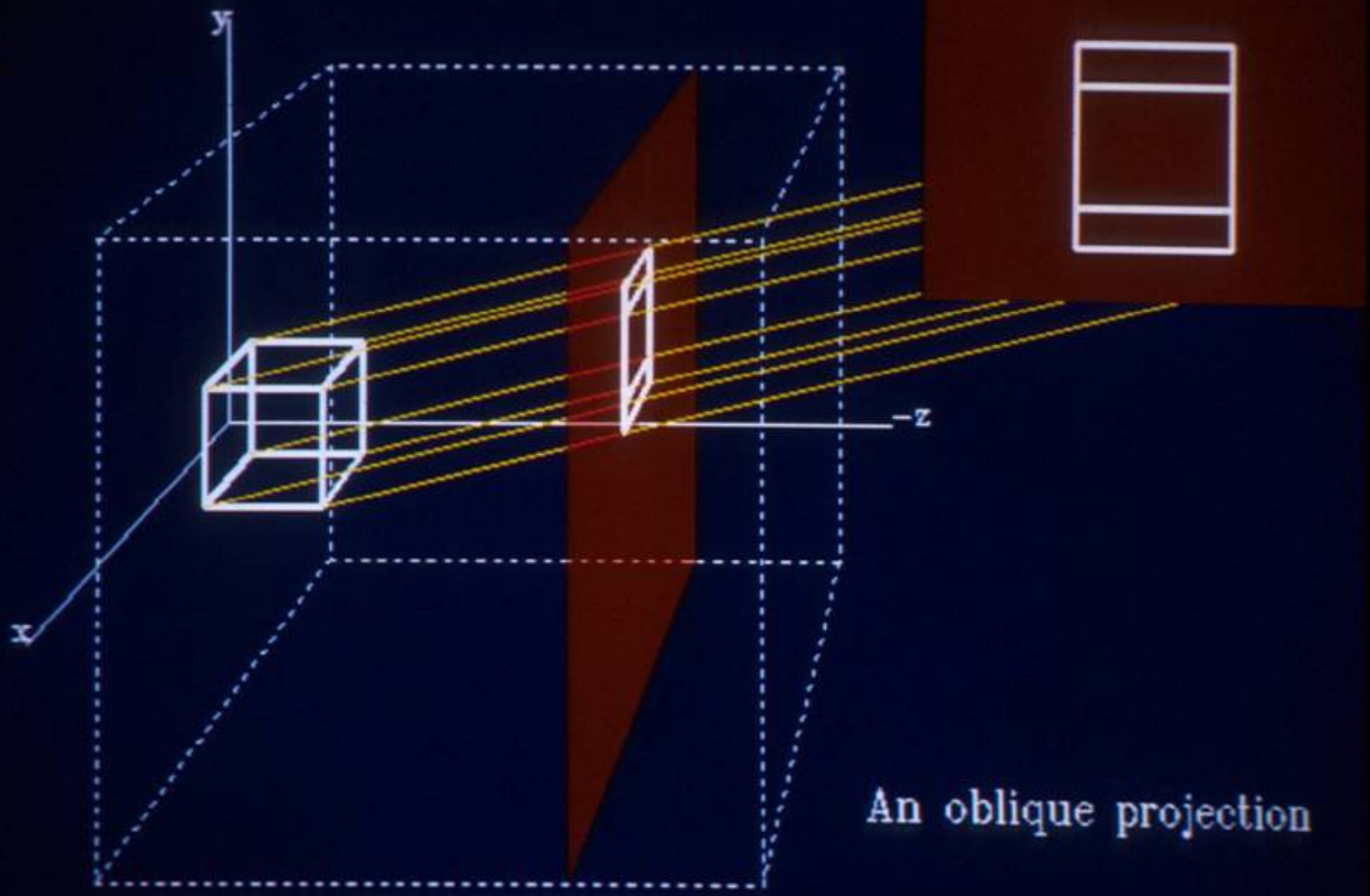
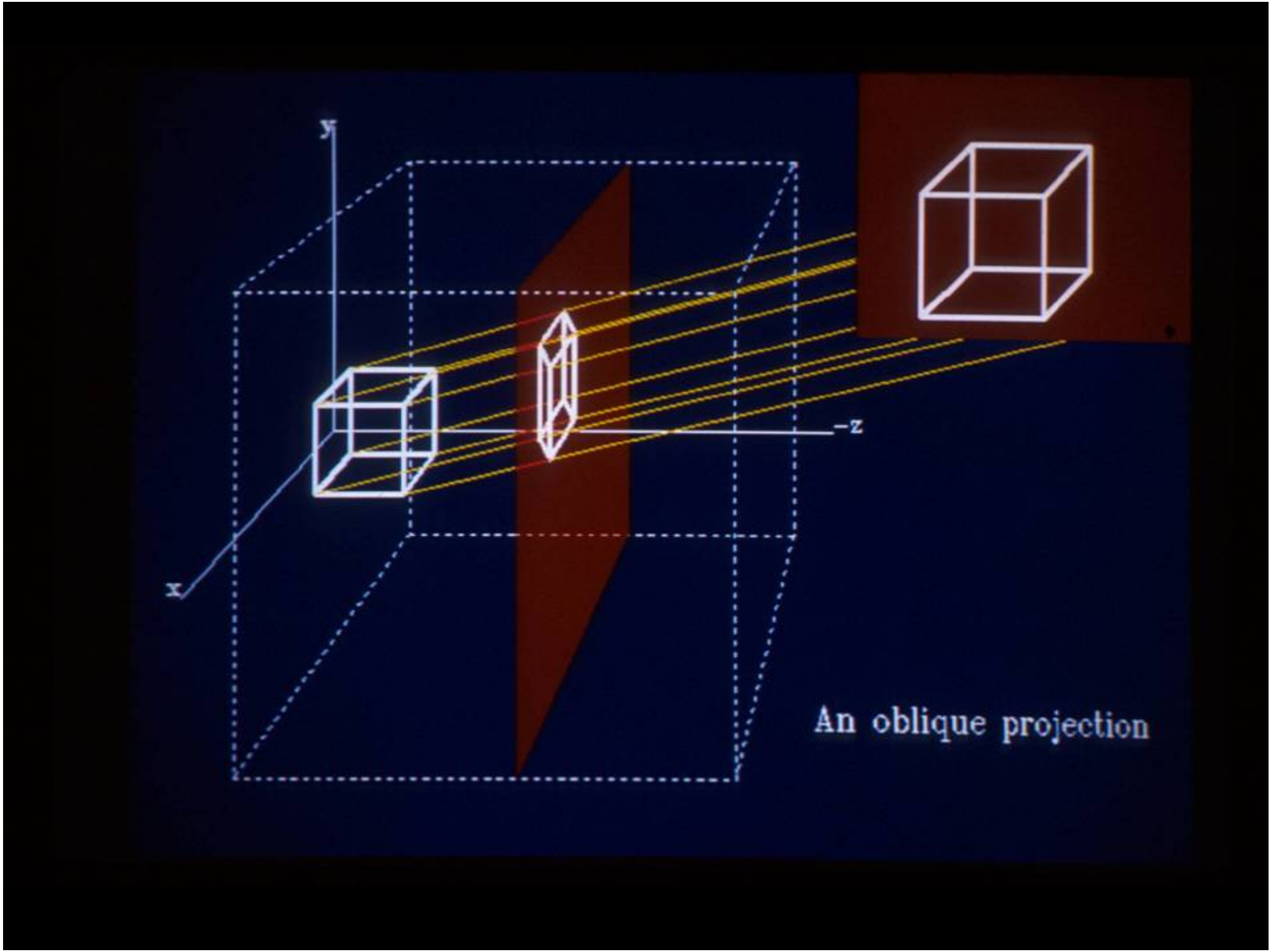

