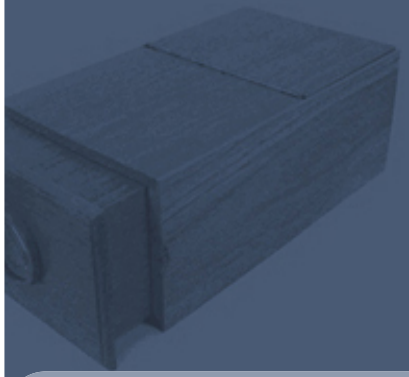


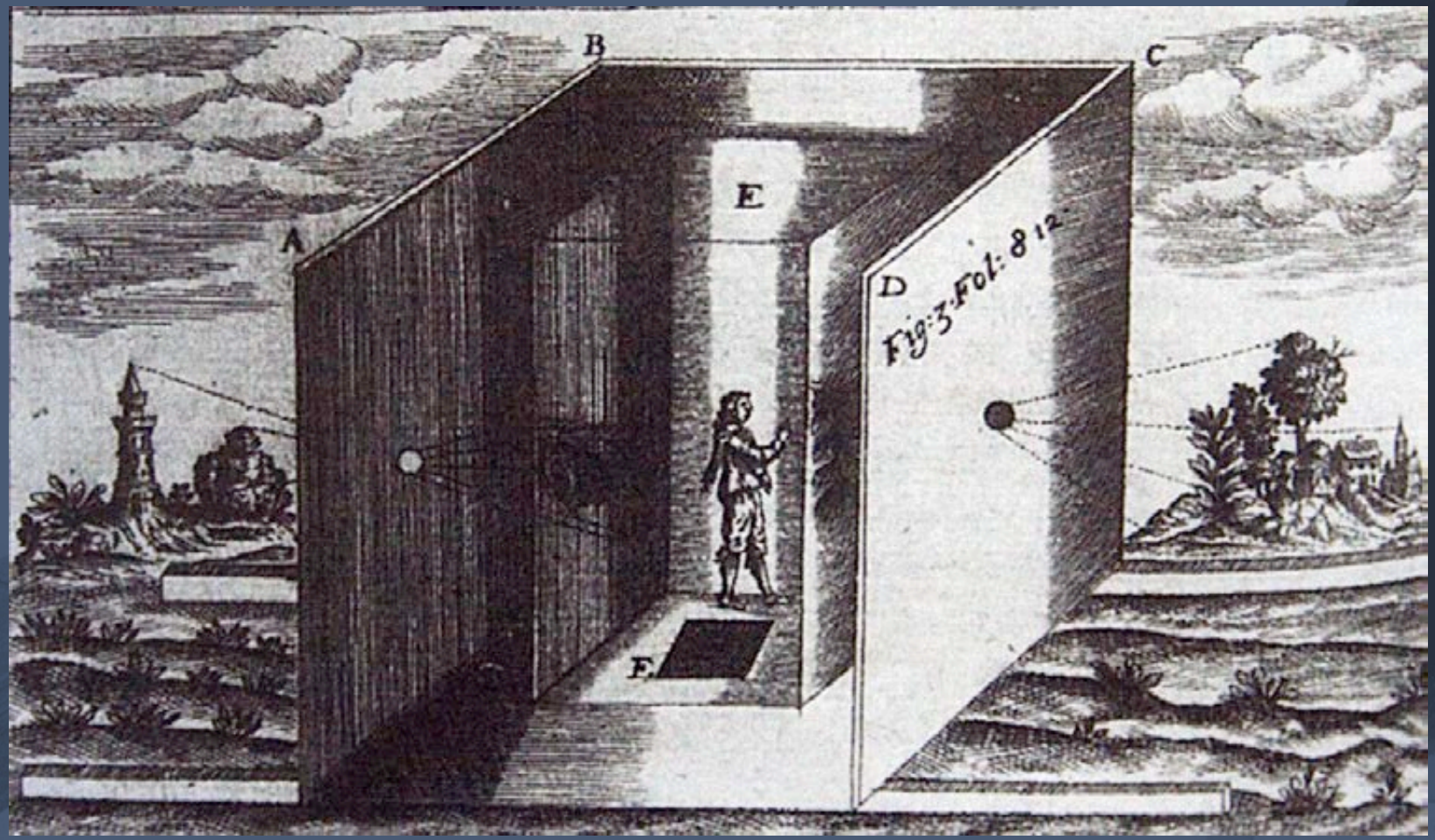
History of optical devices:

The camera obscura

Professor:
José Vicente Martín Martínez

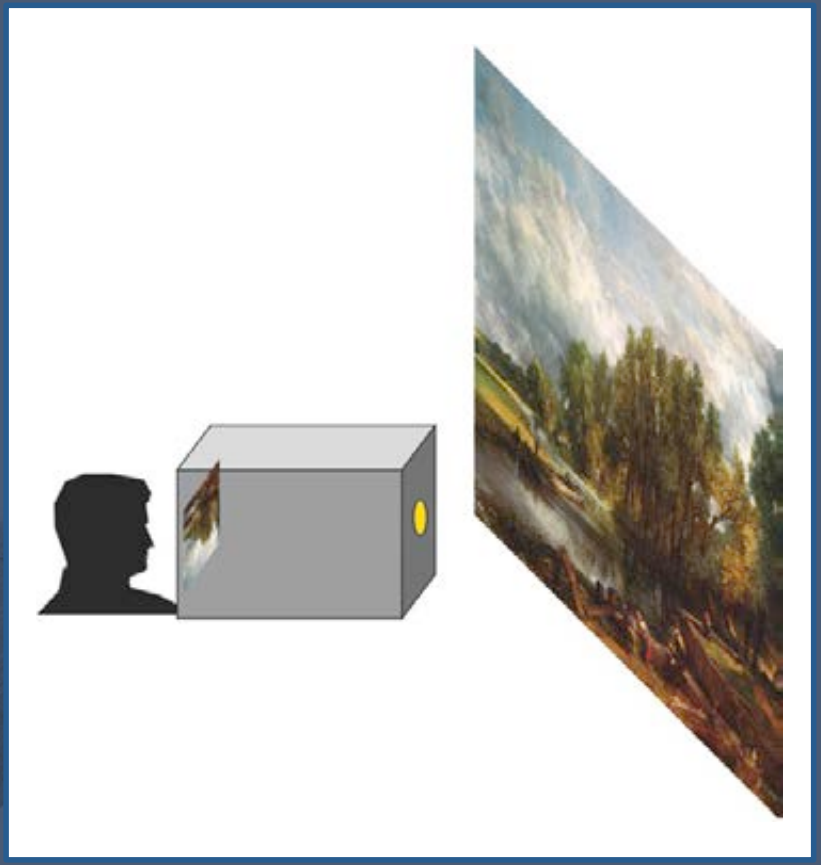
Universidad Miguel Hernández de Elche

Replica of a portable camera obscura

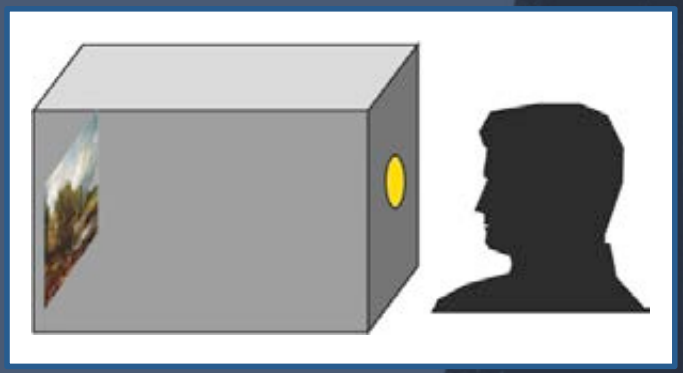


Athanasius Kirchner, *Camera obscura in Ars Magna Lvcis Et Vmbrae*, 1649.