projection plane
projector
object
projection
projector
Parallel projection

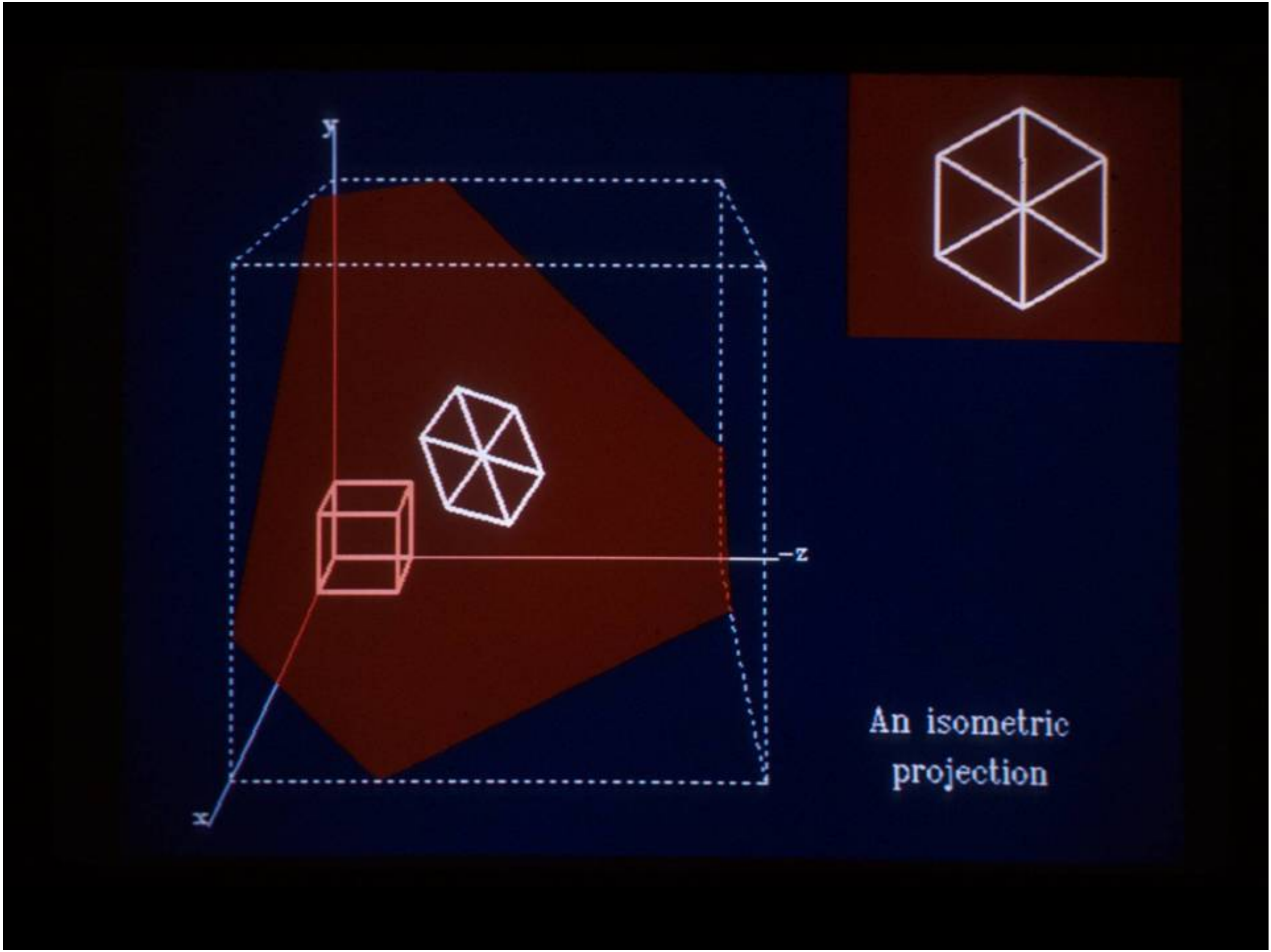


An orthographic projection

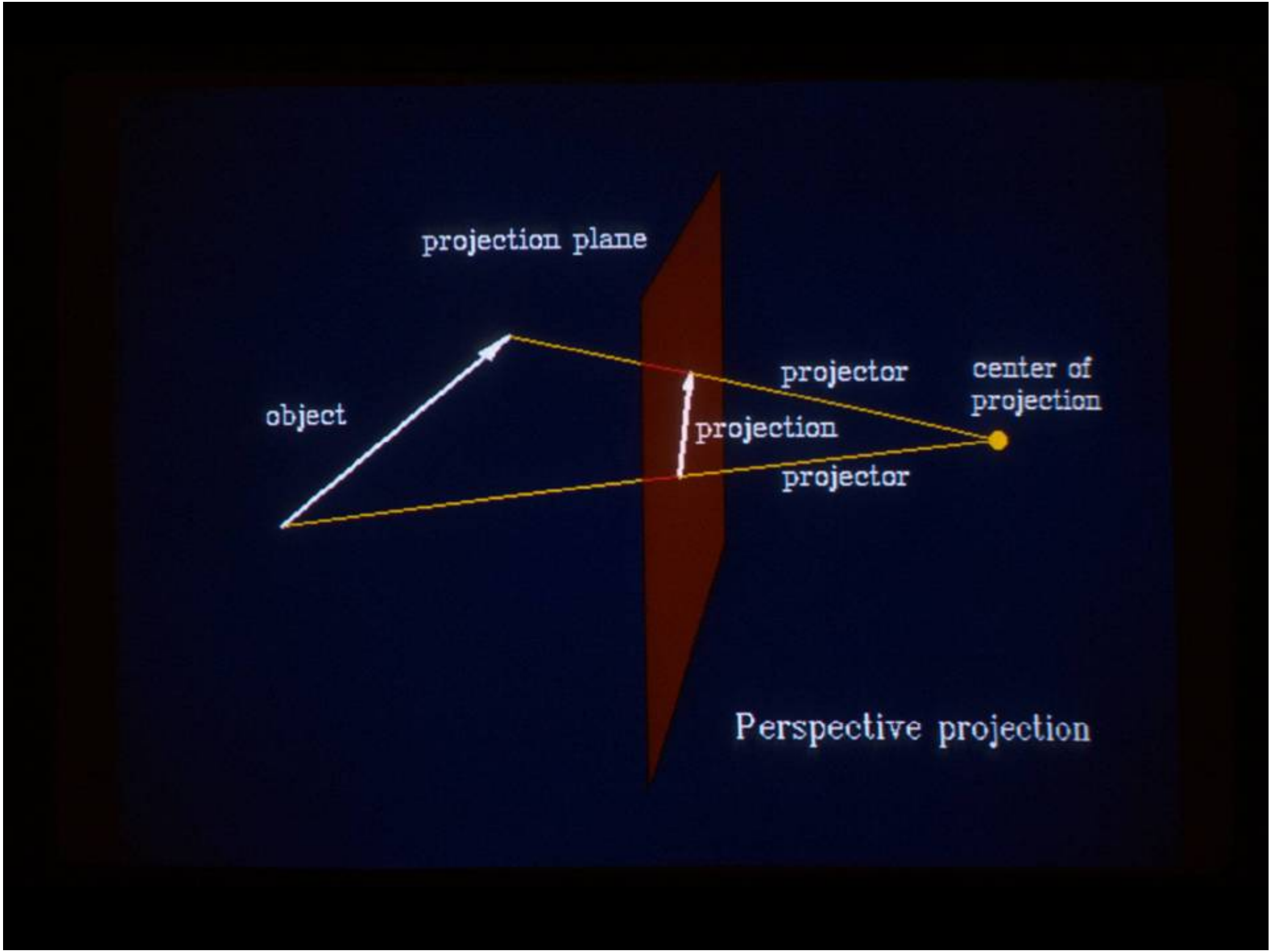


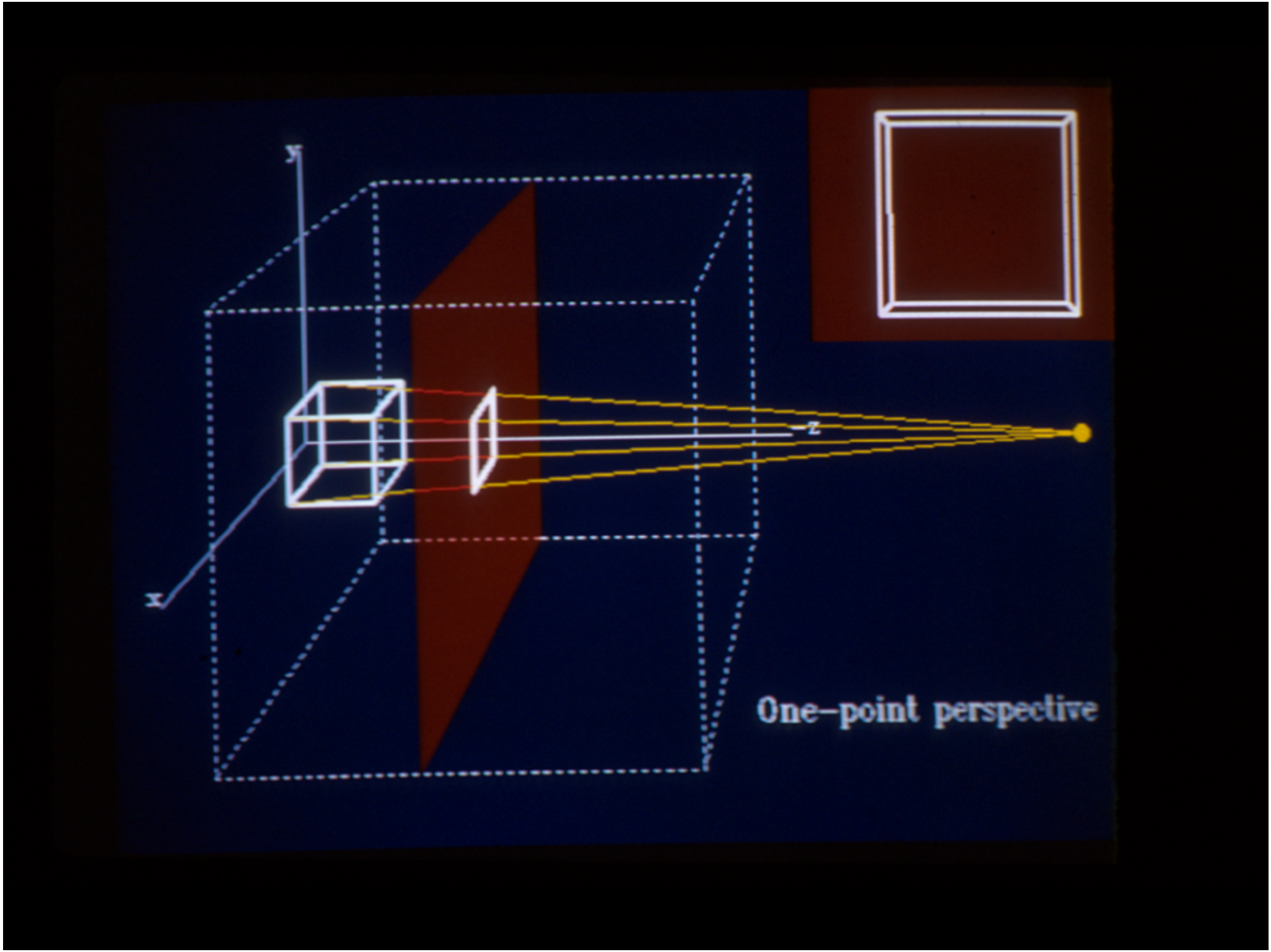
An oblique projection

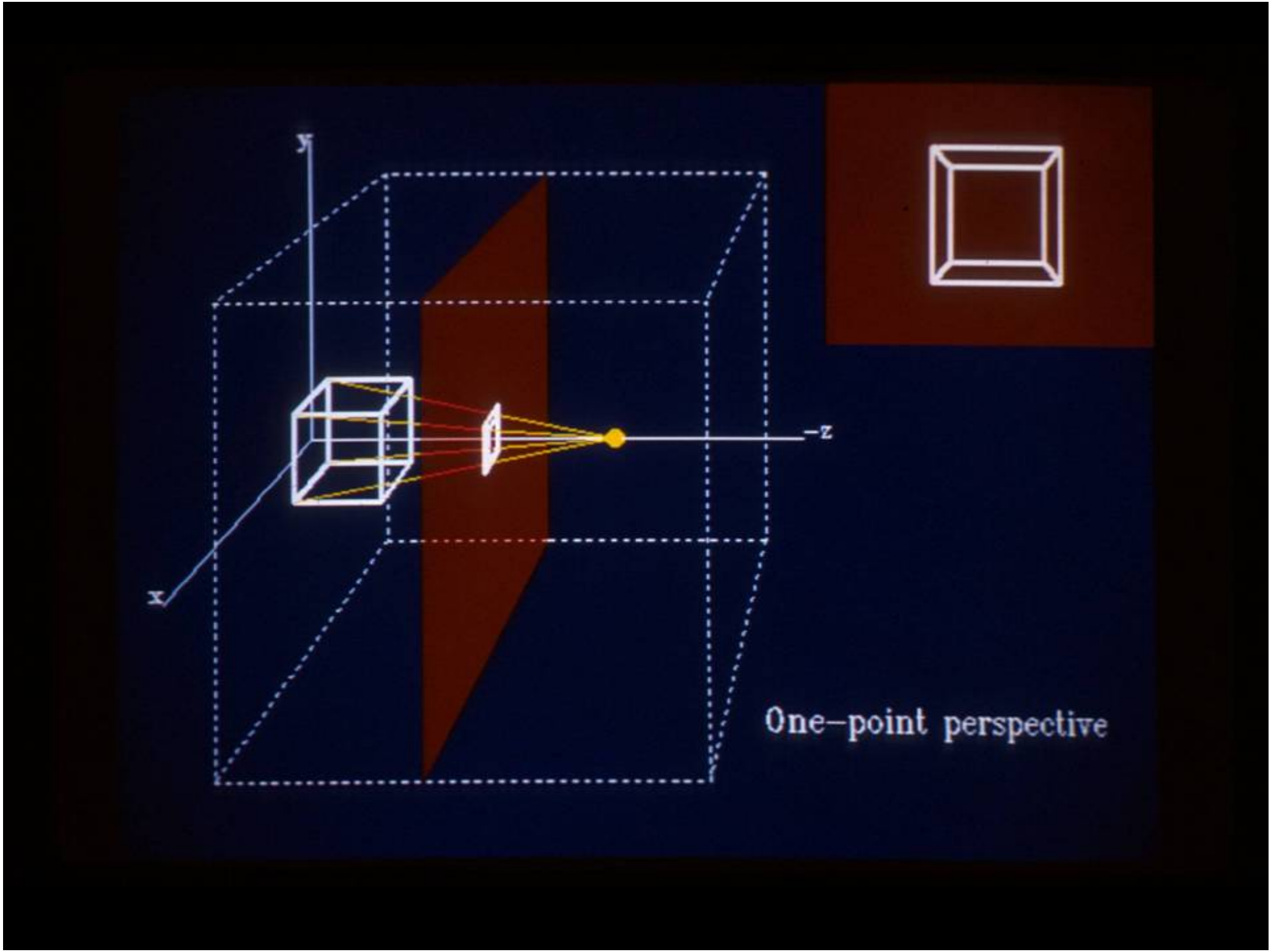