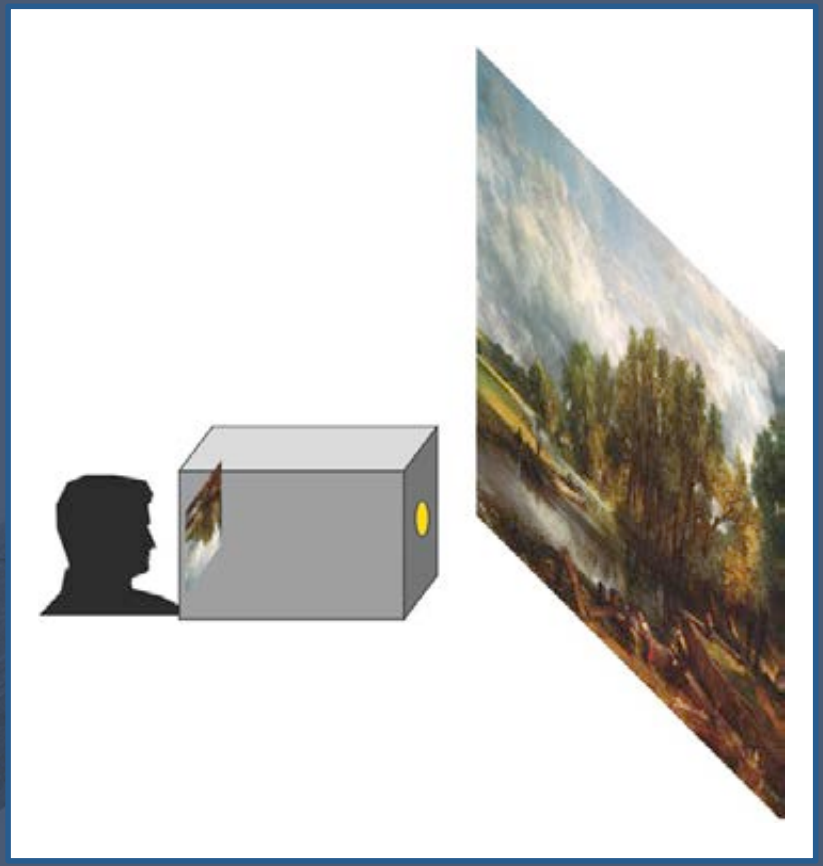
A. SUBJECT IN FRONT



B. IMAGE INSIDE

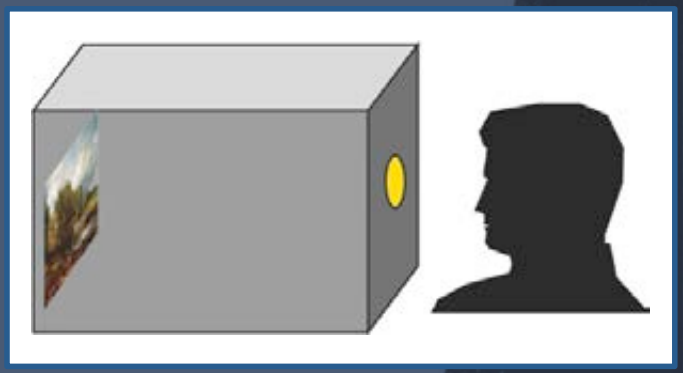


A. SUBJECT IN FRONT



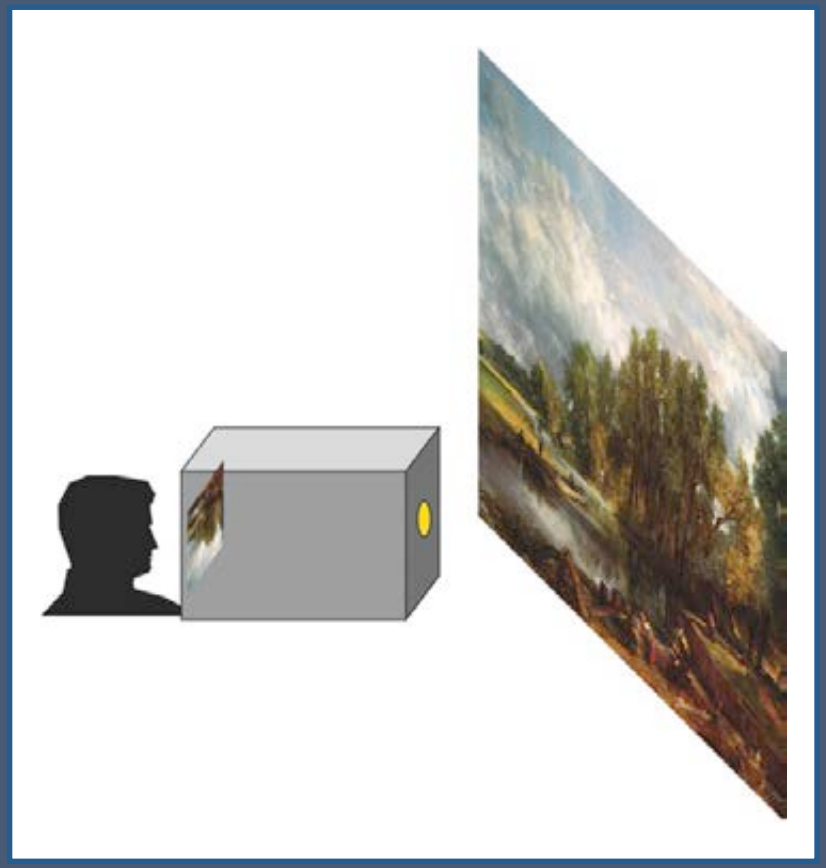
MACHINES OF REPRESENTATION

B. IMAGE INSIDE



MACHINES OF VISUALIZATION

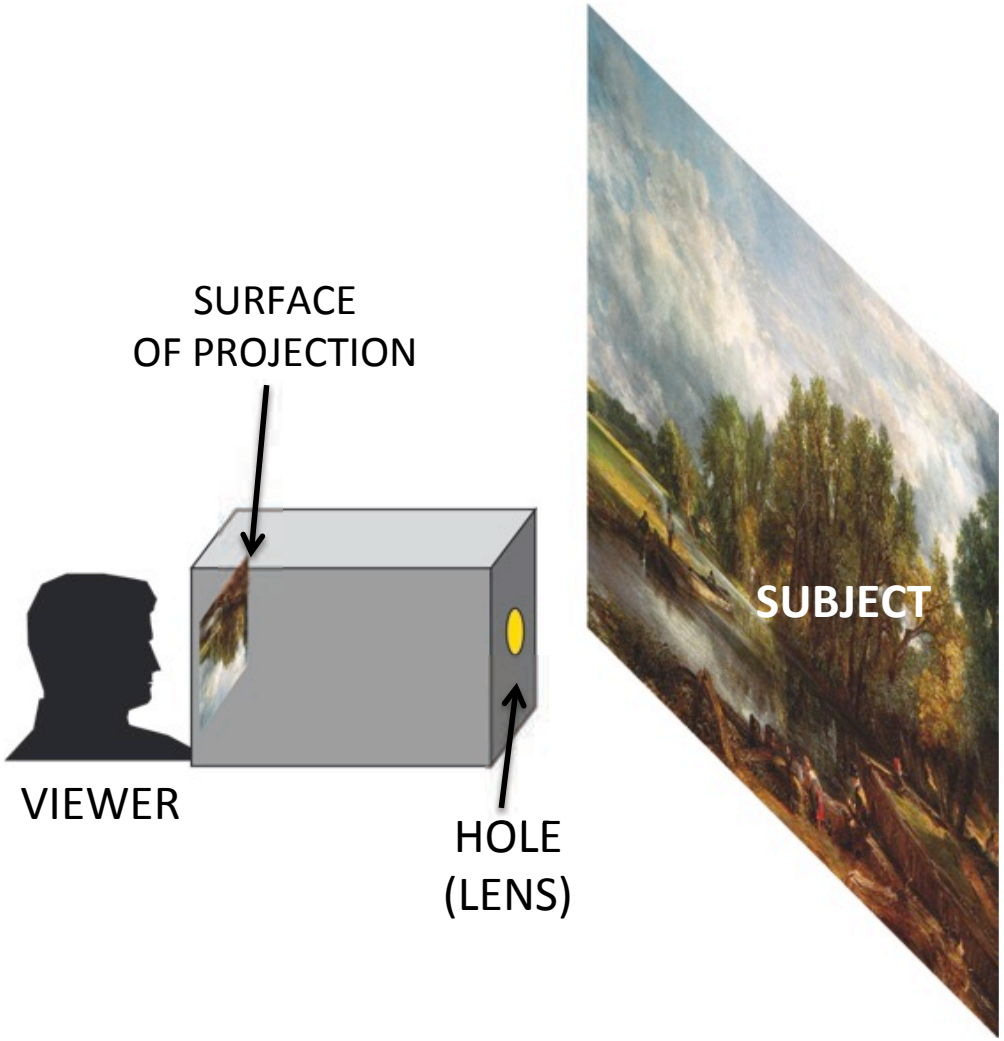
A. SUBJECT IN FRONT



BASED ON THIS STRUCTURE:

VIEWER **>** SURFACE OF PROJECTION **>**(OPTIONAL: 45º MIRROR) **>** HOLE (LENS) **>** SUBJECT

A. SUBJECT IN FRONT



A. SUBJECT IN FRONT

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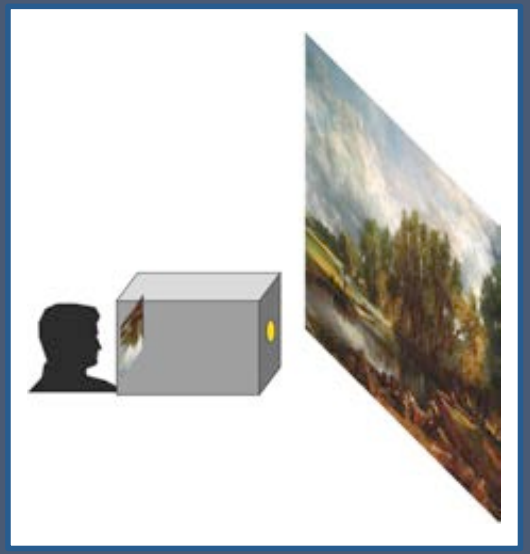
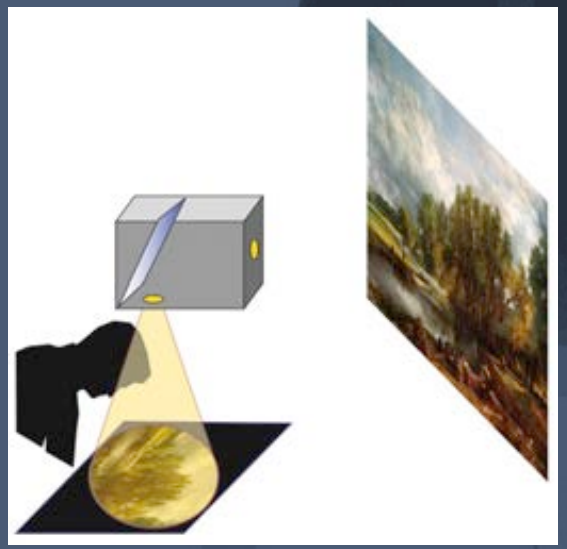


A1. IMAGE BEHIND

A2. IMAGE OVER



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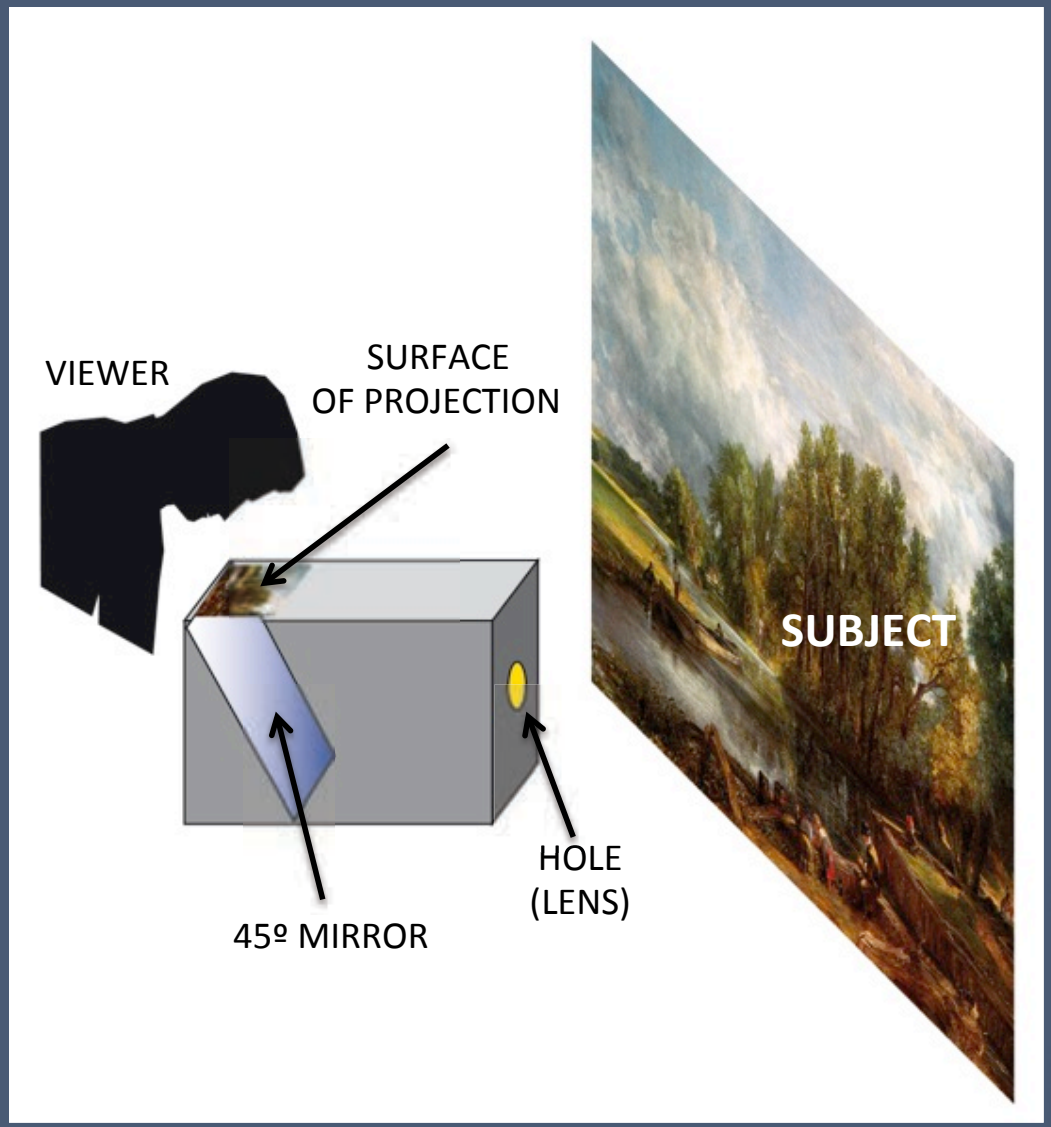

A. SUBJECT IN FRONT

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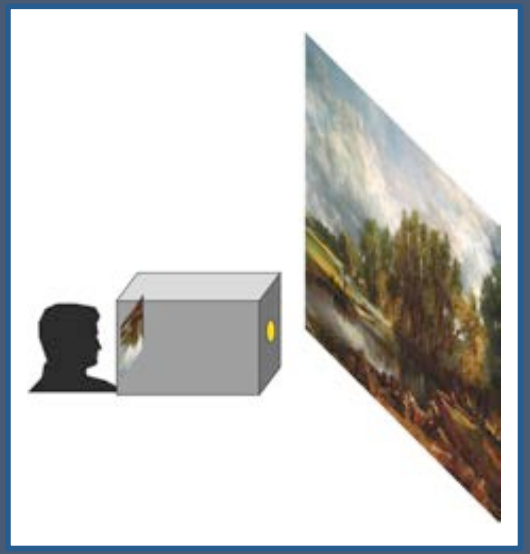

A1. IMAGE BEHIND

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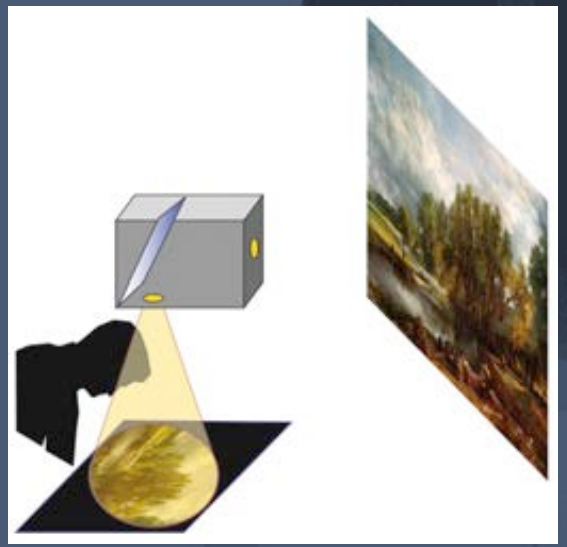

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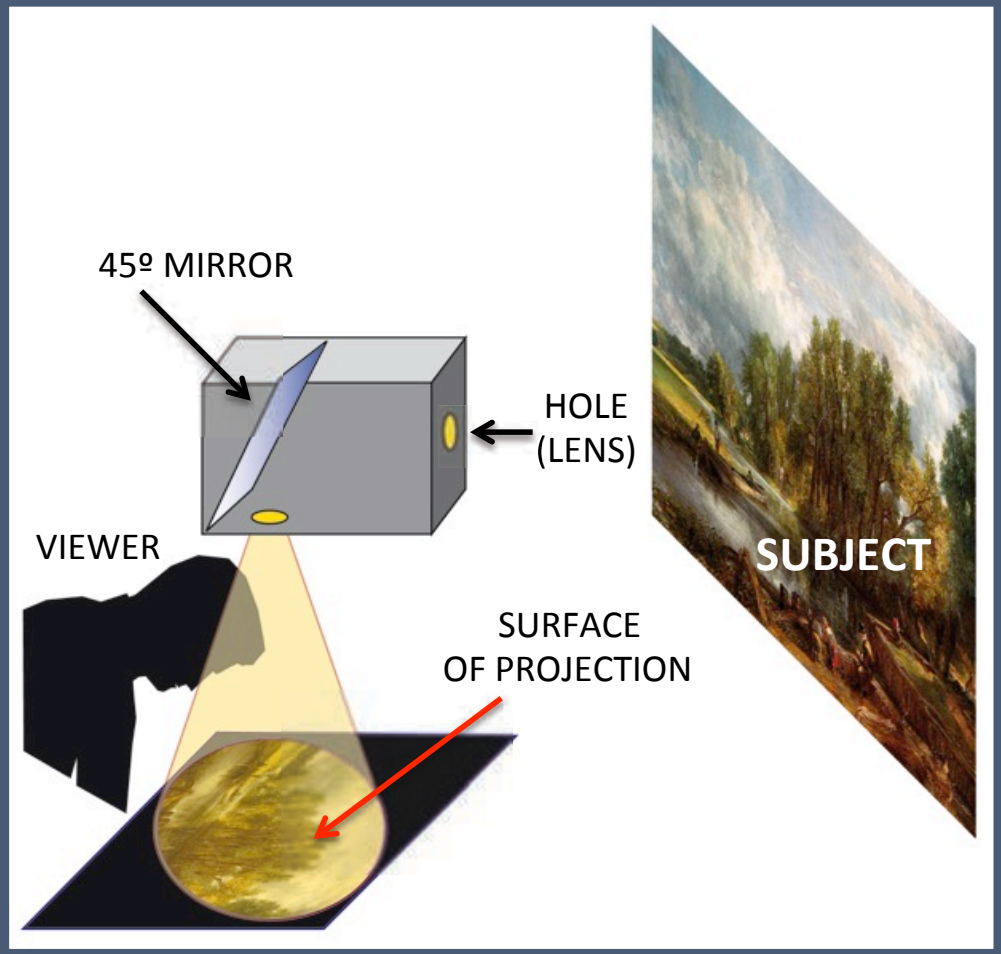
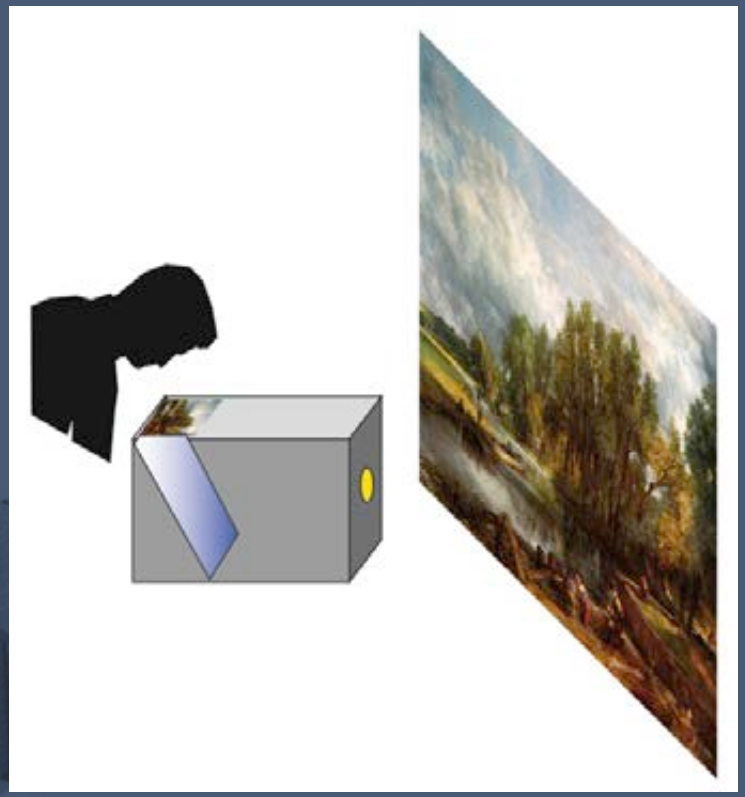


A. MOTIF IN FRONT

A1. IMAGE BEHIND



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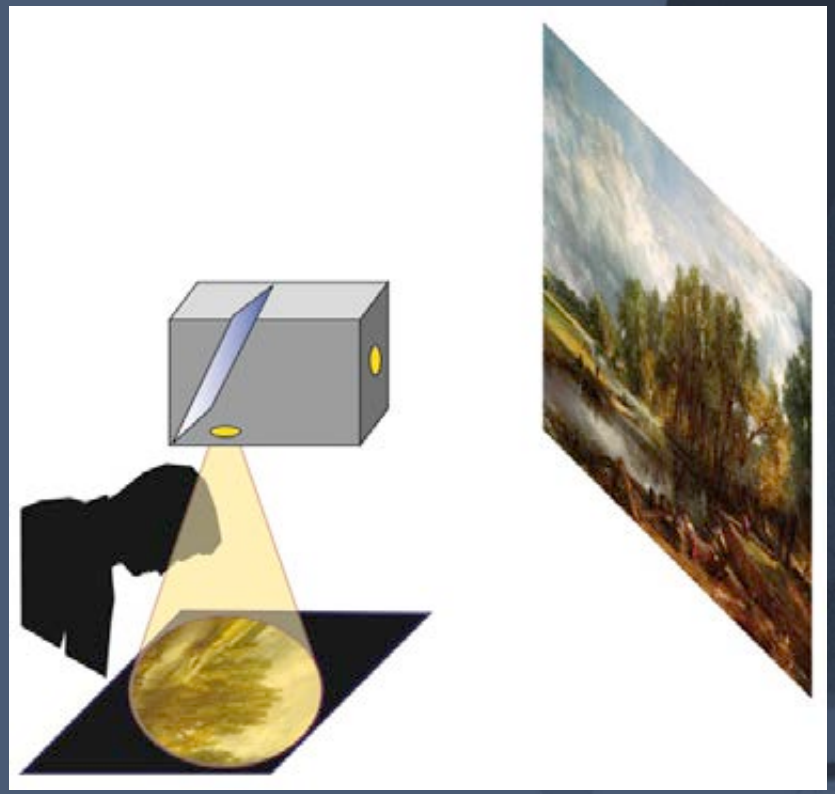


Camera obscura in the film
Girl with a pearl earirng

Tent camera in Costa, engraving 19th C.

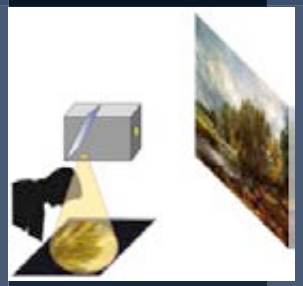
History of optical devices: The camera obscura

SEEING THE REALITY

TYPES

IN PAINTING

CAMERA LUCIDA



COPYING THE REALITY

TYPES

IN PAINTING

OUR RESEARCH

SEEING THE REALITY
TYPES
IN PAINTING
CAMERA LUCIDA

COPYING THE REALITY
TYPES
IN PAINTING
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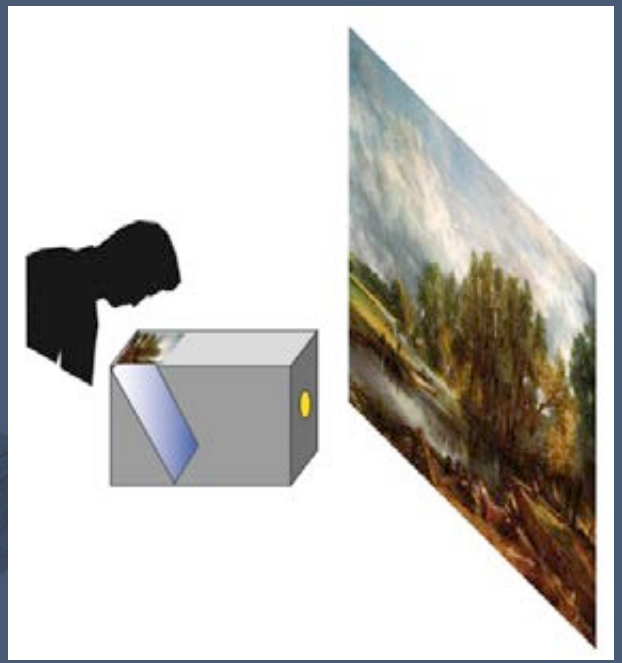
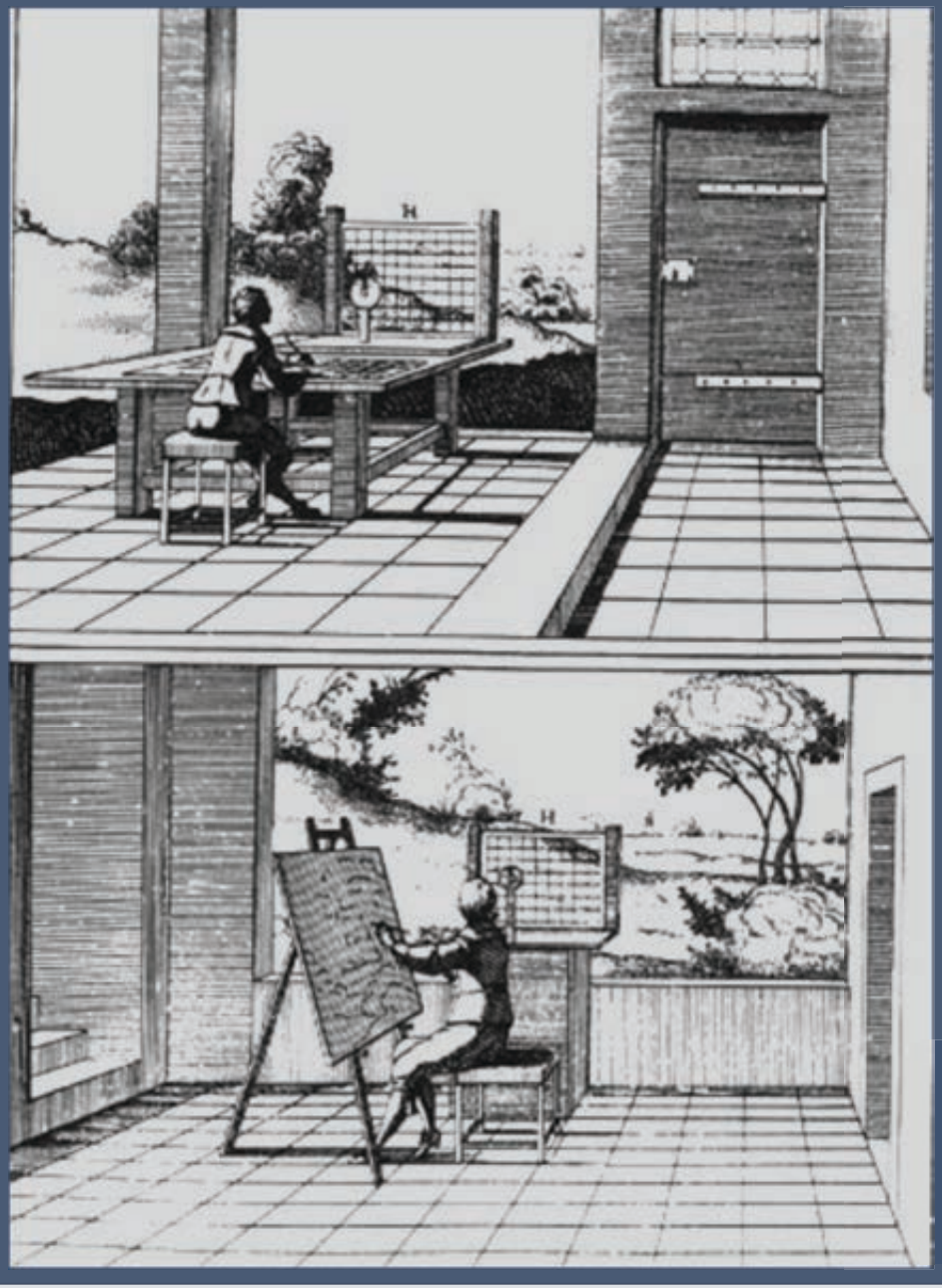
A1. IMAGE BEHIND



Camera obscura XVIII Century

SEEING THE REALITY
TYPES
IN PAINTING
CAMERA LUCIDA

COPYING THE REALITY
TYPES
IN PAINTING
OUR RESEARCH



Use of the Alberti's veil,
Jean Debreuil,
Le perspective pratique, 1642

SEEING THE REALITY
TYPES
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CAMERA LUCIDA

COPYING THE REALITY
TYPES
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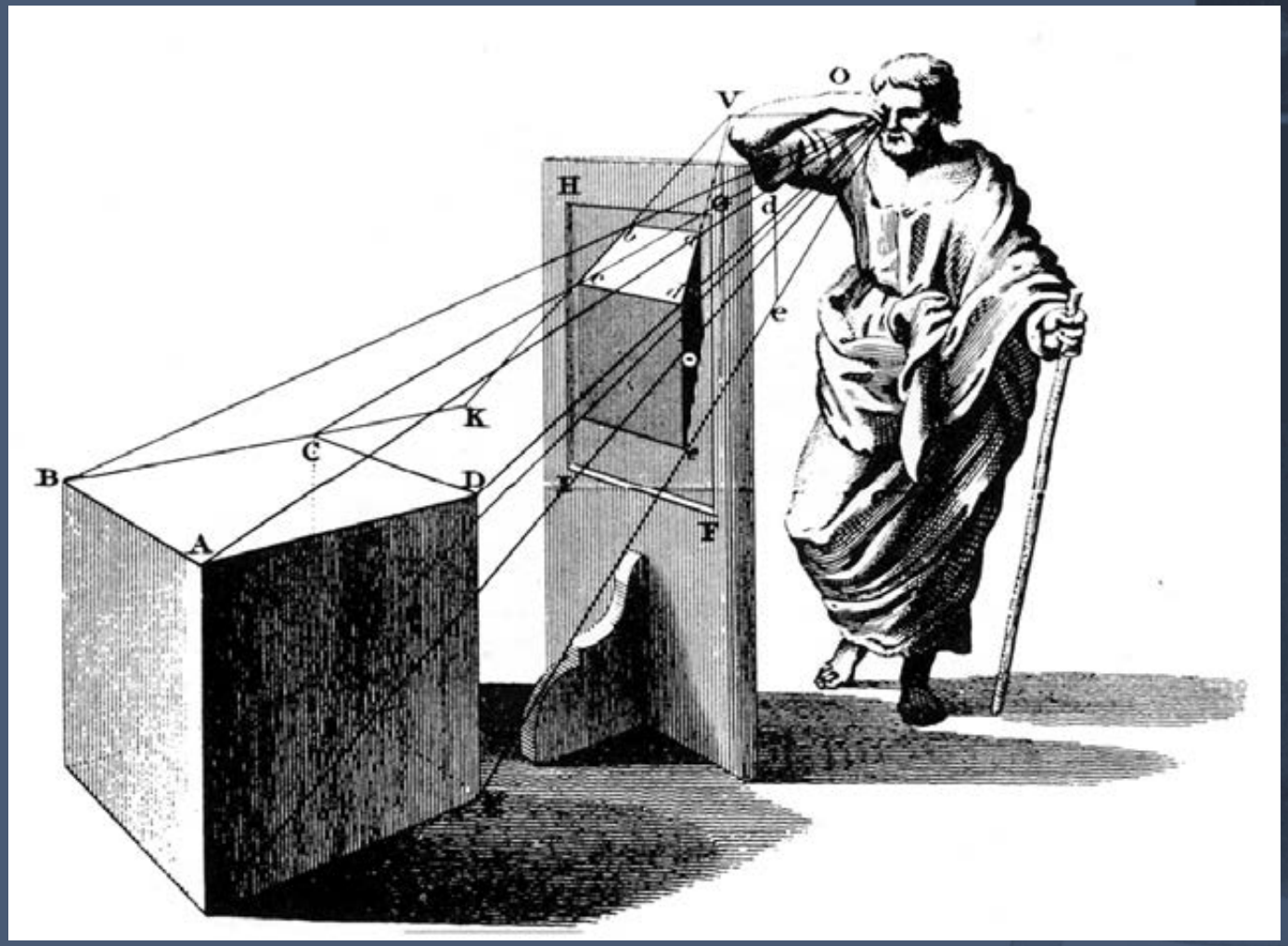
OUR RESEARCH



Visual pyramid,
Brook Taylor, *New Principle of Linear Perspective* (London, 1719),

SEEING THE REALITY
TYPES
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CAMERA LUCIDA