y
-z
x
An oblique projection

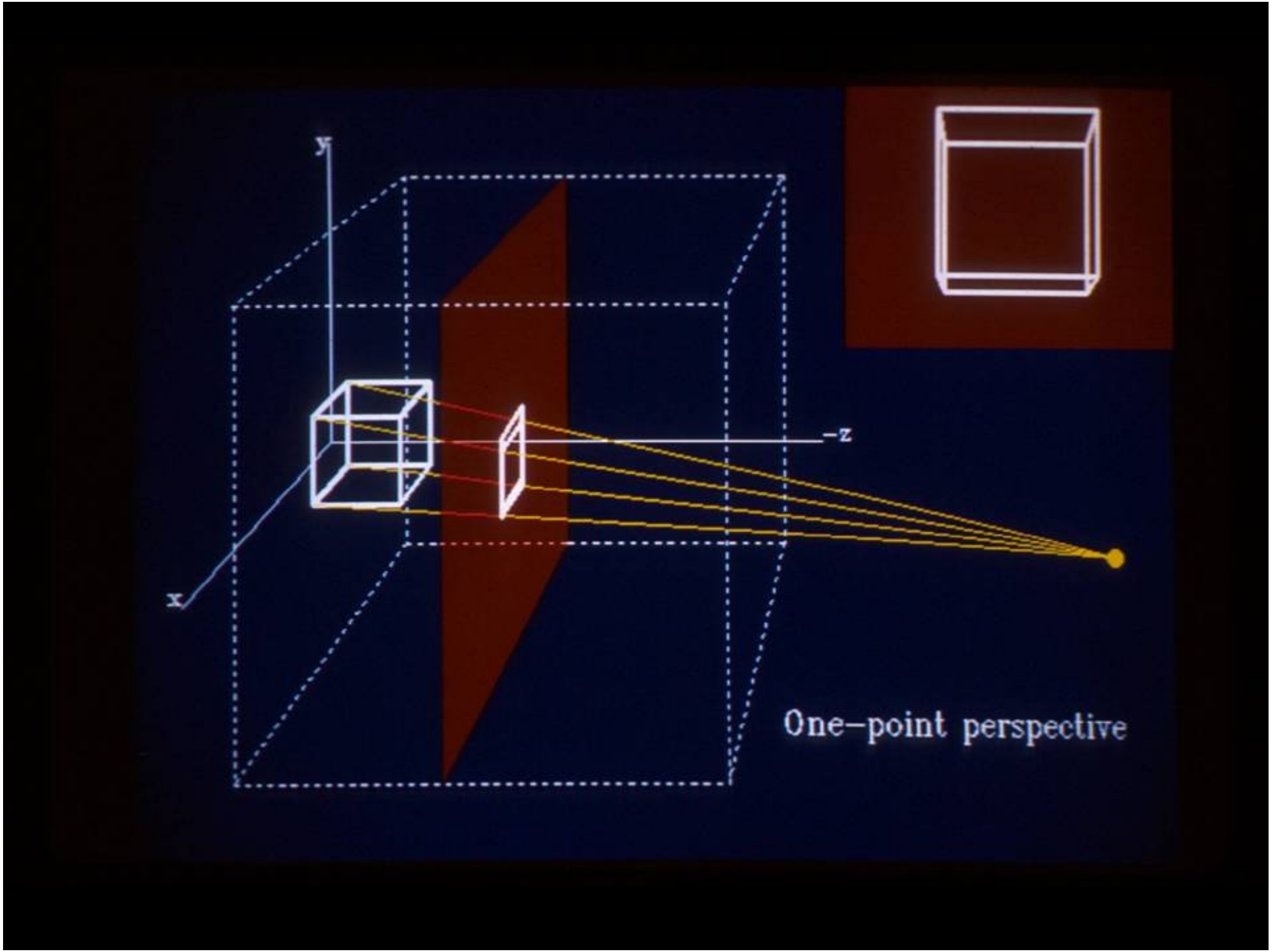


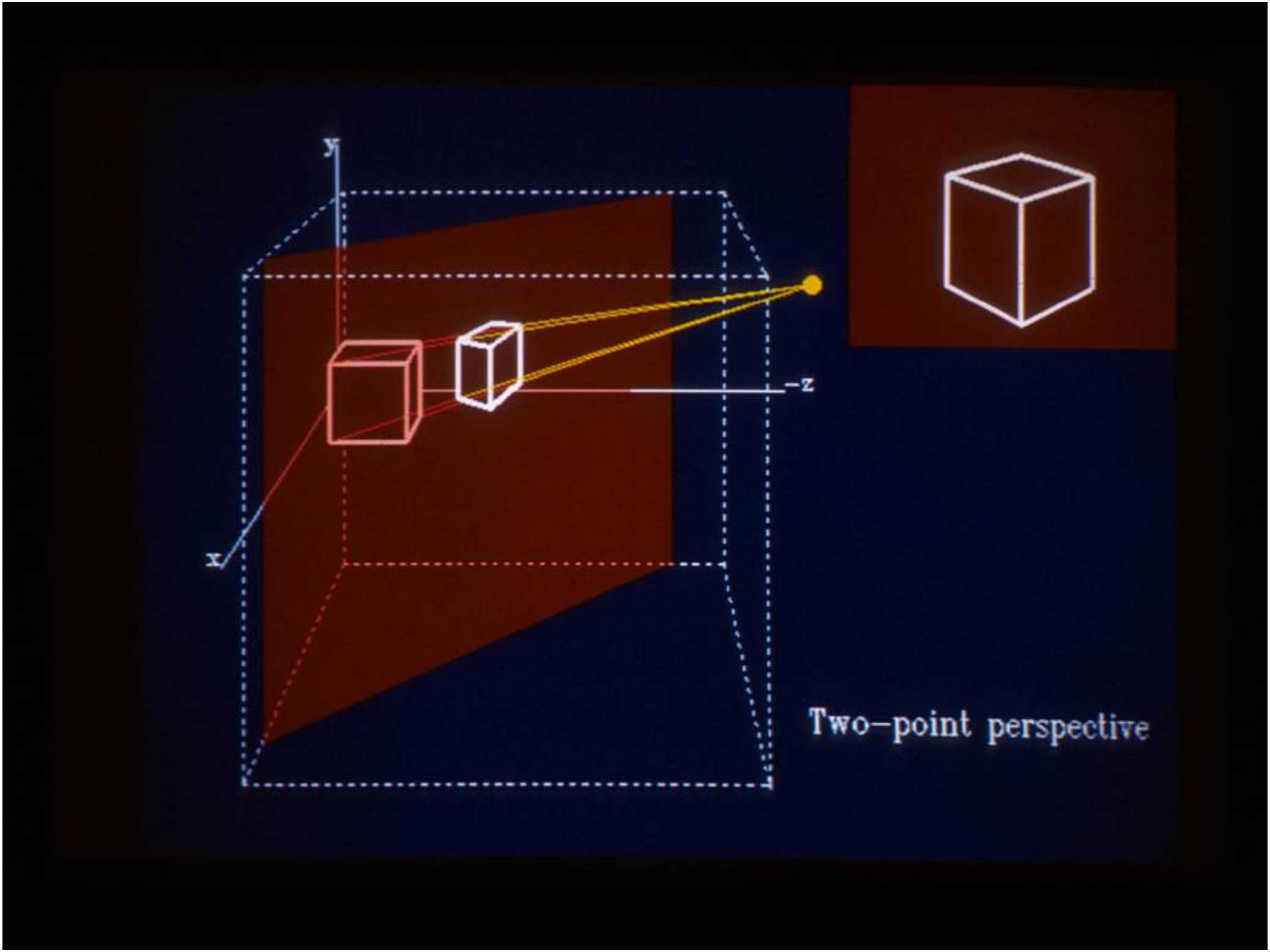
An isometric projection

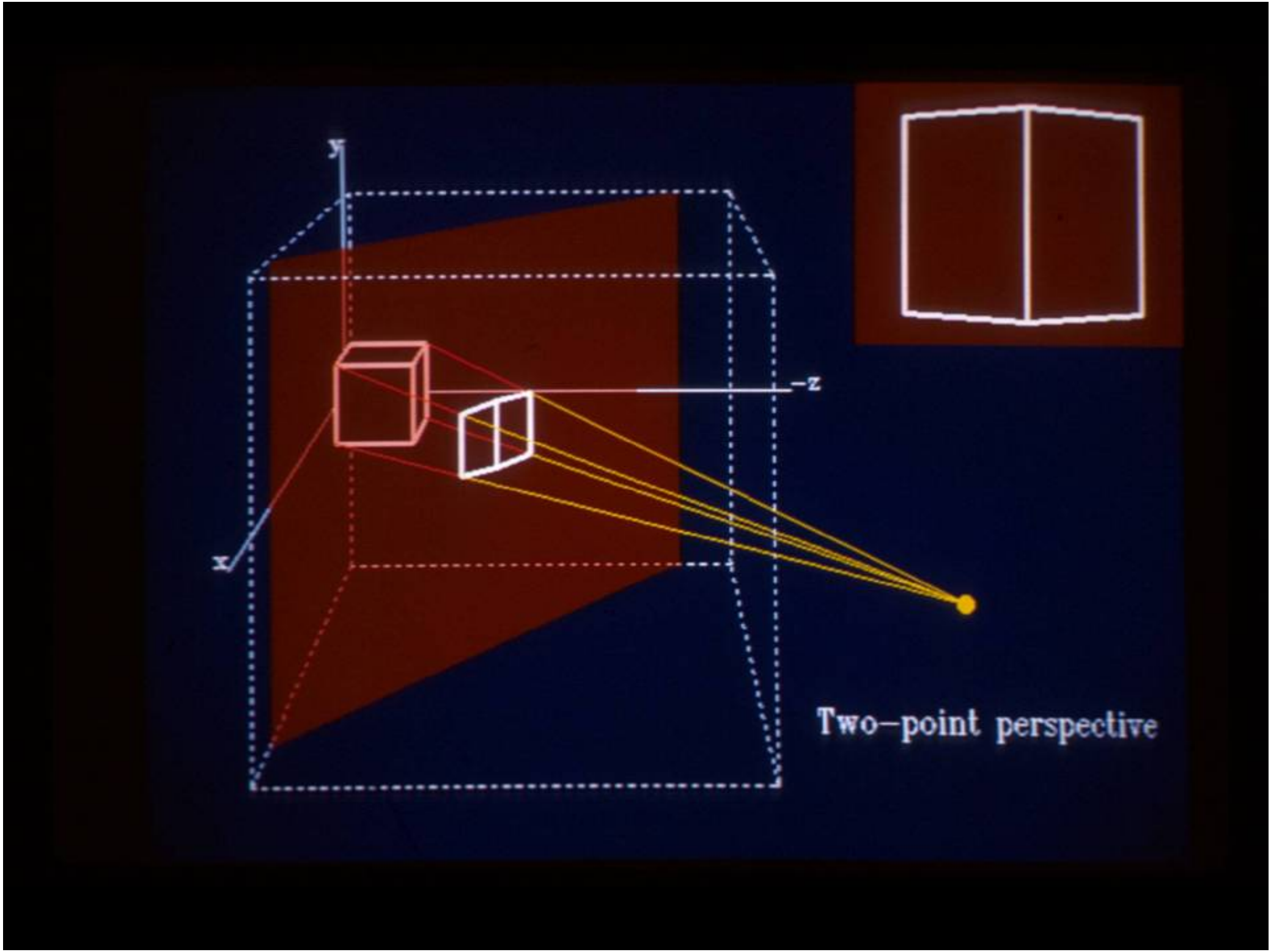

projection plane
projector
center of
projection
object
projection
projector
Perspective projection