COPYING THE REALITY
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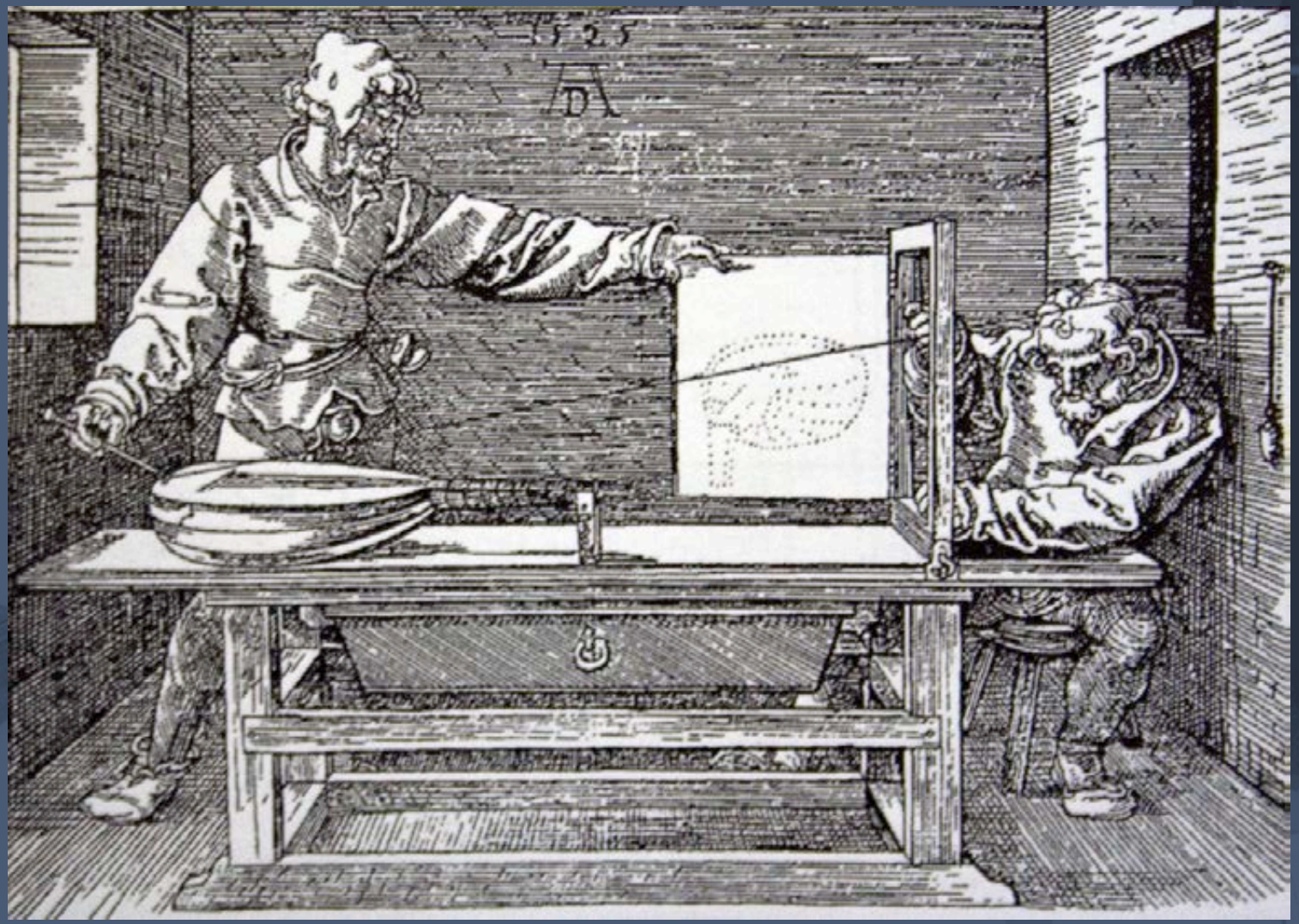
OUR RESEARCH



Durer, Men drawing a lute in *Underweysung der Messung*, Nuremberg, 1525

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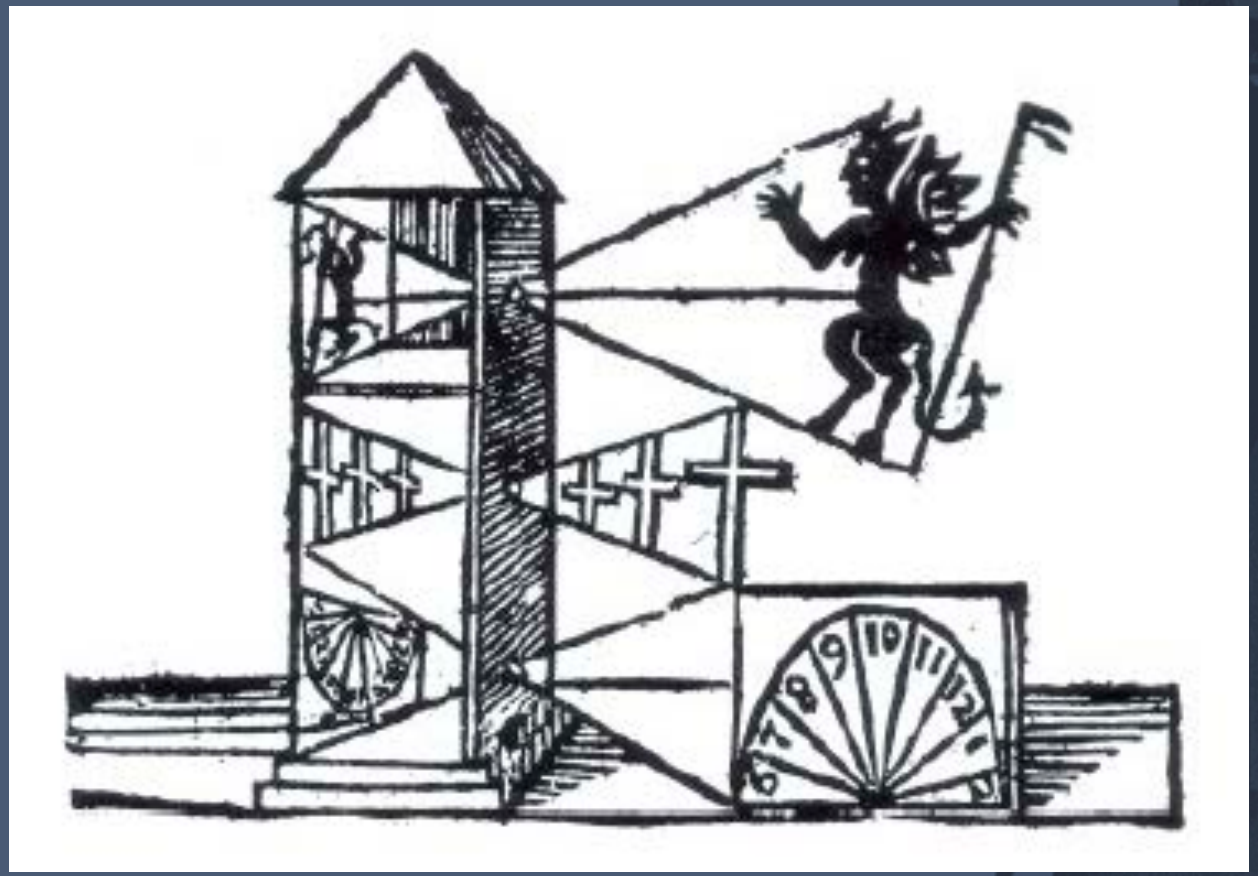

Drawing of the phisical principle of the camera obscura
by Roger Bacon (1214-1294)

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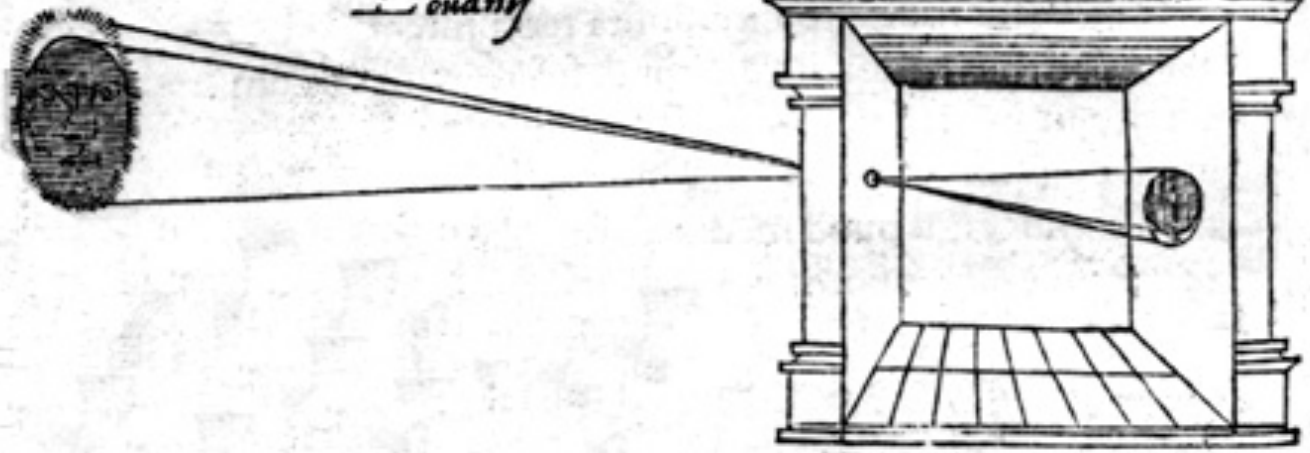
illum in tabula per radios Solis, quàm in cœlo contingit: hoc eſt, ſi in cœlo ſuperior pars deliquiũ patiatur, in radiis apparebit inferior deficere, vt ratio exigit optica.

Solis deliquium Anno Christi 1544. Die 24. Januarij Louanij



Sic nos exactè Anno .1544. Louanii eclipſim Solis obſeruauimus, inuenimusq; deficere paulò plus q̃ dex-

Solar eclipse in Louvain in *De radio astronomico et geometrico liber,* Regnier Gemma Frisius. 1544

SEEING THE REALITY
TYPES
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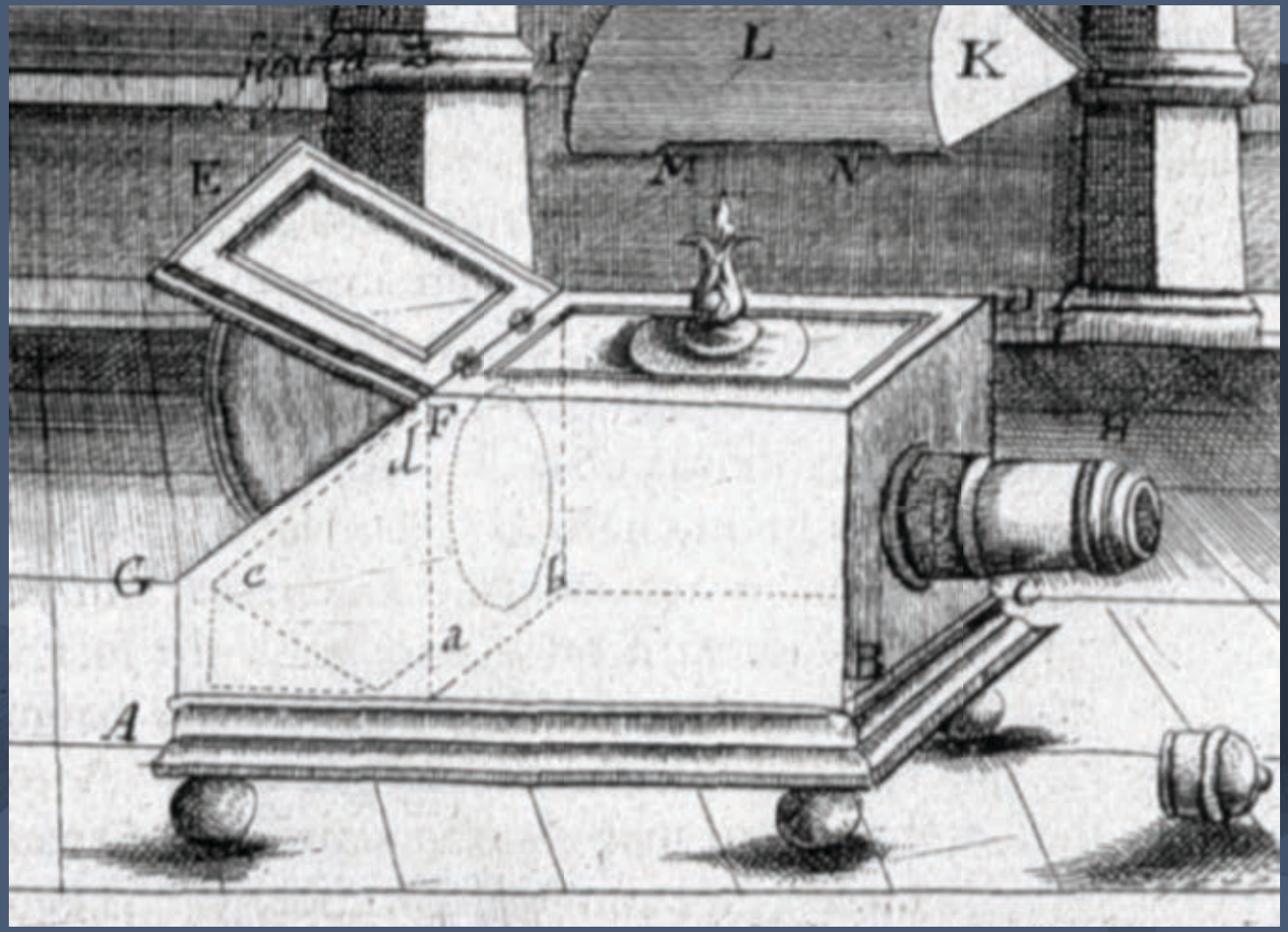
Magiae Naturalis, 1589
Giovanni Battista Della Porta.

Frontispiece of an English translation of *Natural Magick* published in London in 1658



Johann Zahn, *Oculus artificialis teledióptricus*, 1685

SEEING THE REALITY
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Flier to of a Camera Obscura, London, 1820.

"By this Instrument, persons unacquainted with Drawing, are enabled to take an exact likeness of anything they desire."

SEEING THE REALITY
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Camera obscura XVIII Century

SEEING THE REALITY
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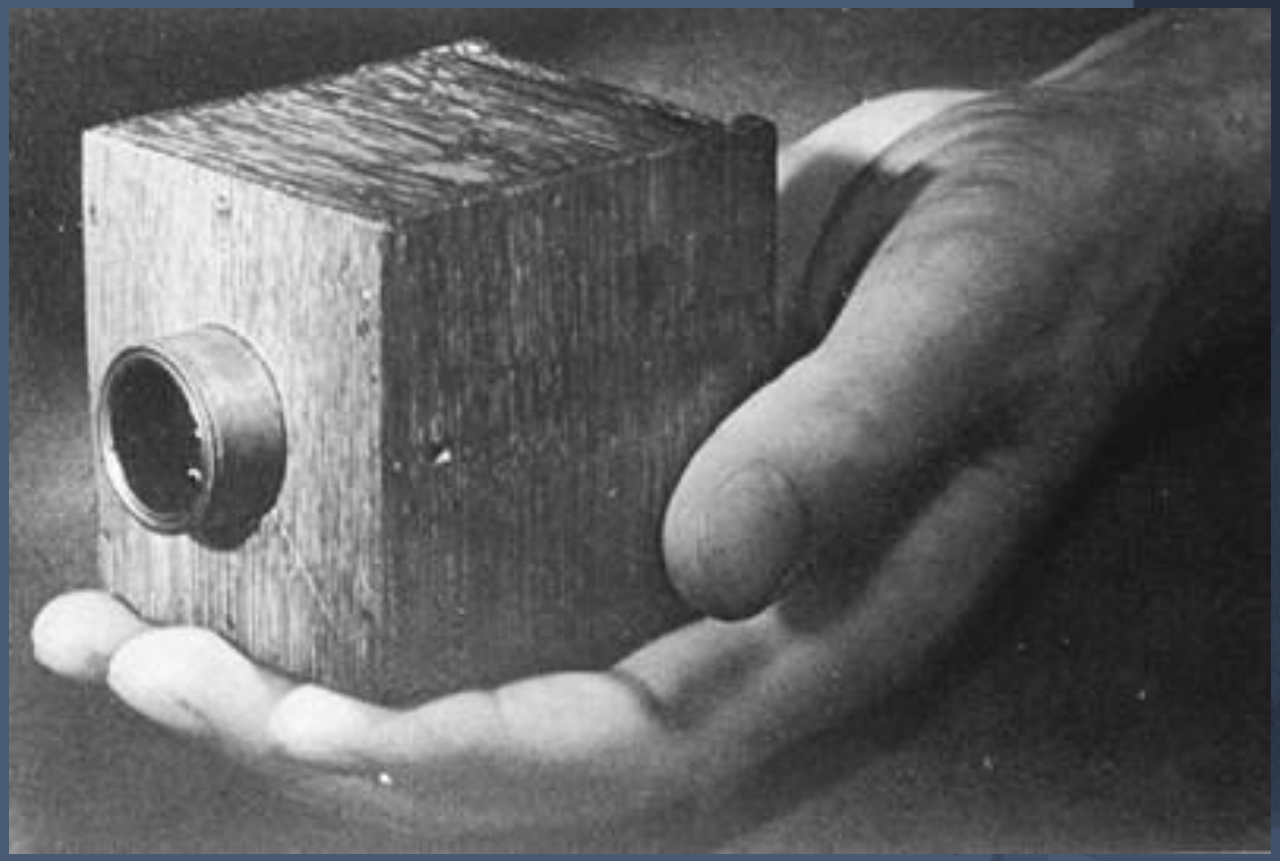
CHARACTERISTICS: PORTABILITY



Camera obscura portable

SEEING THE REALITY
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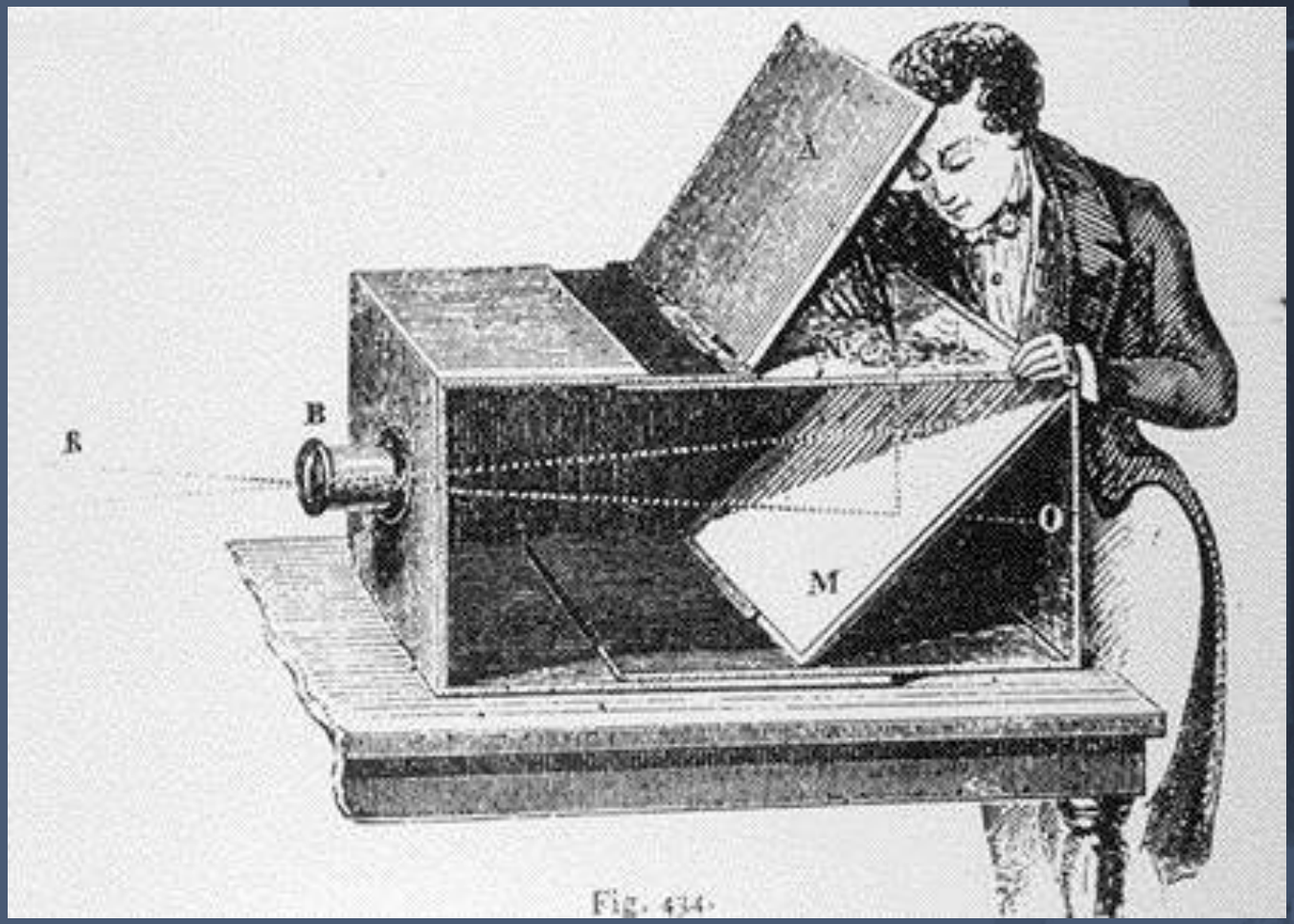
CHARACTERISTICS: THE ENTIRE IMAGE CAN BE ORSERVED AT ONCE



Camera obscura, *Treatise elementary of physic* , A. Ganot, 1855

SEEING THE REALITY
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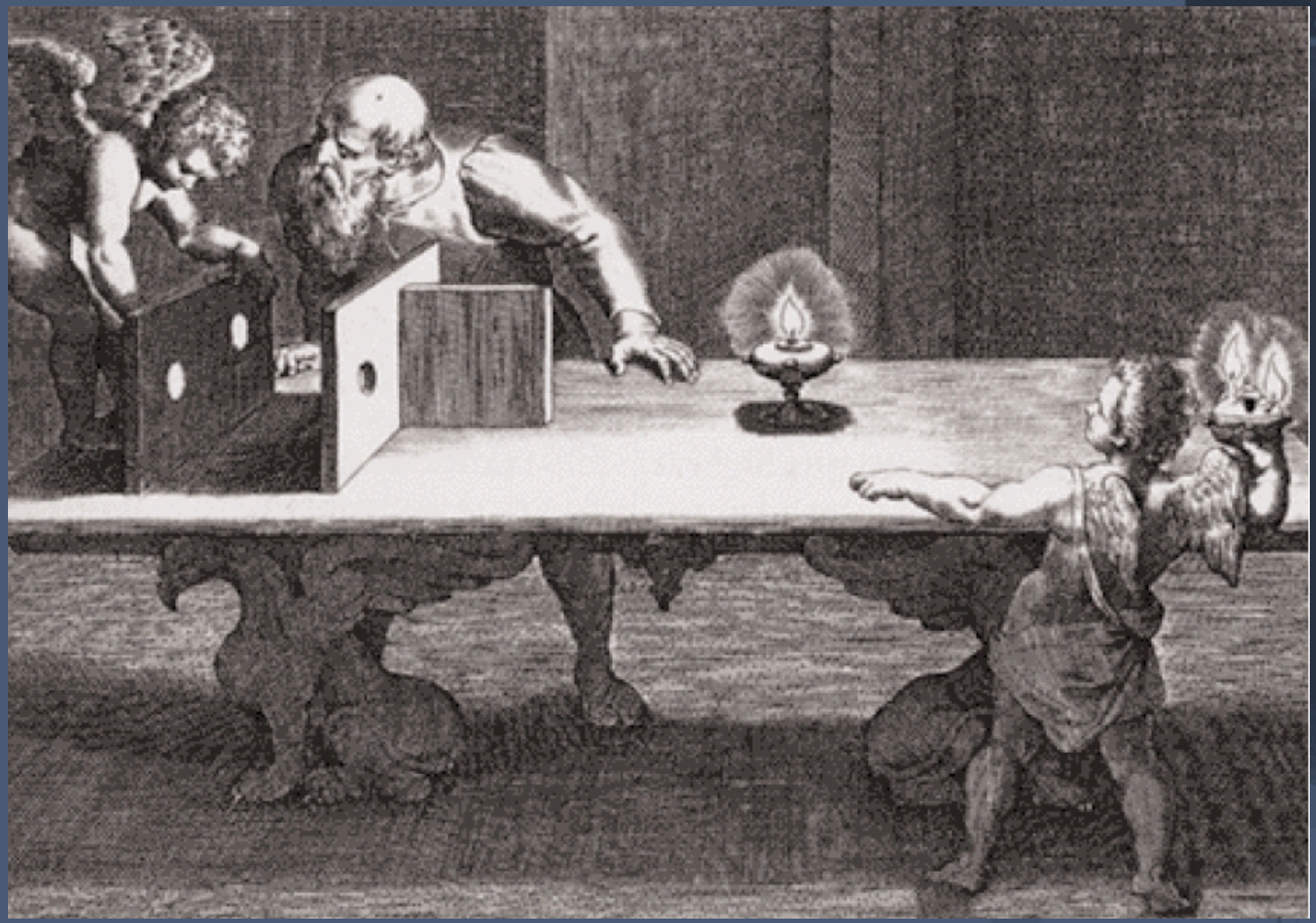
TYPE OF HOLE: SIZE / LENS / TYPE OF LENS



P.P. Rubens engraving , François d'Aguillon, Óptica, 1611

SEEING THE REALITY
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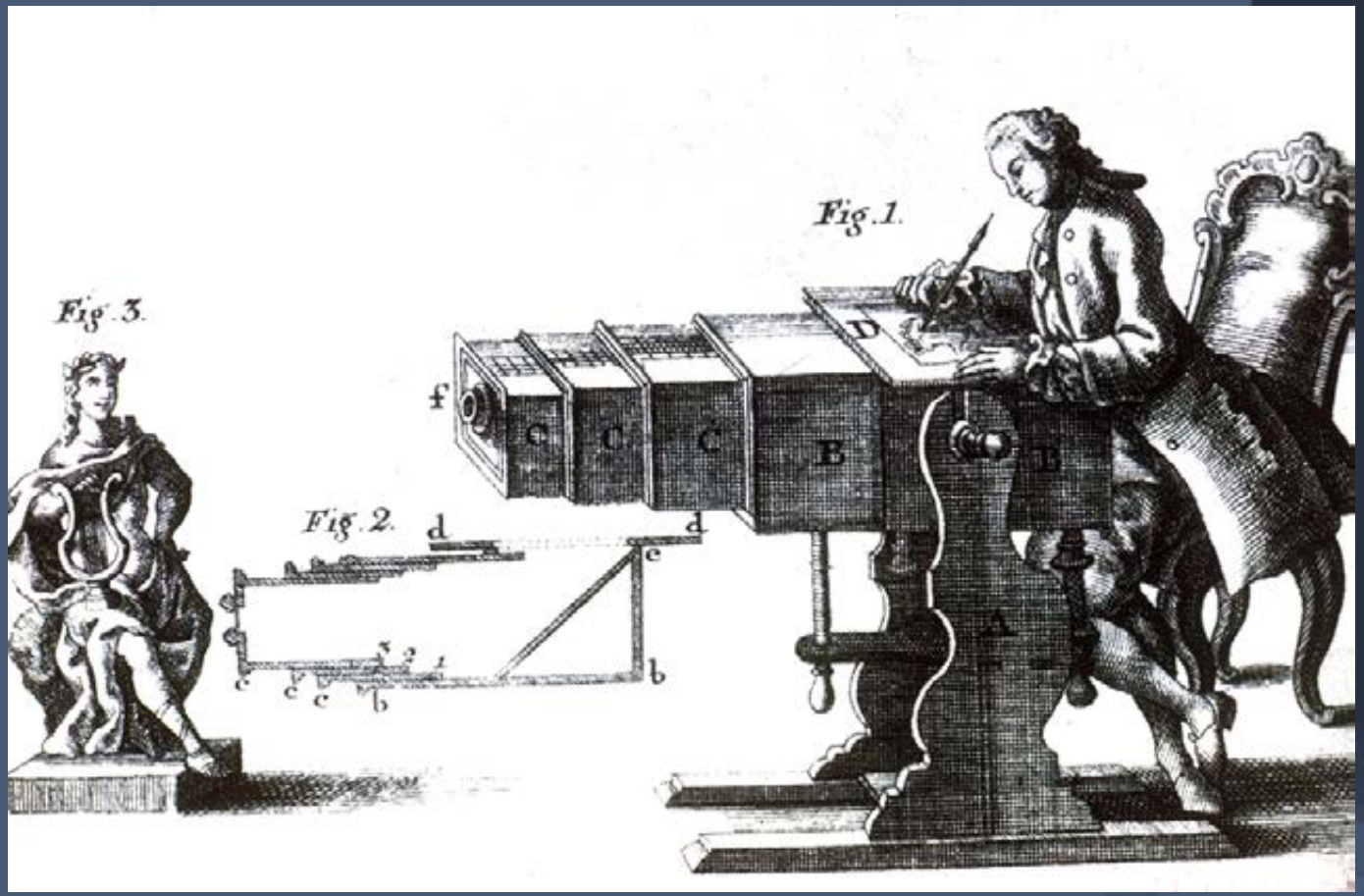
BELLOWS ALLOWS TO FOCUS CLOSER SUBJECTS



G.F.Brander, Drawing with the help of a camera obscura, 1769

SEEING THE REALITY
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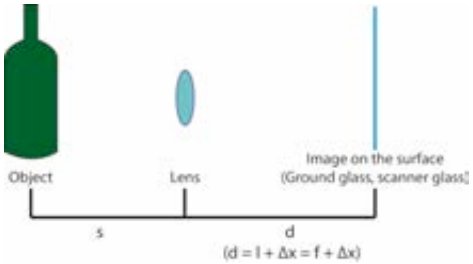
HOW TO CALCULATE THE FOCUSING DISTANCE



These are the variables used to calculate the focusing distances.

s = distance from lens to object (focusing plane)
d = distance from lens to image
f = focal length

- Every lens has a focal length expressed in millimeters. If we don't know the focal length of a lens we take the lens, we focus the infinite and project the image on a surface (e.g. a wall) until the image is focused. Then we have to measure the distance between the lens and the wall. That's the focal length expressed in centimeters (we convert to millimeters by multiplying by ten).
- Notice that in a camera obscura with bellows **d = l + Δx**, where **l = f** expressed in centimeters. That means that when the lens is in the closest position to the image the infinite is on focus. **Δx** is the sliding distance of the bellows. It's a variable. If we move the lens backwards or forwards we will focus on different depth planes.