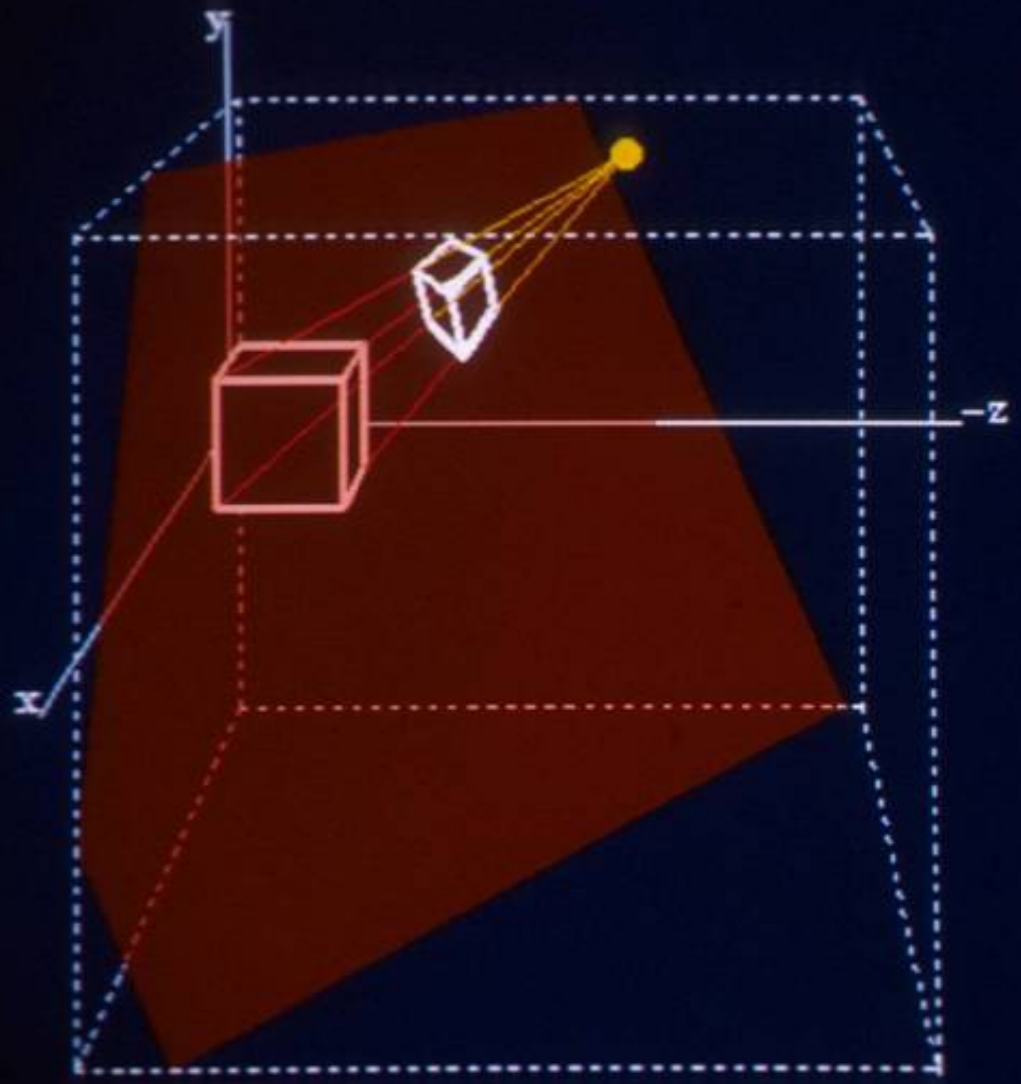

y
x
z
One-point perspective

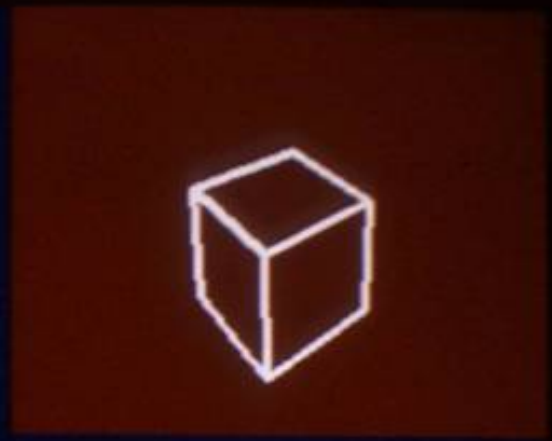

y
x
-z
One-point perspective


y
-z
x
One-point perspective

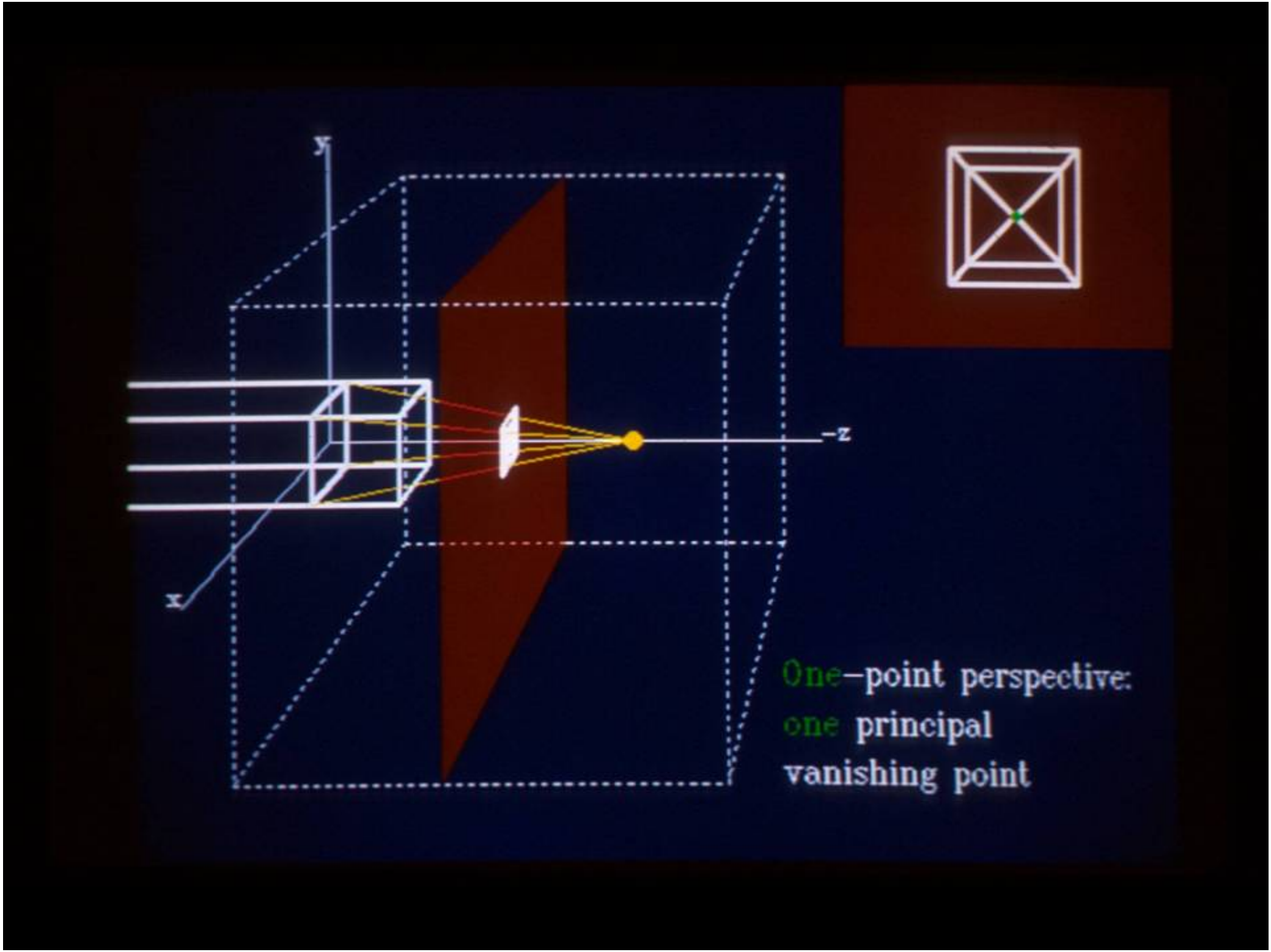

y
x
-z
Two-point perspective

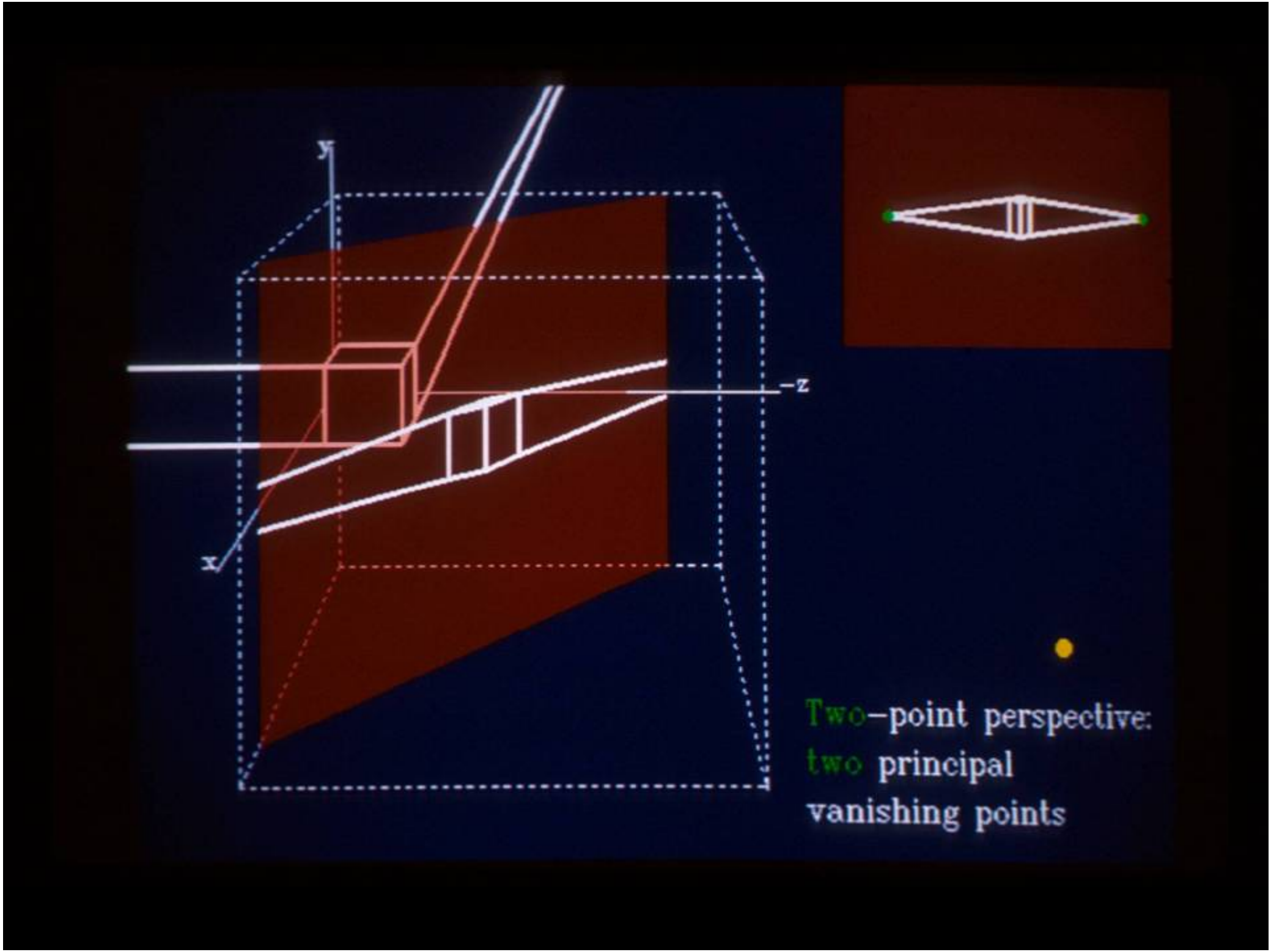

y
x
z
Two-point perspective

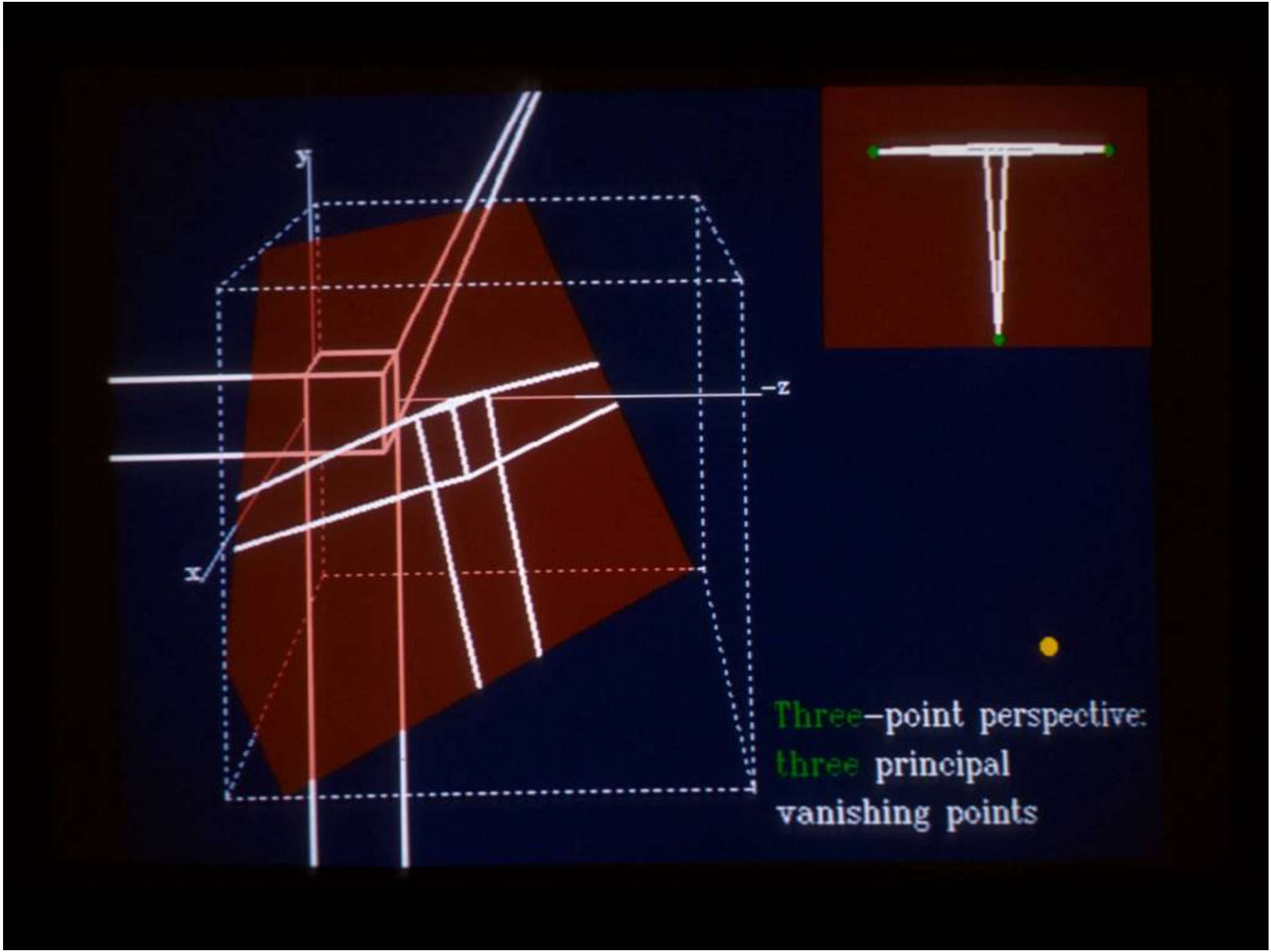


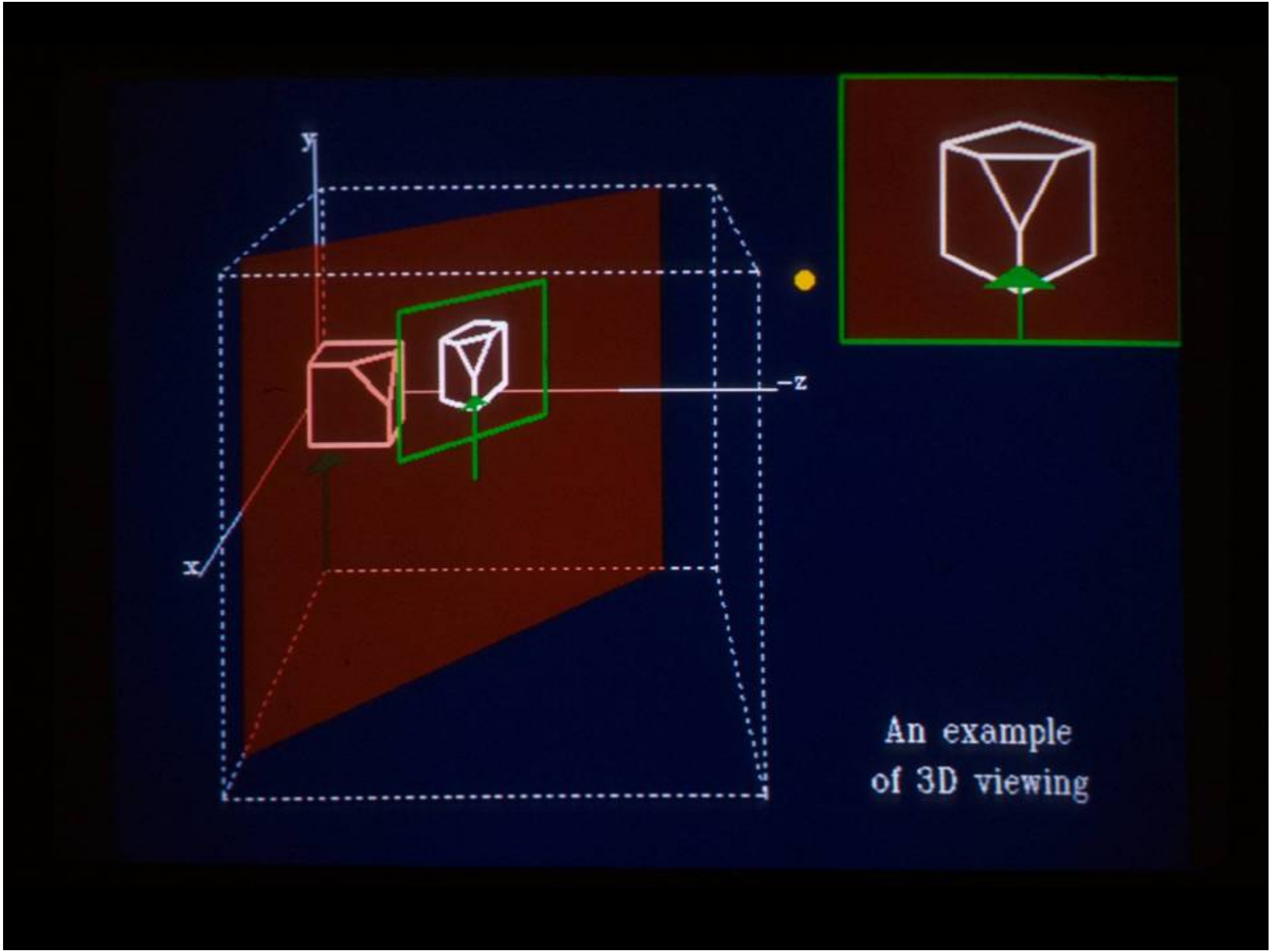