These are the two practical formulas to use:

A. $s = \frac{f \times (f + \Delta x)}{\Delta x}$

We use this formula if we want to calculate where we have to place an object for a given sliding distance. For example, if we have a camera with a lens with a focal distance, **f =** 200 mm = 20 cm and we move the sliding box, **Δx =** 10 cm. we get:

$$60 = \frac{20 \times (20 + 10)}{10}$$

(All the figures in centimeters) So the object must be placed 60 centimeters (25,58 inches) away from the lens. With the same formula we can calculate the closest focusing plane if we substitute Δx for the furthest sliding distance.

B. $\Delta x = \frac{f \times f}{s - f}$

We use this formula if we want to calculate how far we have to move the sliding box if we want to focus an object placed at a given distance. For example, if we have a camera with a lens with a focal length, **f = 3**00 mm = 30 cm and we want to focus an object place, **s =** 150 cm, we get.

$$7{,}5 = \frac{30 \times 30}{150 - 30}$$

(All the figures in centimeters) So we move the sliding box 7,5 centimeters (2,9 inches) forwards.

NOTE: 1 centimeter = 0,393 inches / 1 inch = 2,54 centimeters

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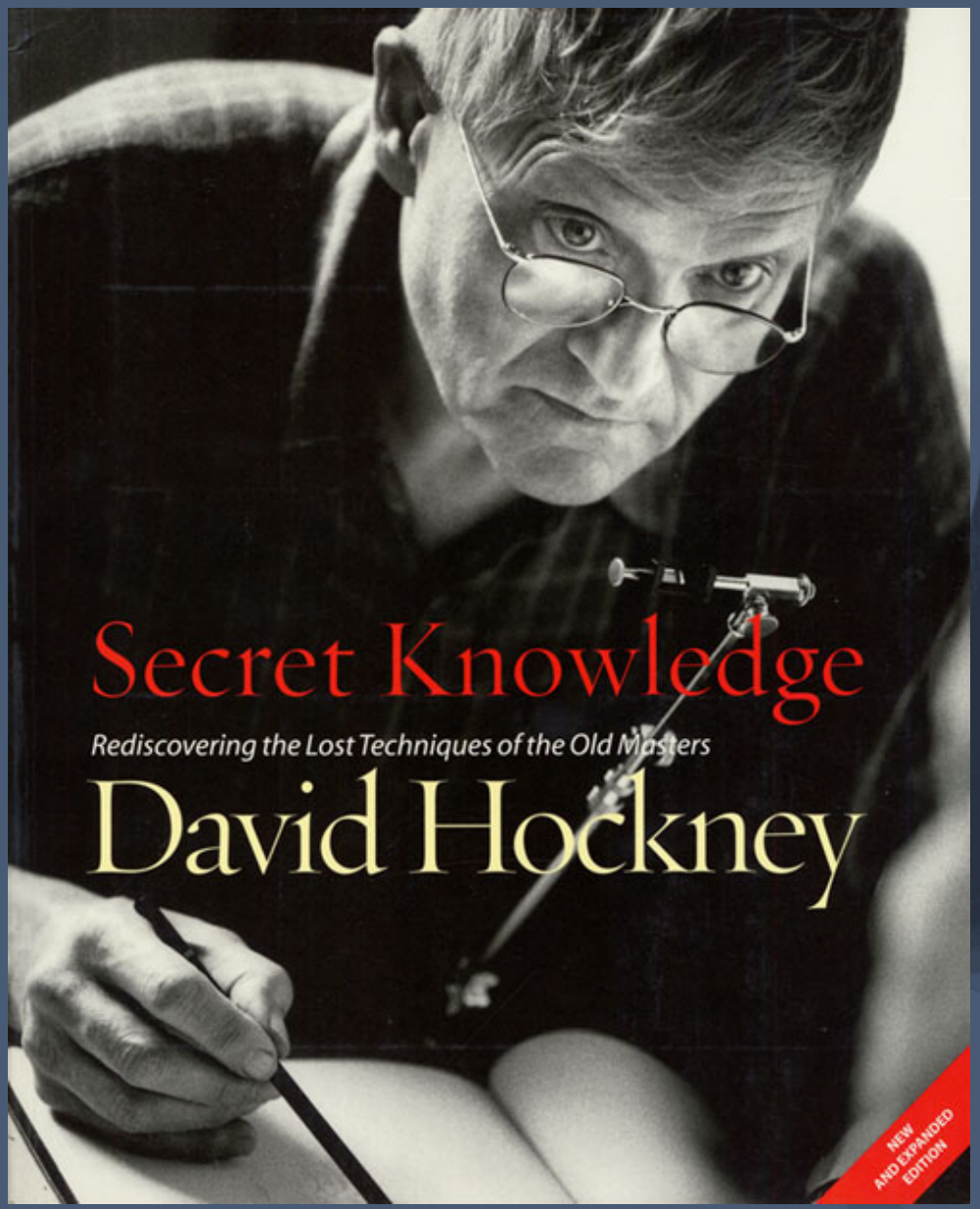

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Van Loo, *The Magic Lantern*, 1764

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Georges Desmarees (1697 - 1776), *Portrait of Joachimus Franciscus Beich with camera obscura*, Mid 18th century

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Sir Joshua Reynolds book-type camera, London, 18th Century

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Johannes Vermeer.
Music class, 1662-65.

SEEING THE REALITY

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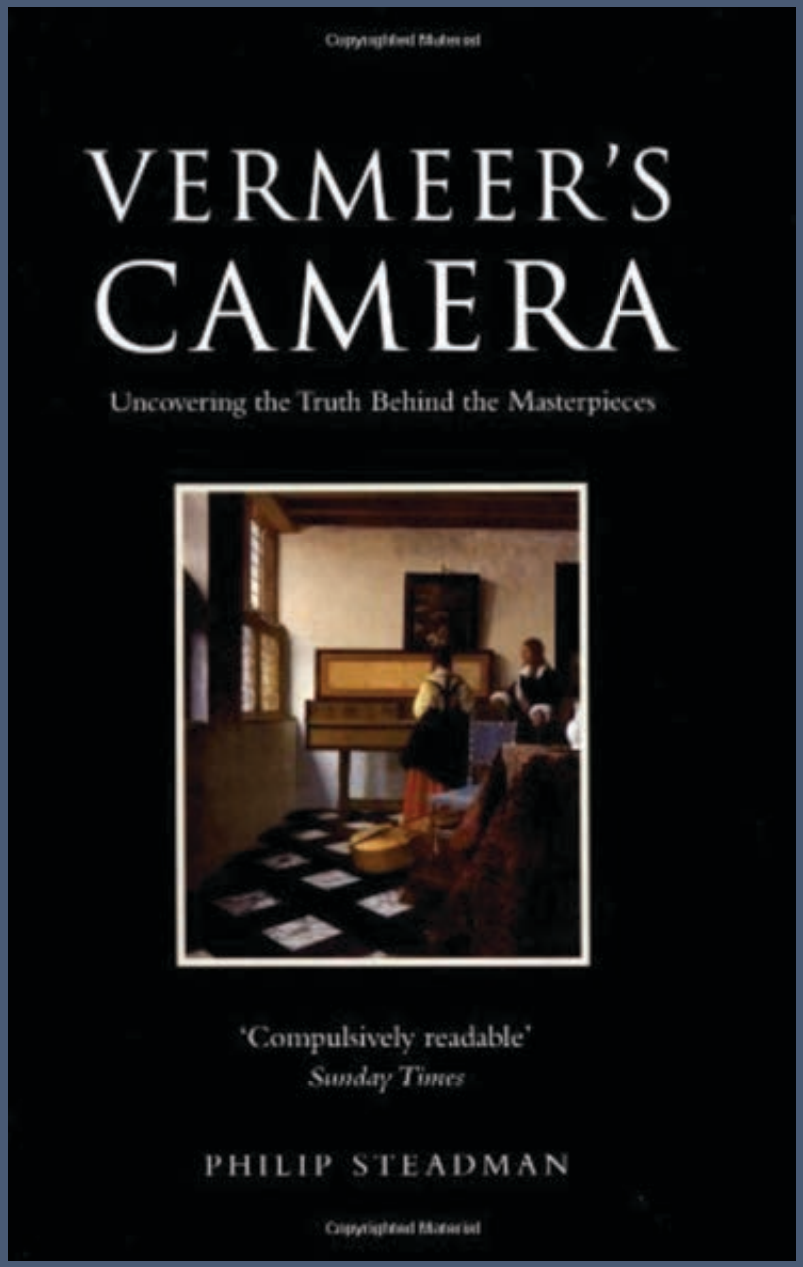

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Johannes Vermeer. *Girl with red hat*, 1665. Oil on wooden panel, 22,8 x 18 cm

SEEING THE REALITY
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Johannes Vermeer. *Girl with red hat*, 1665. detail

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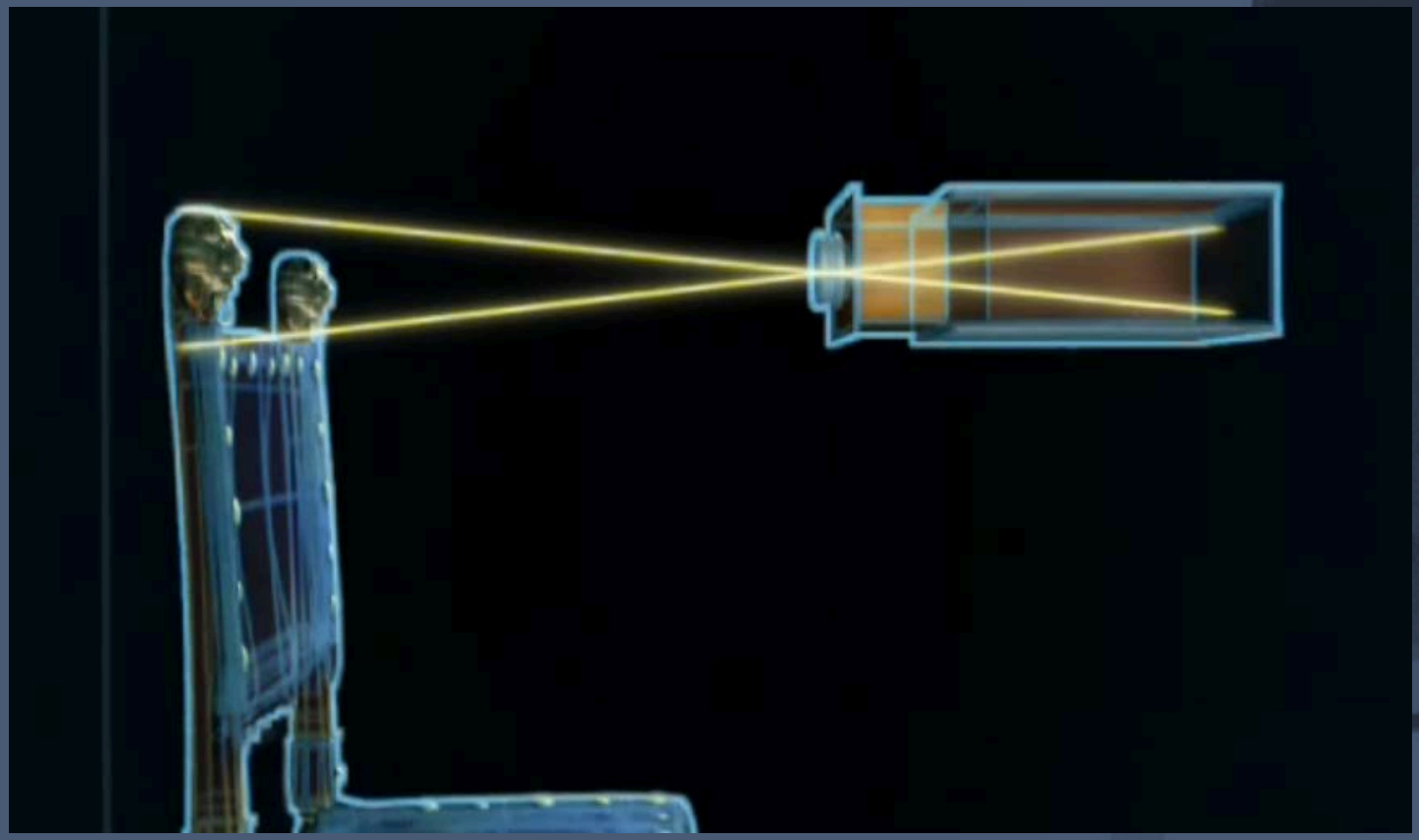
National Gallery of Art. Washington.

Vermeer: Master of Light: Camera Obscura, Part 4. Arthur Wheelock.