Three-point
perspective


y
x
-z
One-point perspective:
one principal
vanishing point

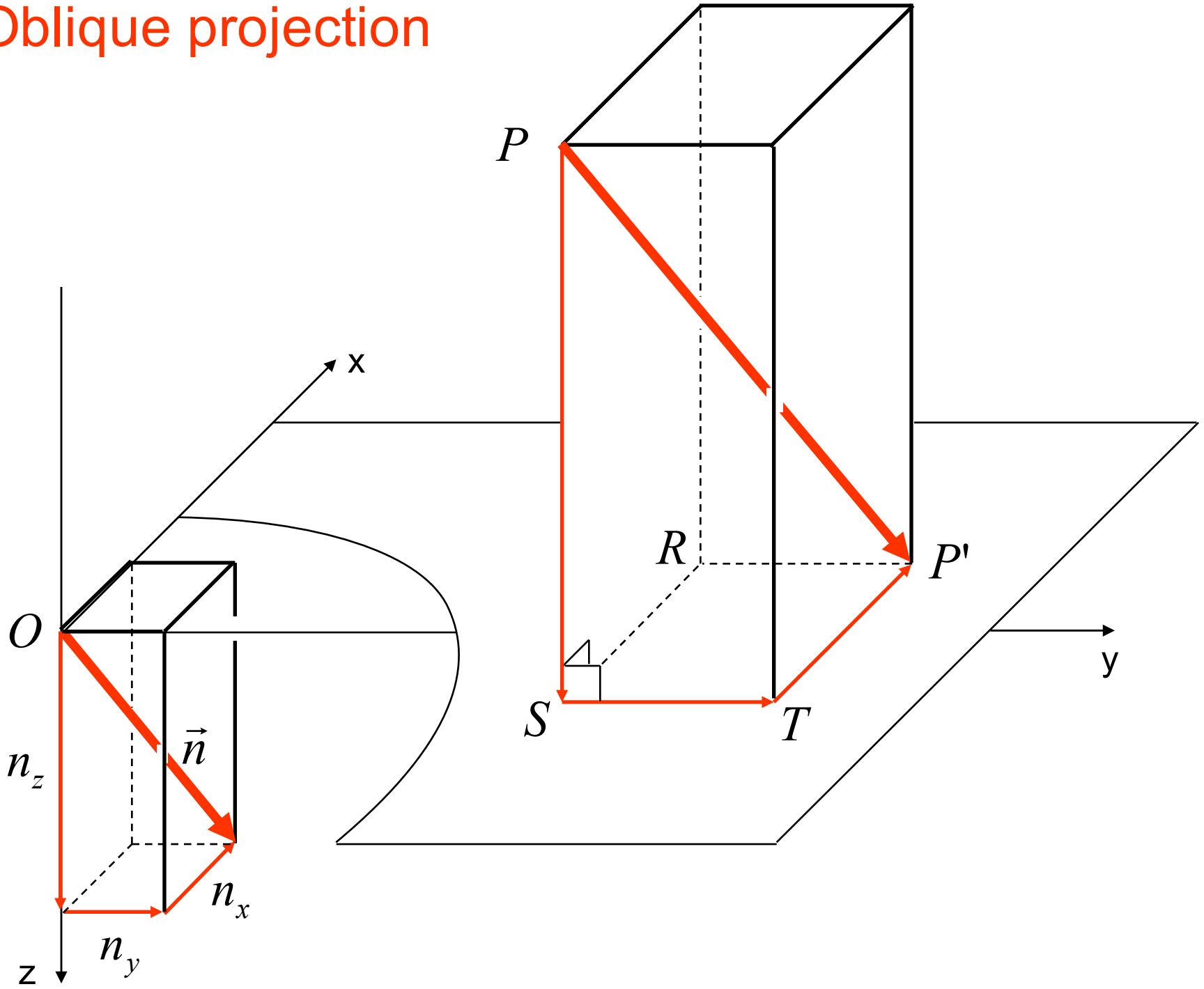

y
x
-z
Two-point perspective:
two principal
vanishing points


y
z
x
Three–point perspective:
three principal
vanishing points

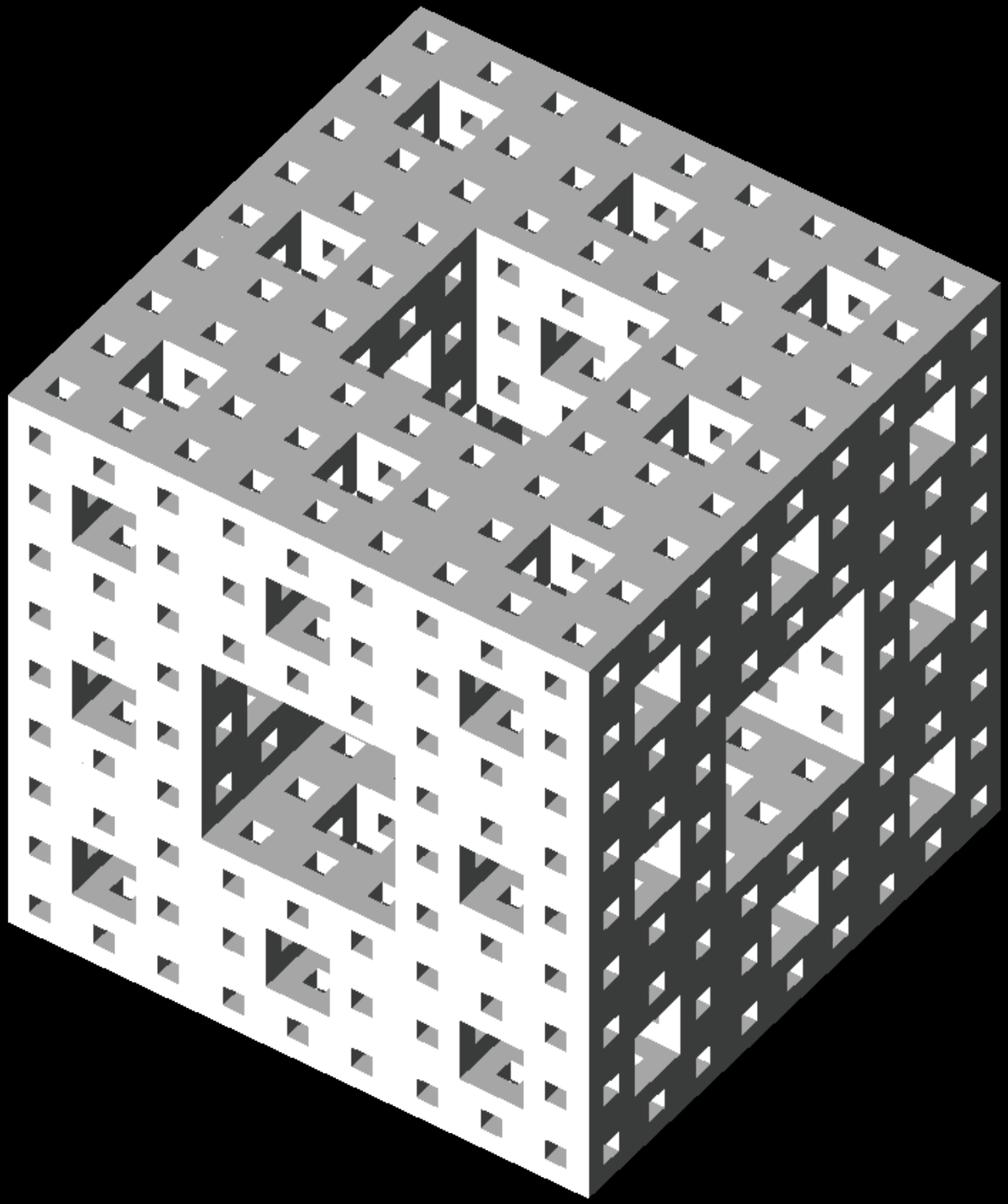

y
x
z
An example
of 3D viewing

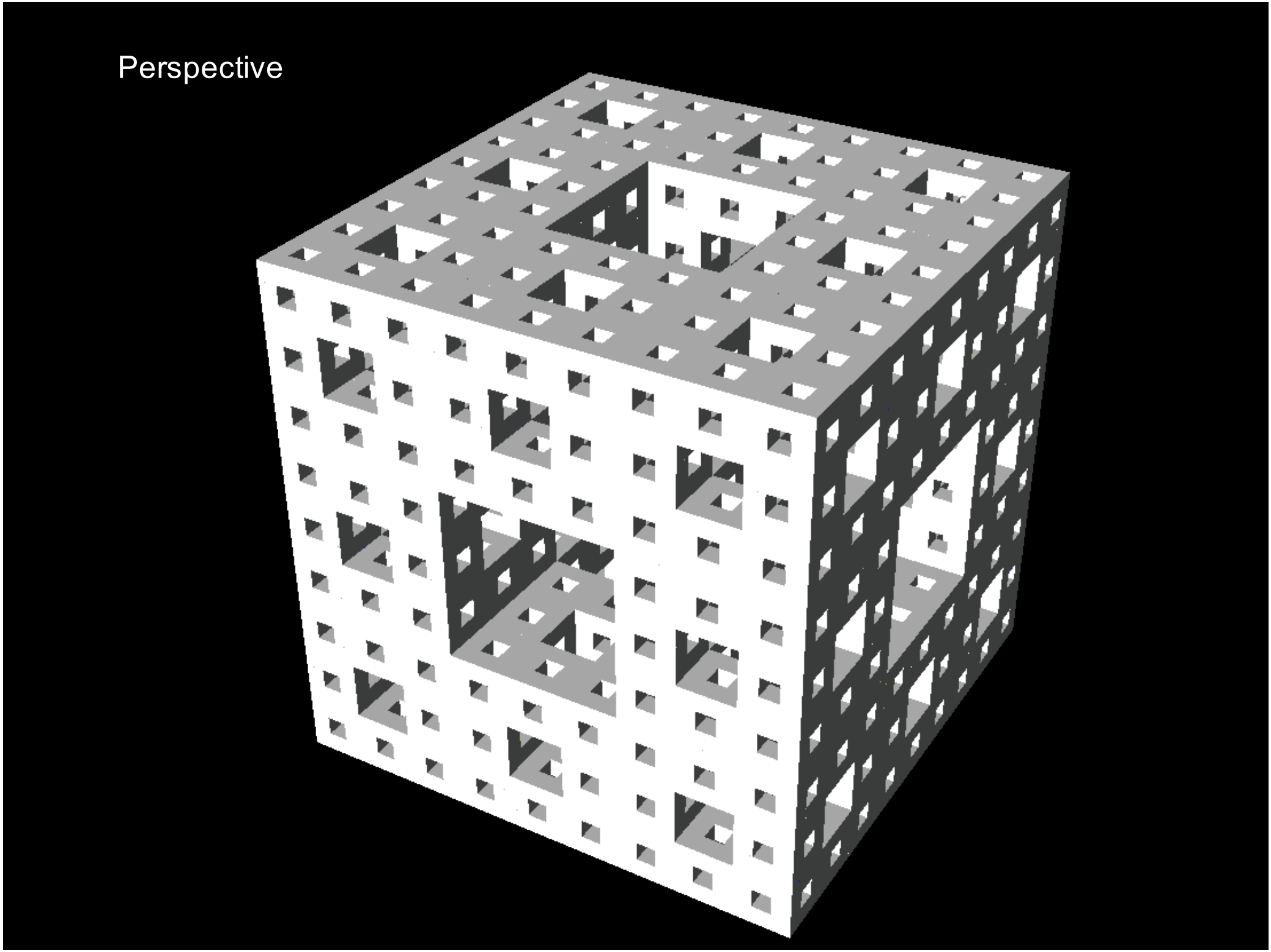
Orthographic projection is very simple...

Oblique projection

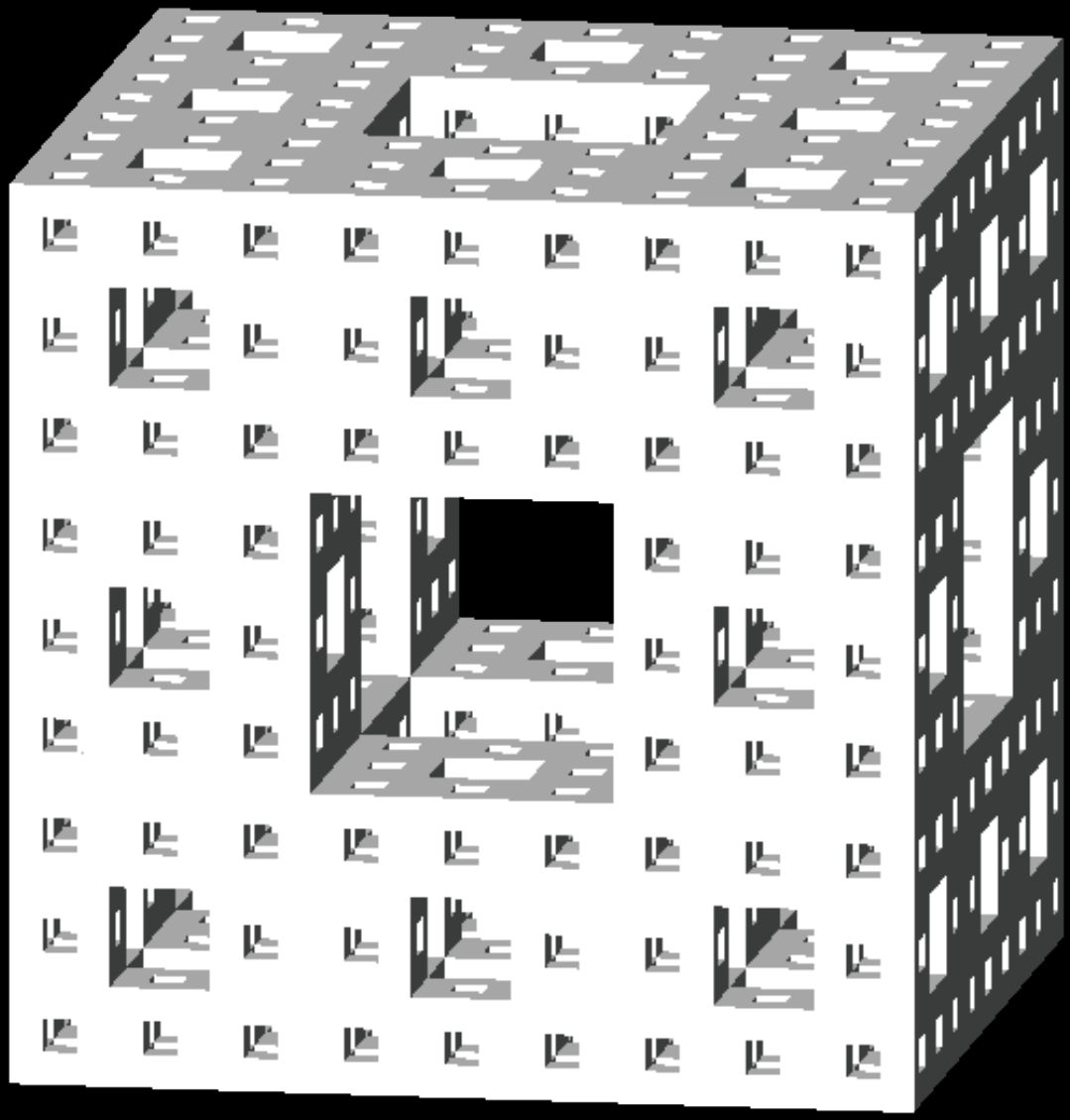


Parallel

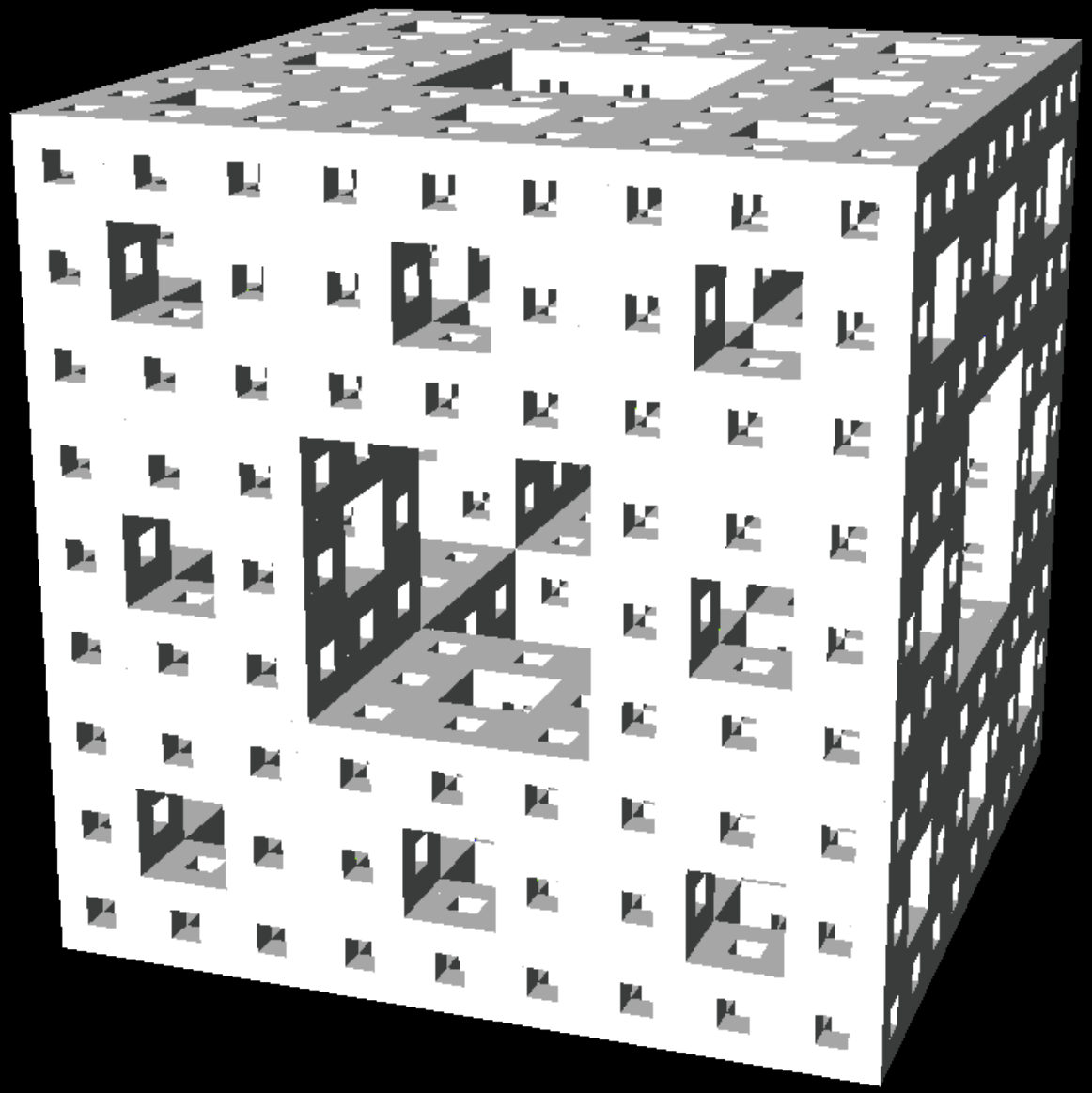



Perspective

Parallel



Perspective

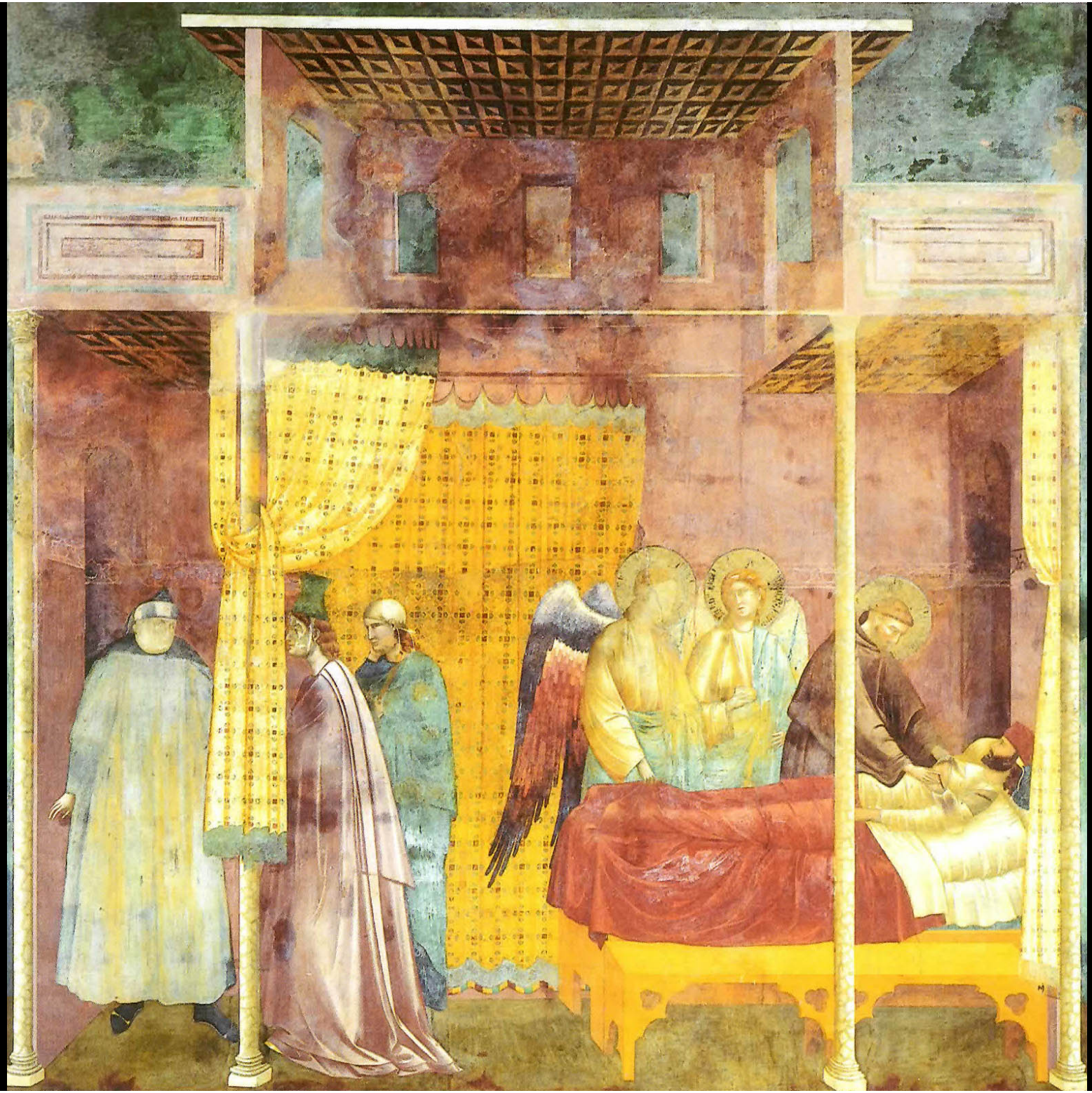


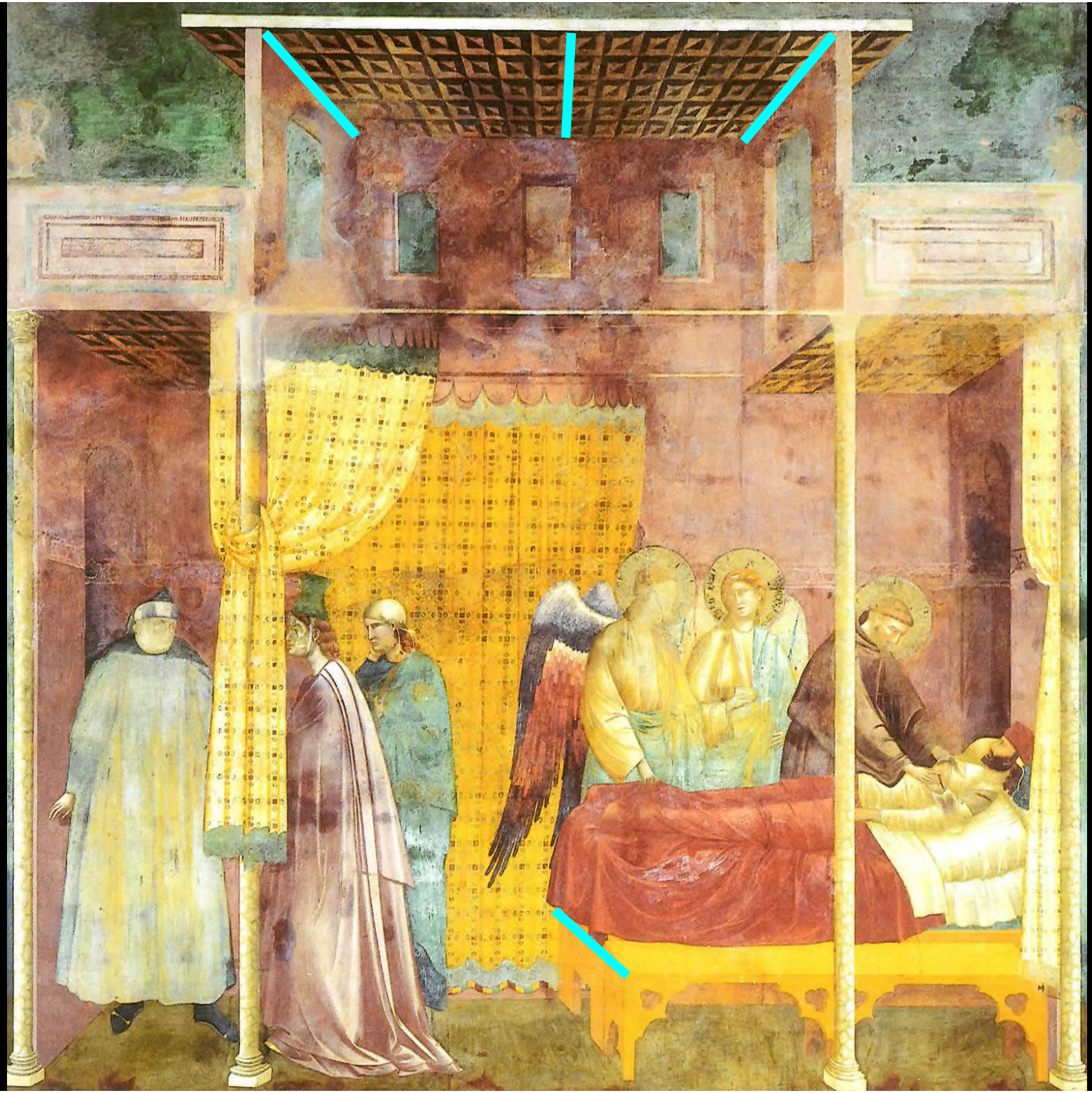
BRUNO DOZZINI

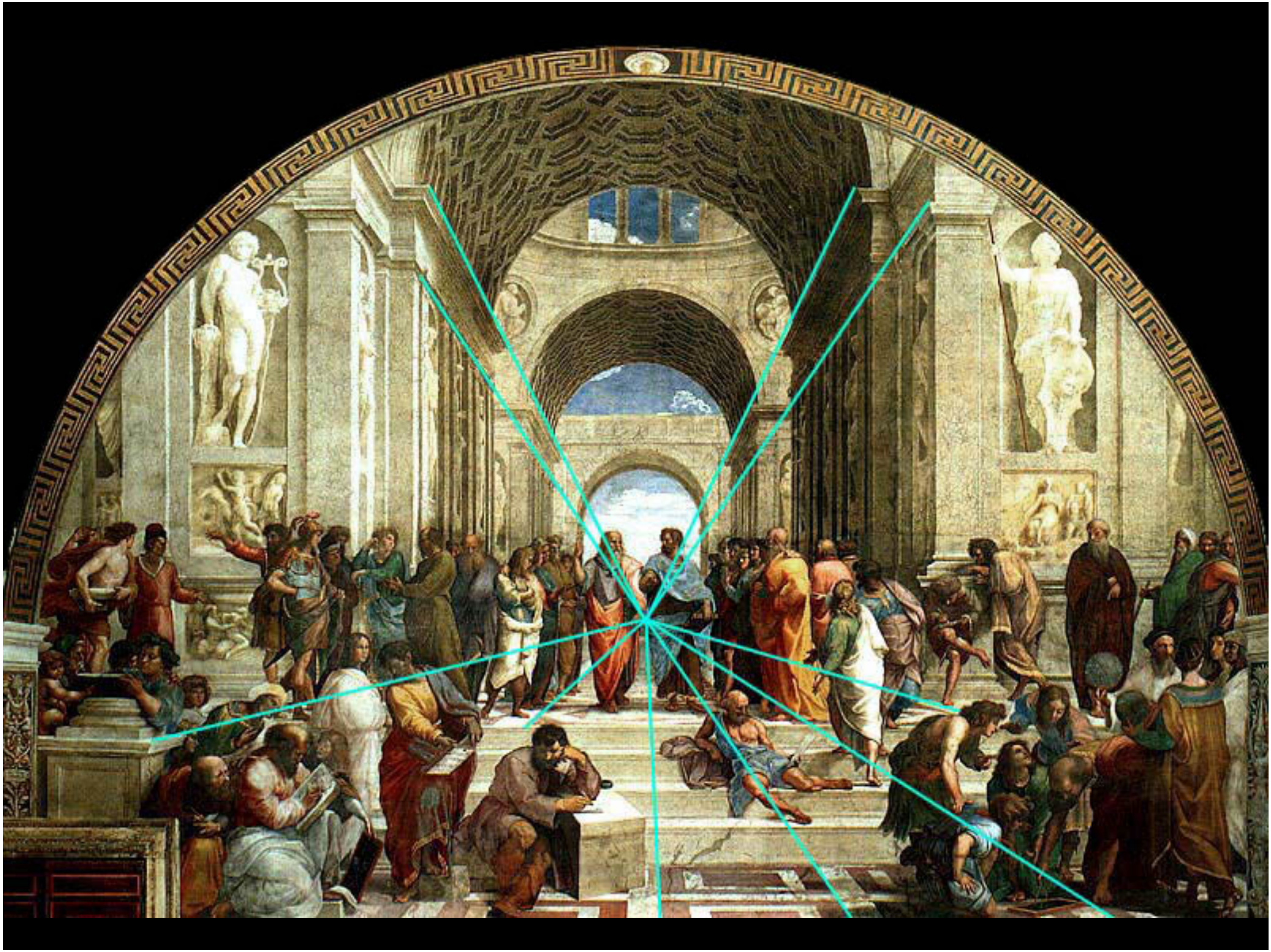
GIOTTO

THE «LEGEND OF ST. FRANCIS» IN THE ASSISI BASILICA

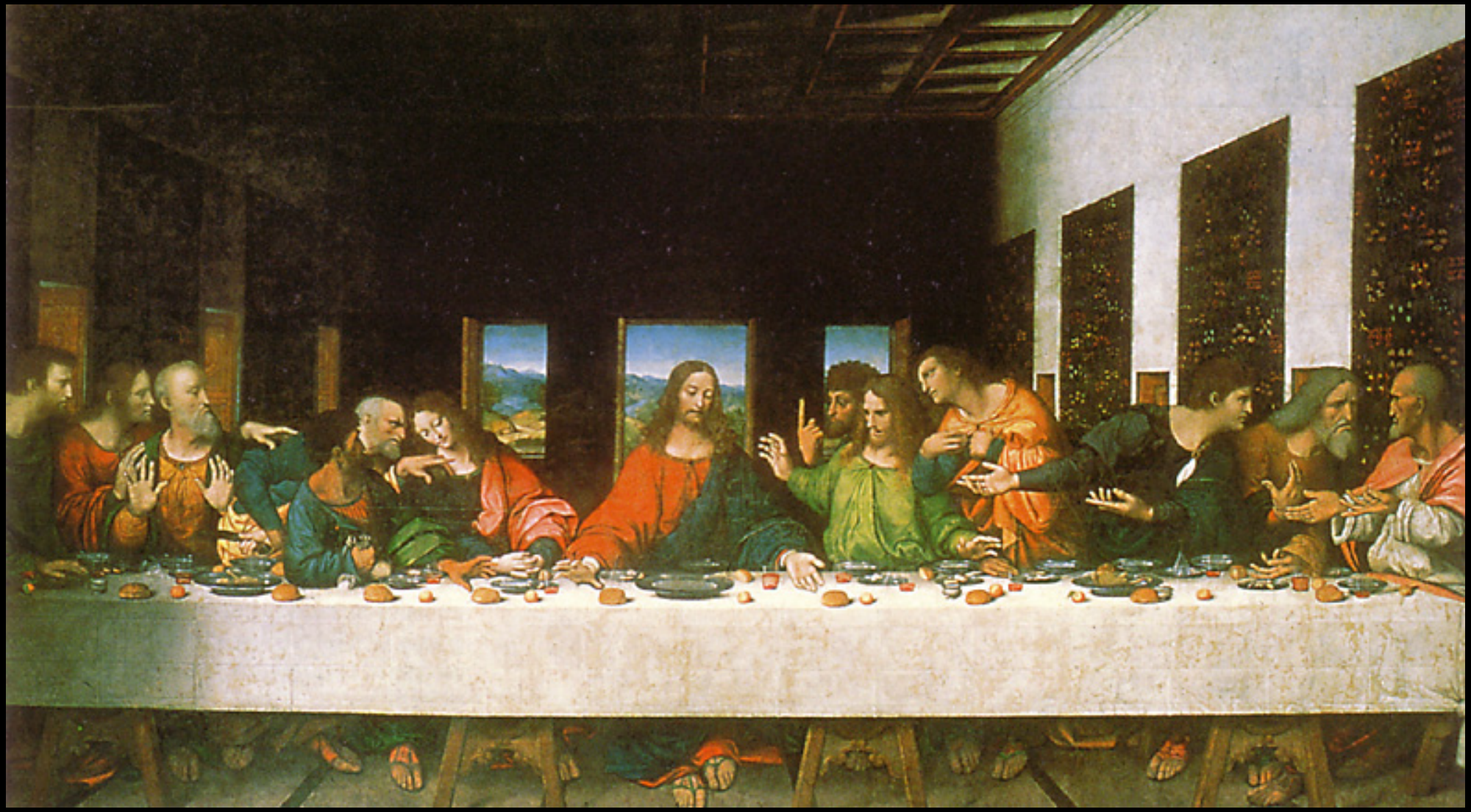