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COPYING THE REALITY
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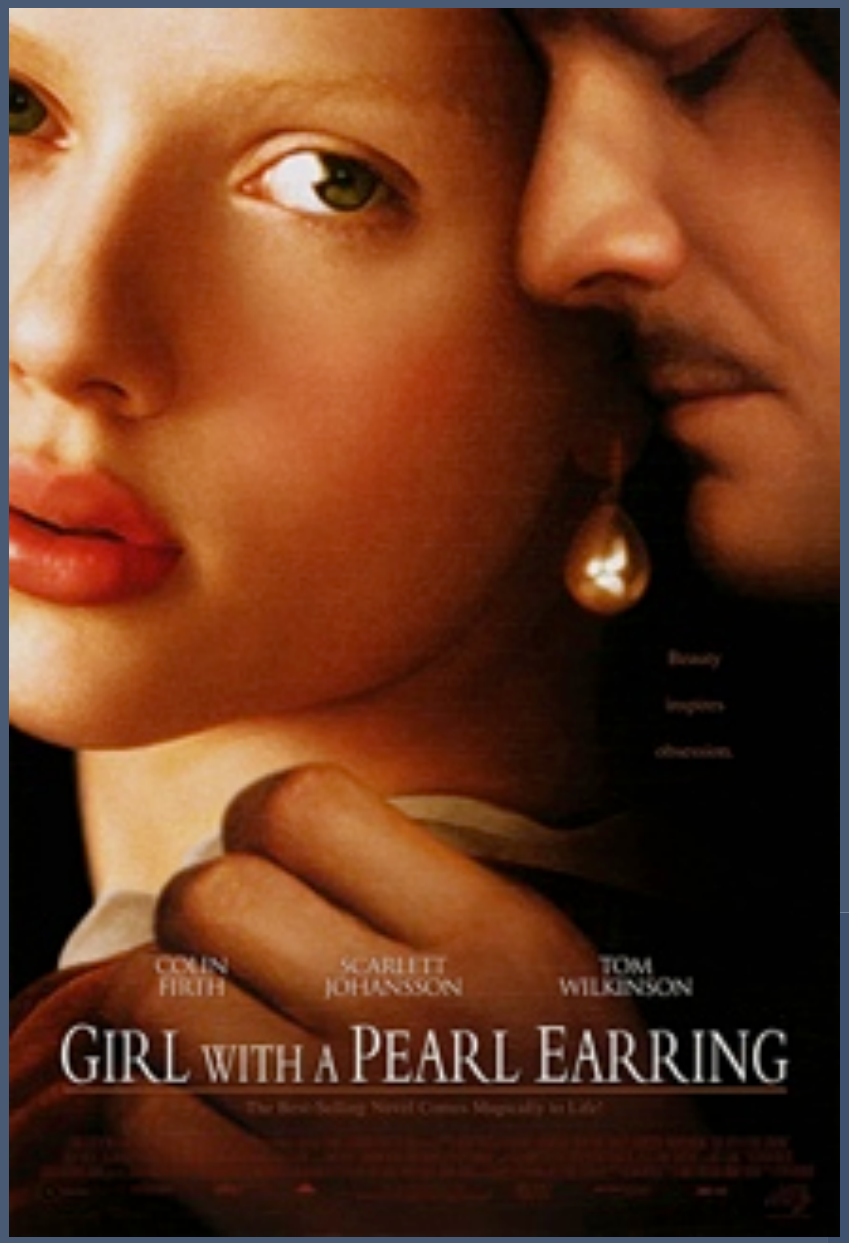

Video

Fragment of the film
Girl with a pearl earring, 2003
Directed by Peter Webber

SEEING THE REALITY
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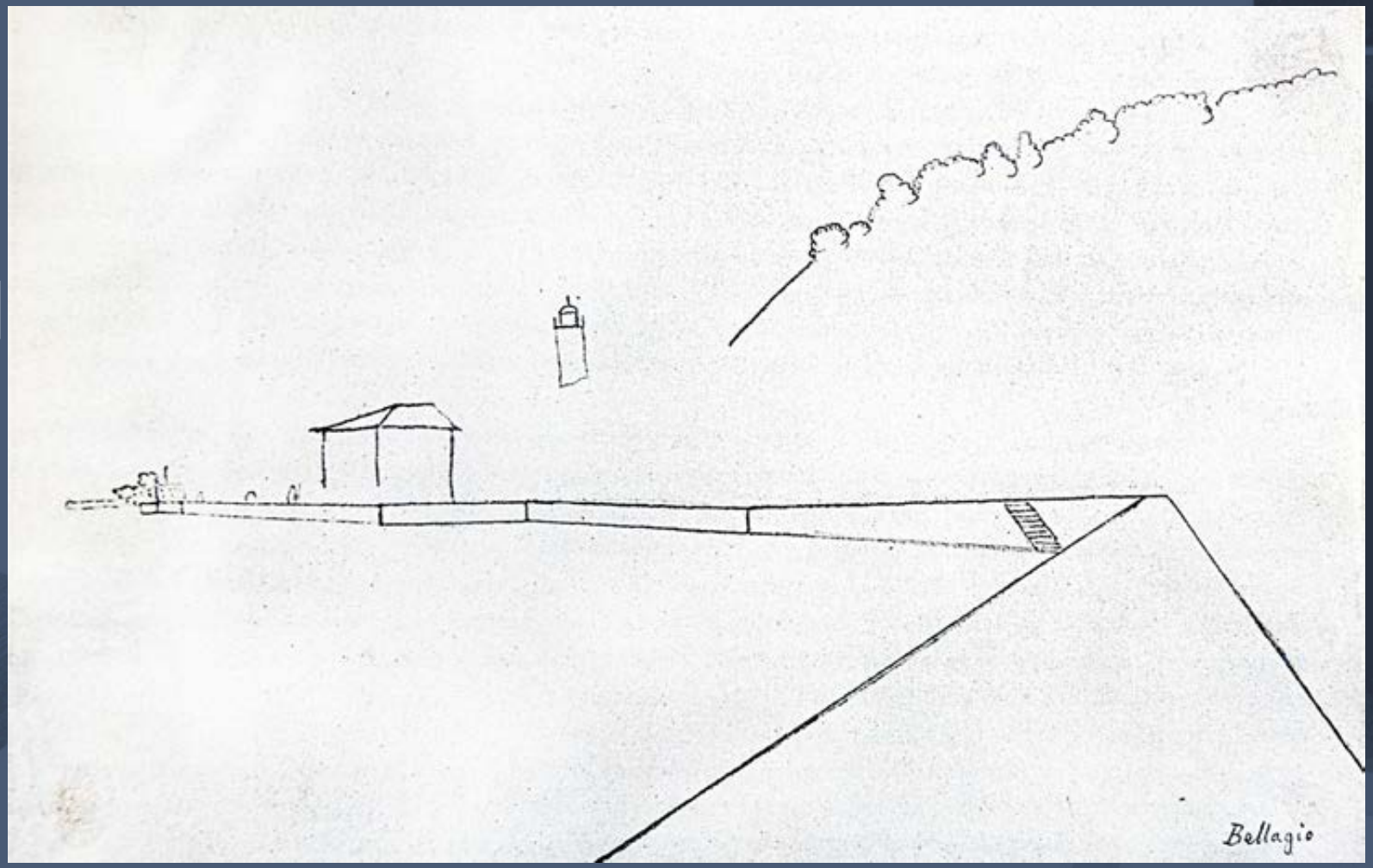

Wiilliam Henry Fox Talbot, Bellagio, Drawing from a camera obscura, 1833

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W. H. Fox Talbot, *Lacock church*, salted paper from Fotogenic drawing negative, 1840

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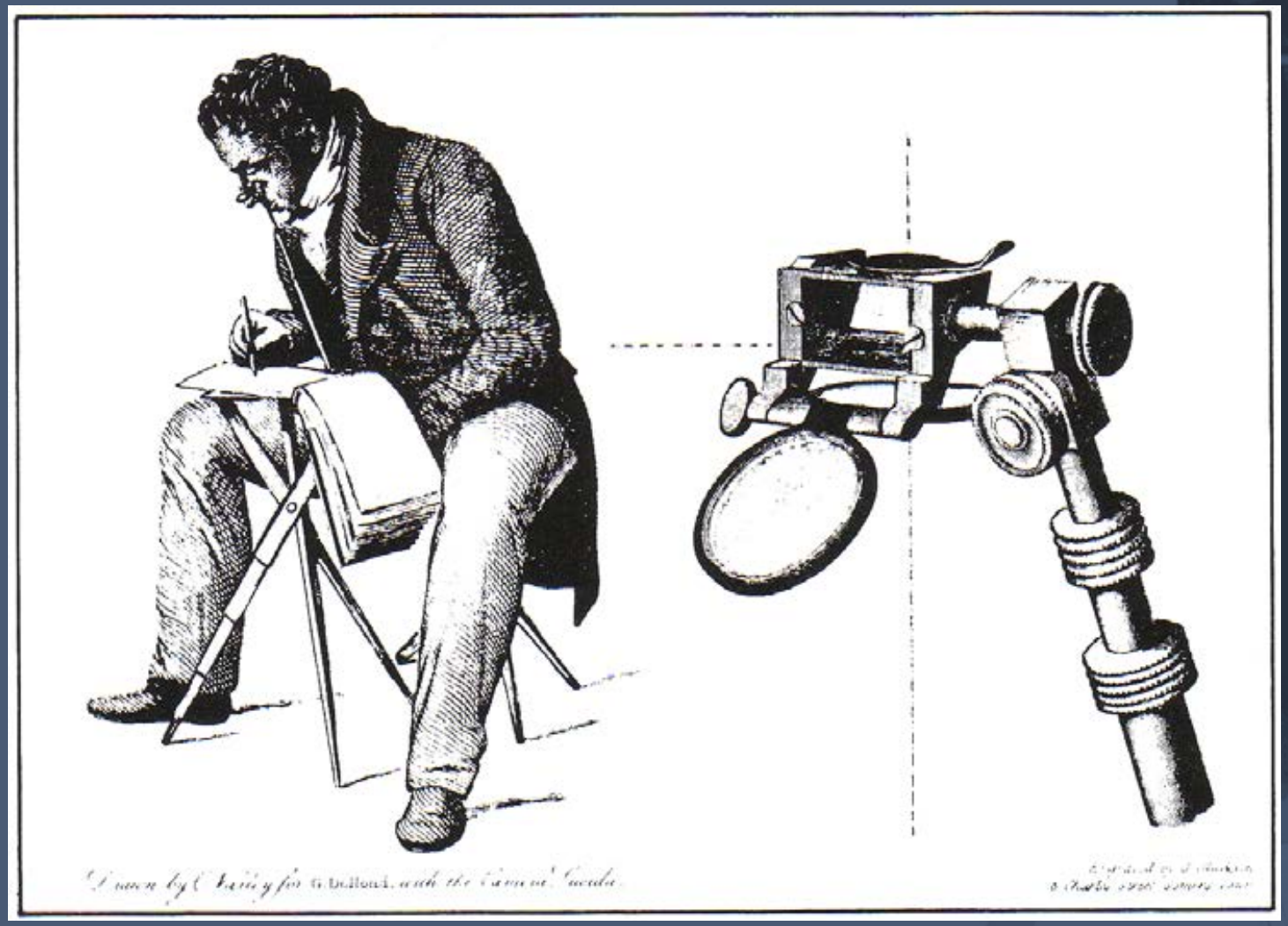

Camera Lucida invented by W.H. Wollaston in 1808.
(Drawn by C. Varley for G. Dollond with the Camera Lucida, 1810)

SEEING THE REALITY

TYPES

IN PAINTING

CAMERA LUCIDA

COPYING THE REALITY

TYPES

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SEEING THE REALITY
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CAMERA LUCIDA

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SEEING THE REALITY
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Camera lucida, late 19th Century

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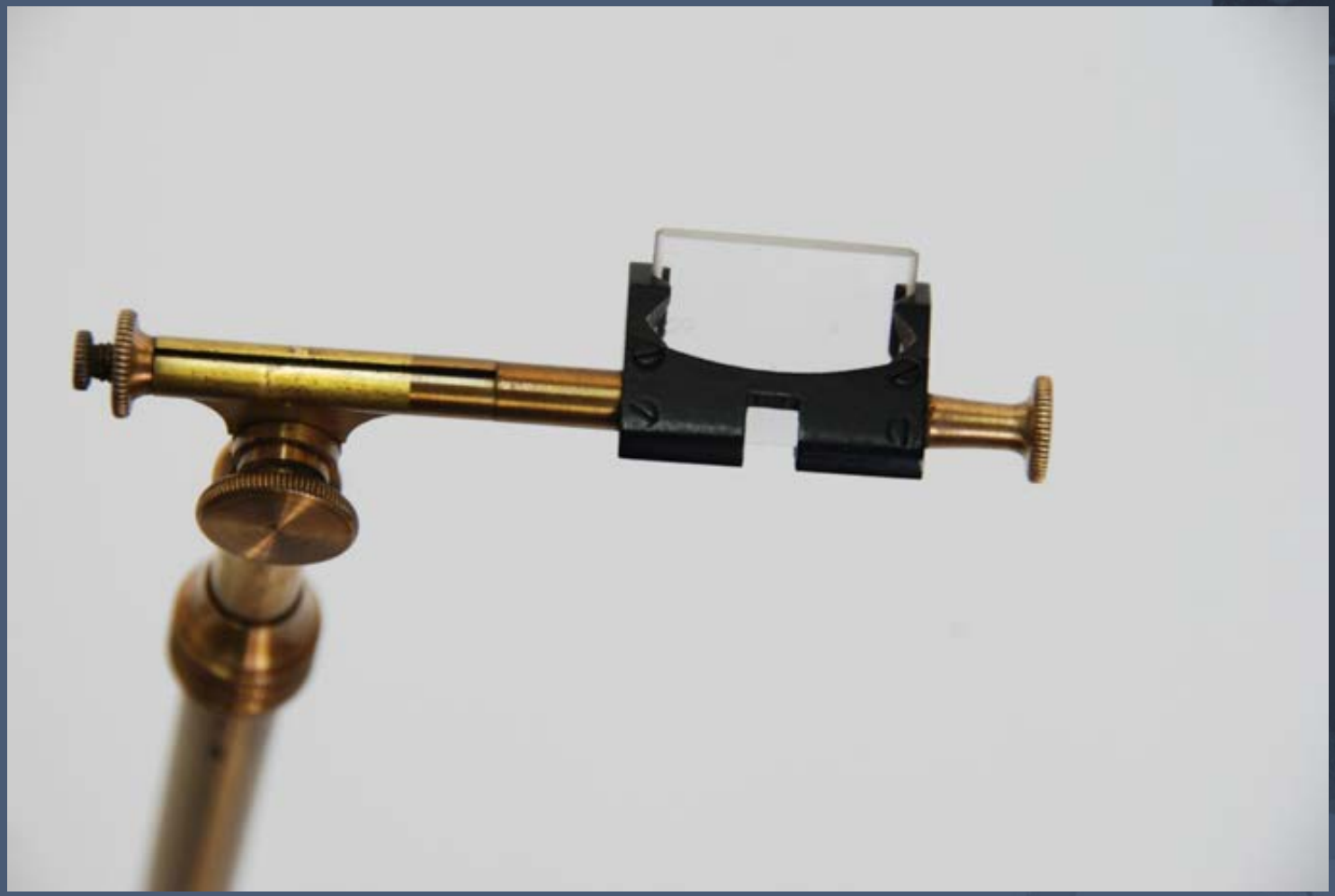