EDITRICE MINERVA
ASSISI







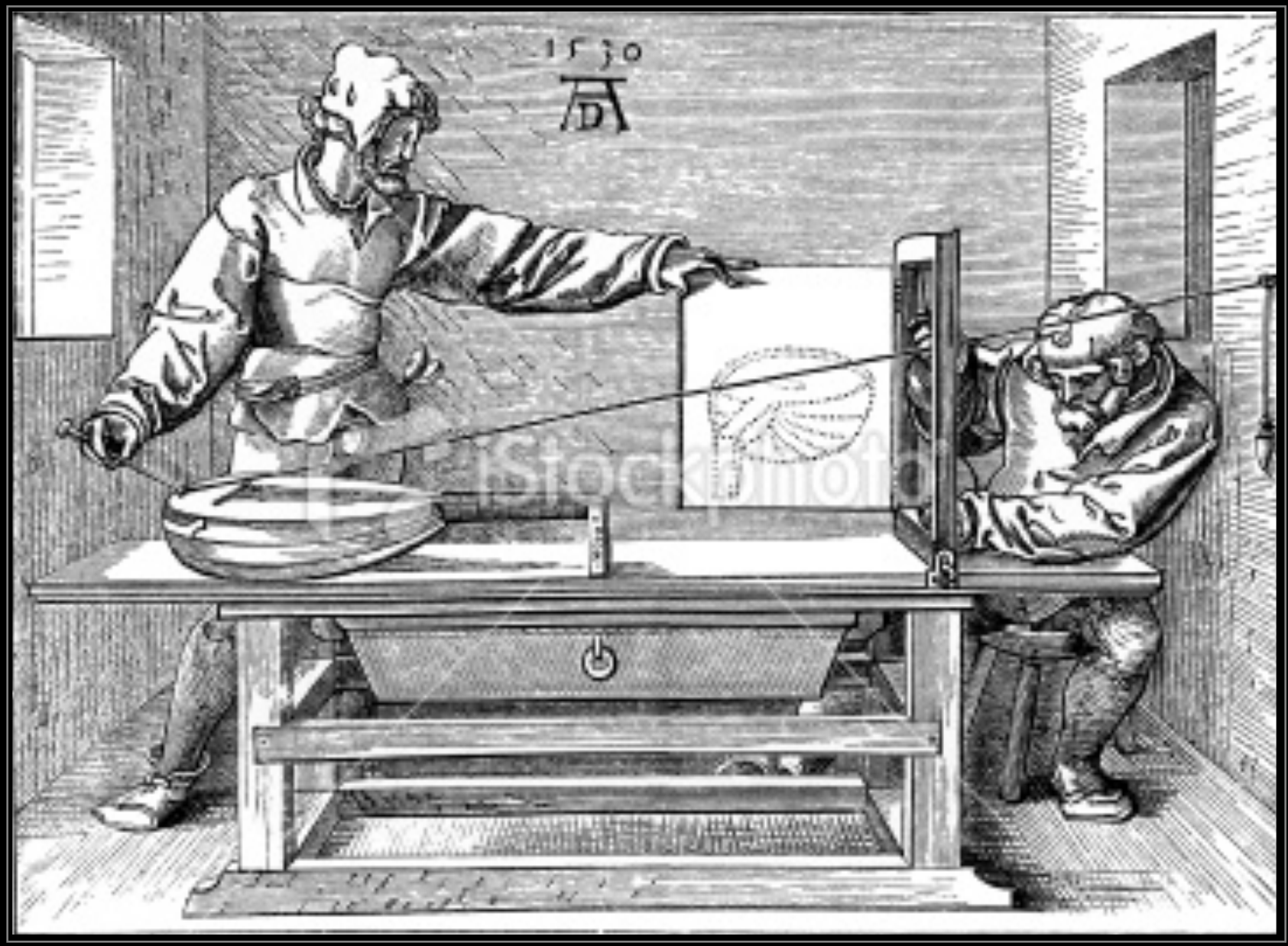
Geometric perspective



16th century copy of Leonardo da Vinci's *The Last Supper (1498)*
Convent of Santa Maria delle Grazie (Refectory), Milan

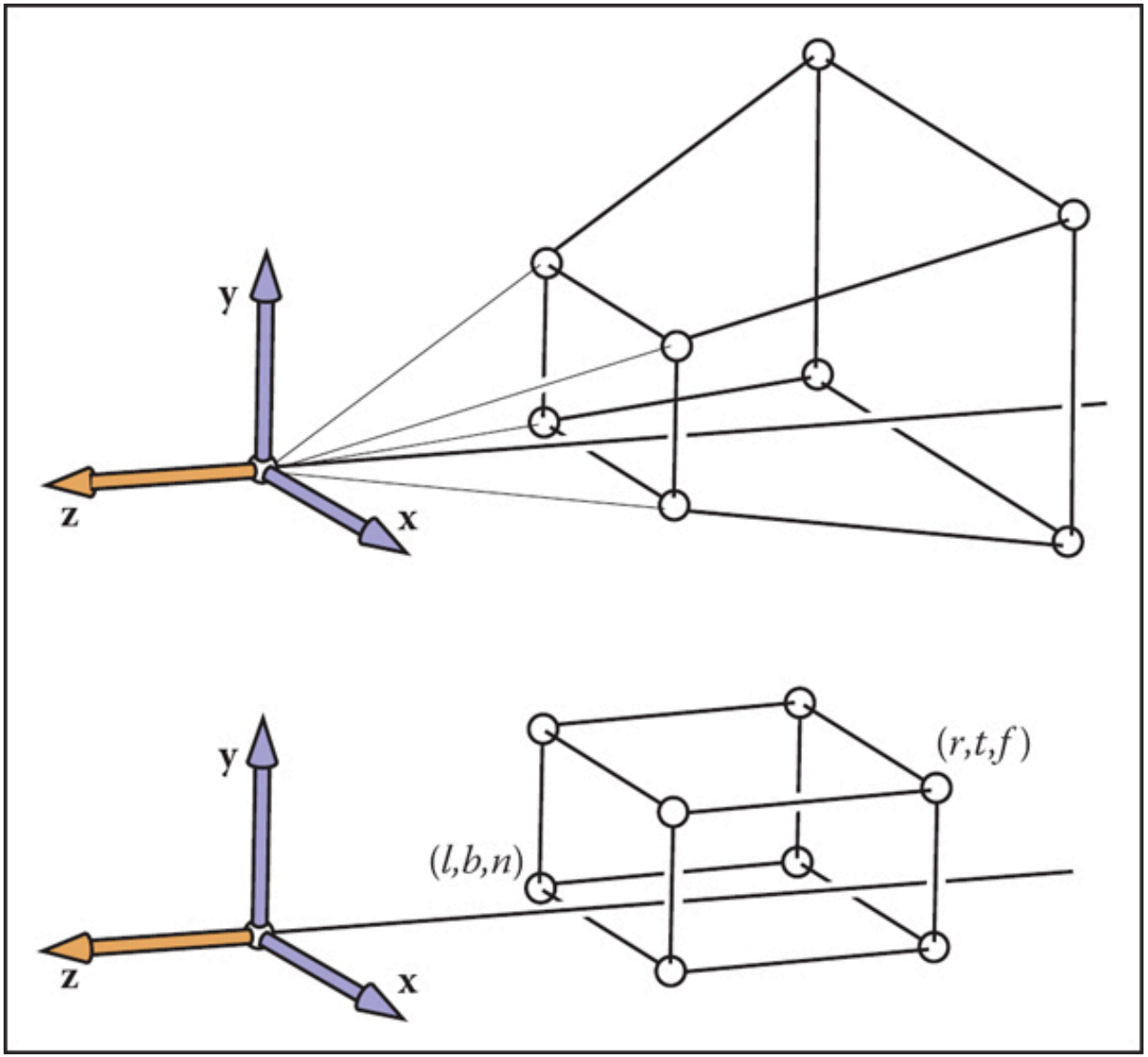
Geometric perspective

Christ Handing the Keys to St. Peter by Pietro Perugino (1481-82)
Fresco, 335 x 550 cm Cappella Sistina, Vatican

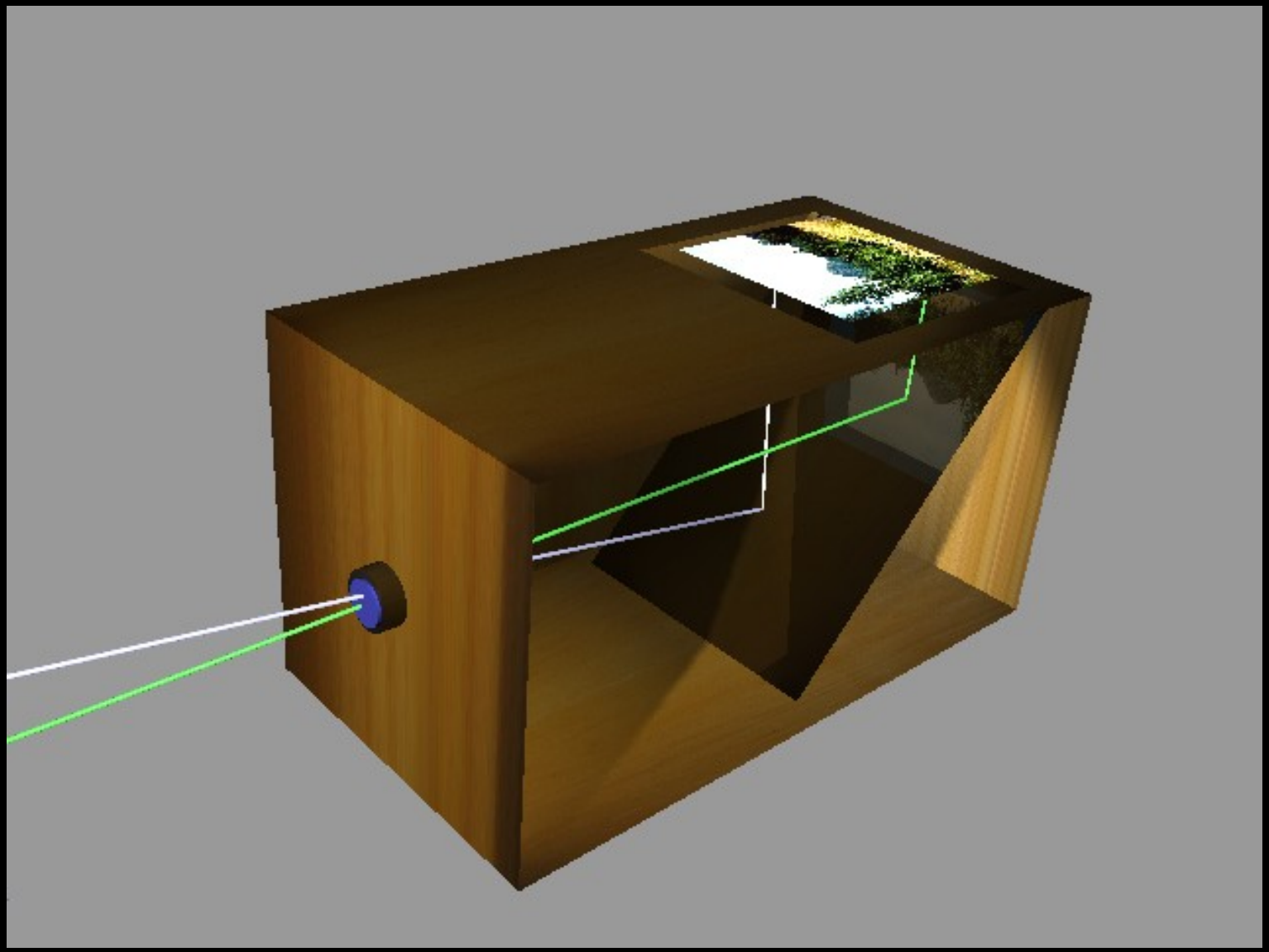


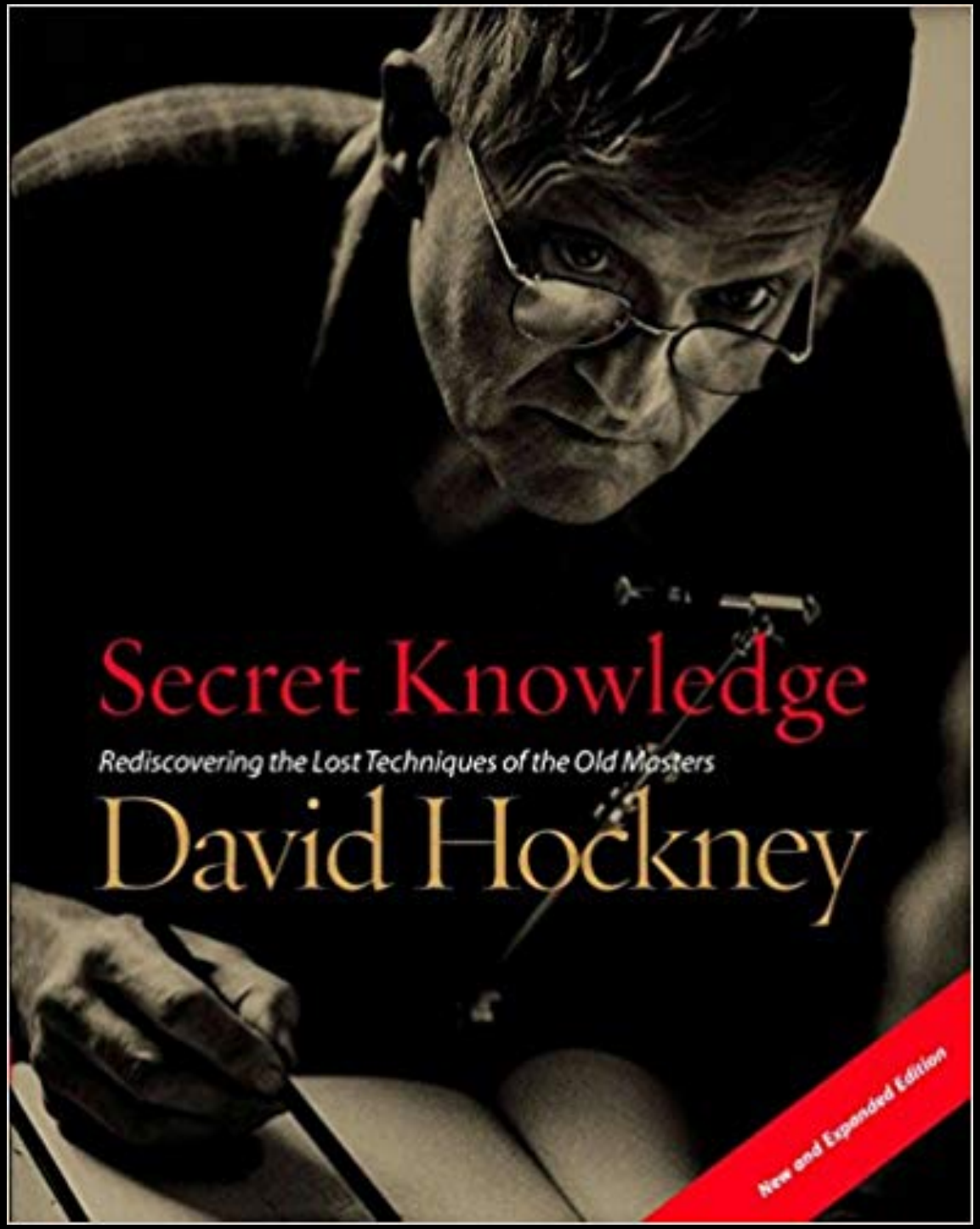
Albrecht Dürer: *The Painter's Manual,* 1525. Another perspective device.

Perspective transformation



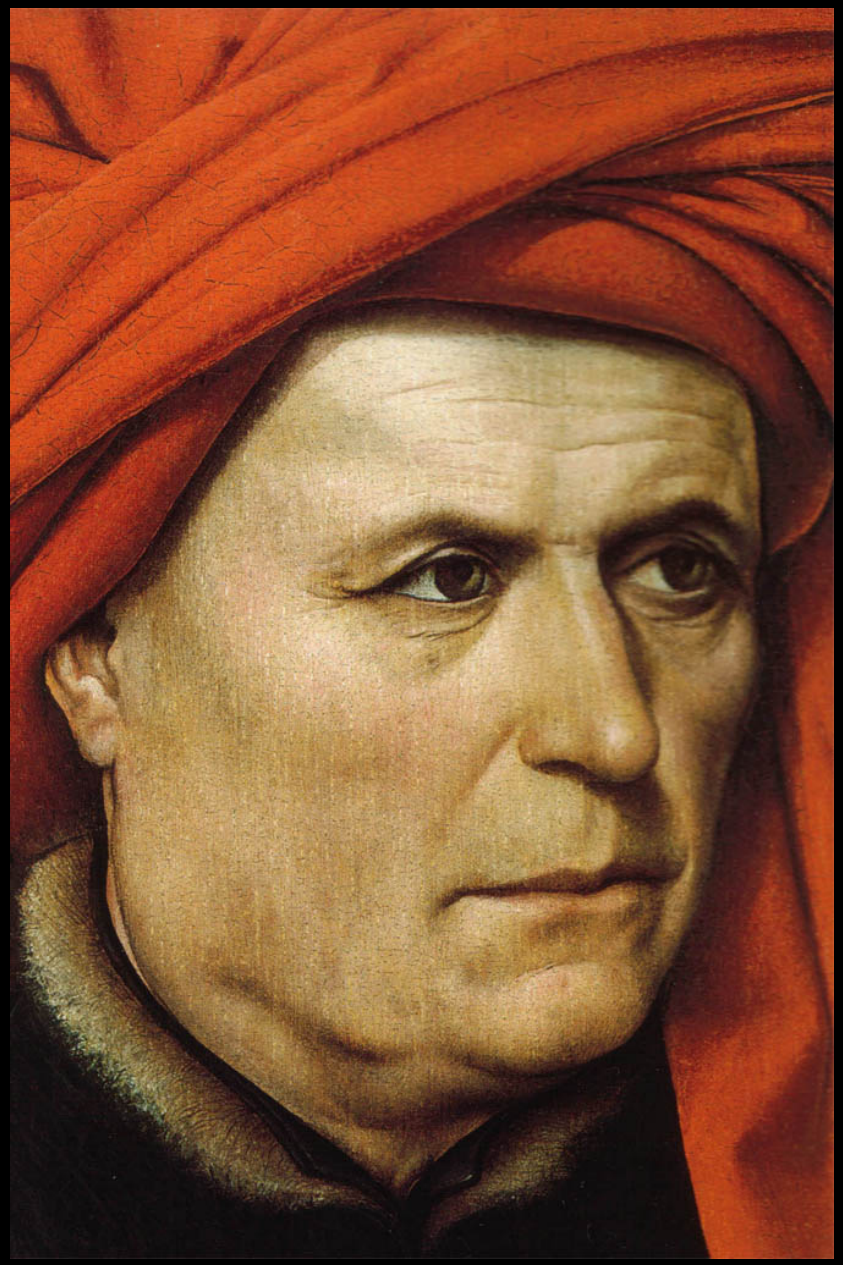
Camera obscura (Mo-Ti, China, 470-390 BC); Aristotle, Euclid (~350-300BC)




Secret Knowledge
Rediscovering the Lost Techniques of the Old Masters
David Hockney
New and Expanded Edition

Argument 1: sudden increase of realism (incl. shading) between 1425 and 1430

Masolino da Panicale 1425



Robert Campin 1430

Argument 2: geometry of textures

Masolino da Panicale
~1425

Antonio and Piero
del Pollaiuolo 1467-8

Agnolo Bronzino
1545

Argument 3: curved mirrors (and lenses) were known

Arnolfini Wedding
van Eyck 1434

Argument 4: precision and distortions

Hans Holbein *The Ambassadors* 1533

Argument 4: precision and distortions

Hans Holbein The Ambassadors 1533

Argument 4: precision and distortions

Hans Holbein *The Ambassadors* 1533

Argument 5: reflections and refractions

Frans Hals 1626-8

Argument 6: drawing speed

Still life, Cotan 1602

Another use of perspective:
Piazza del Popolo (Rome) : Bernini, 2nd half of 17th century

Another use of perspective:
Piazza del Popolo (Rome) : Bernini, 2nd half of 17th century

Non-linear perspective

See also:
http://people.csail.mit.edu/fredo/Depiction/15_Drawing/nonlinear.pdf