Prism of the camera lucida

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Camera lucida with fix lenses

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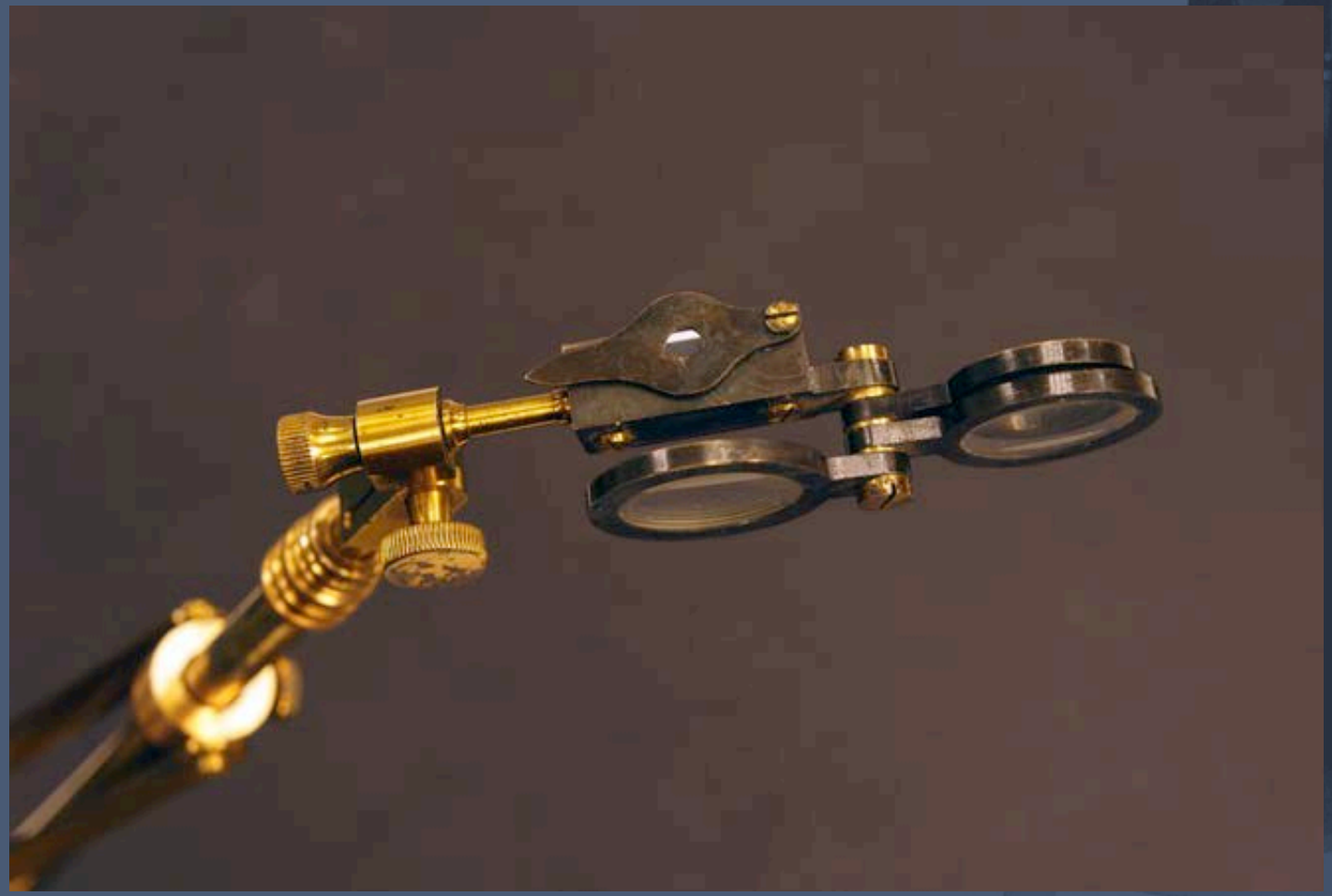

Camera lucida with fix lenses

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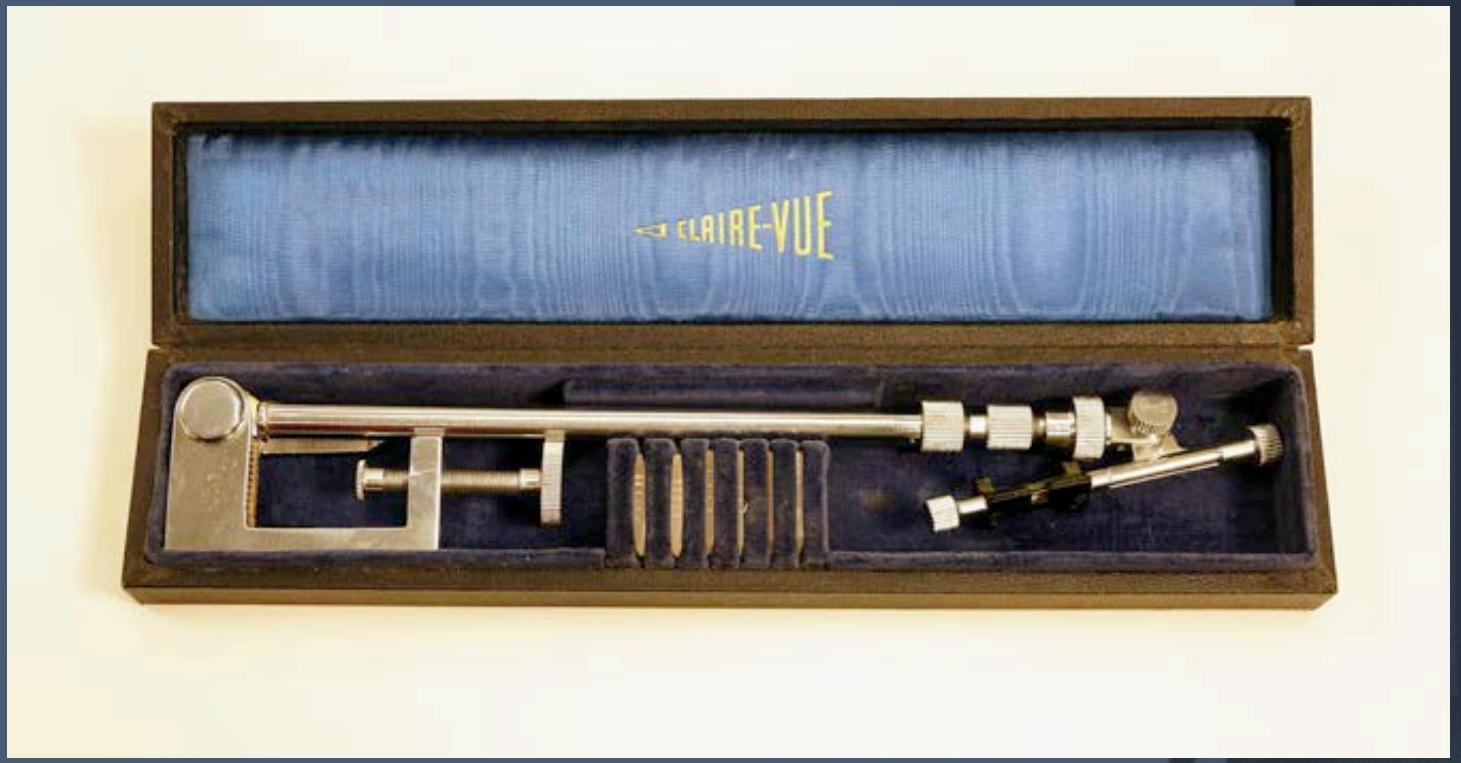

Camera lucida *Claire Vue*, mid-20th Century

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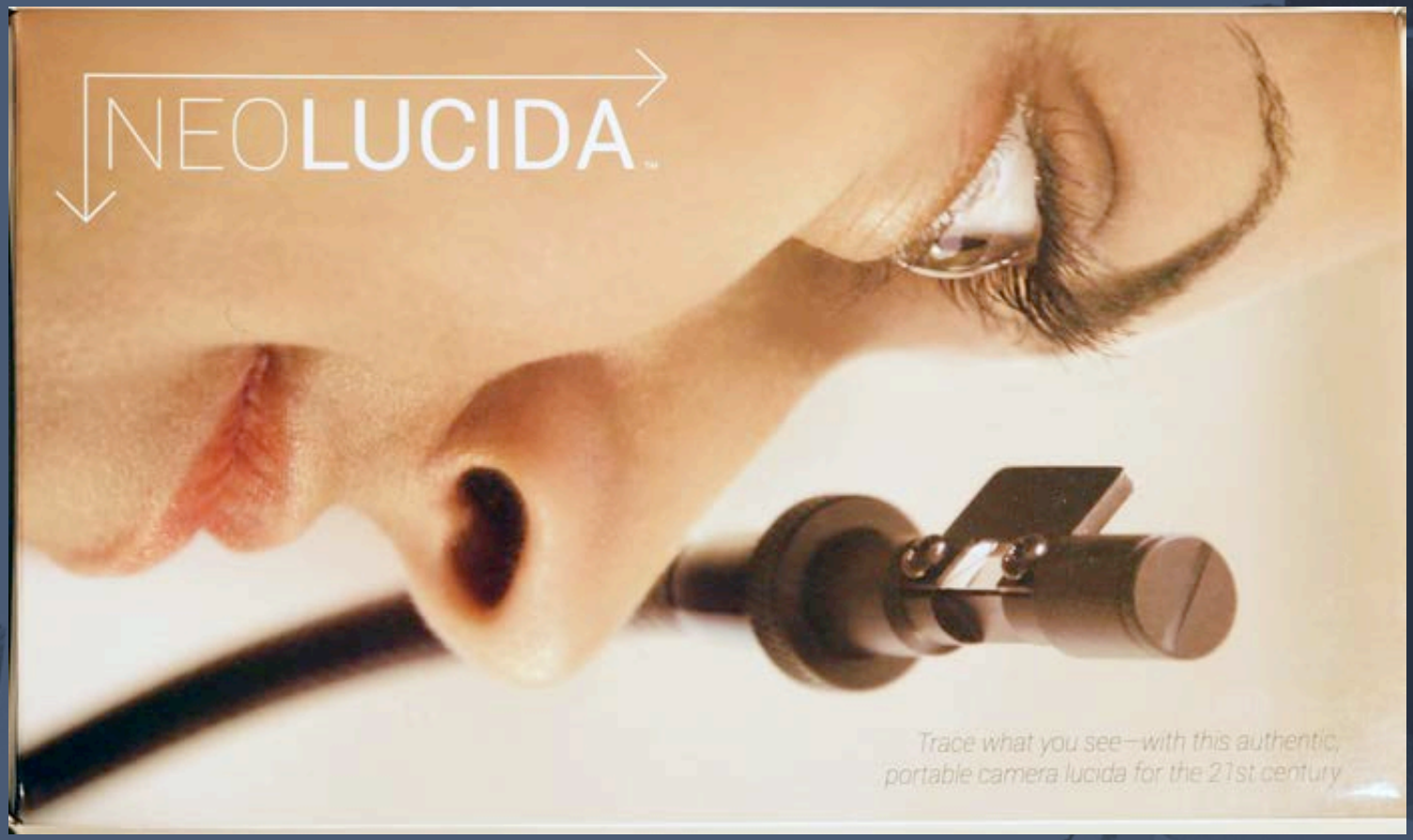

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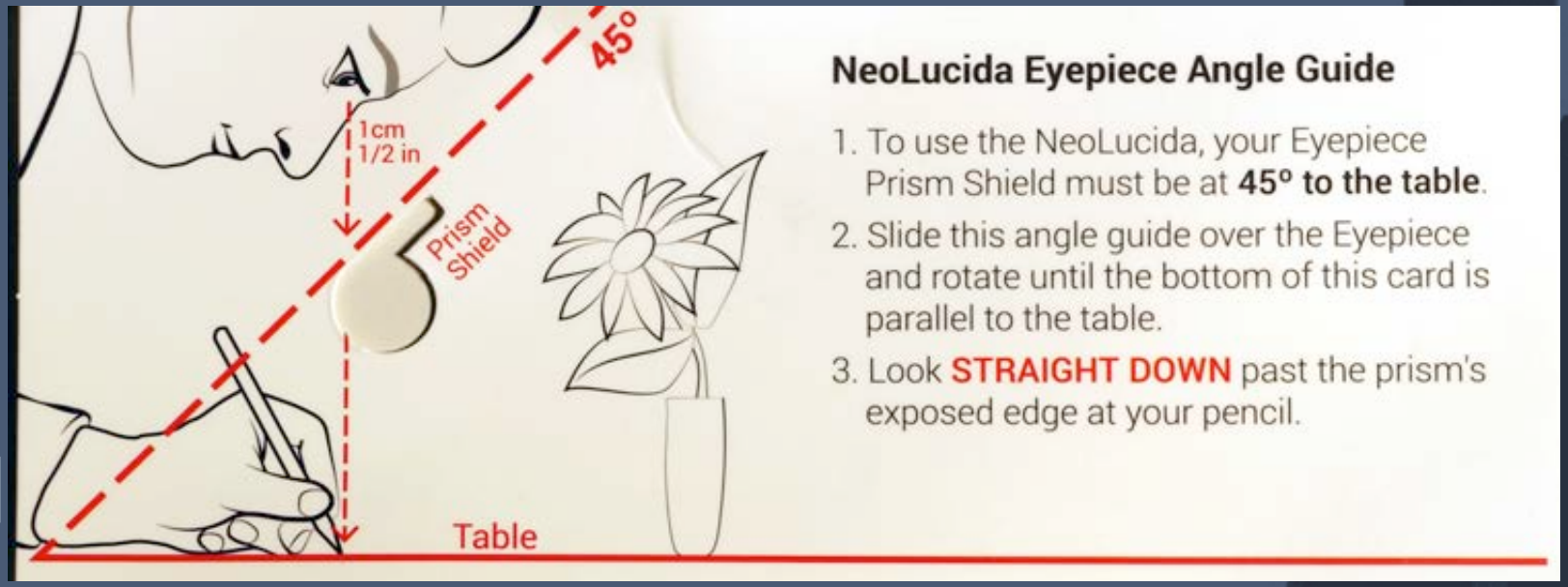

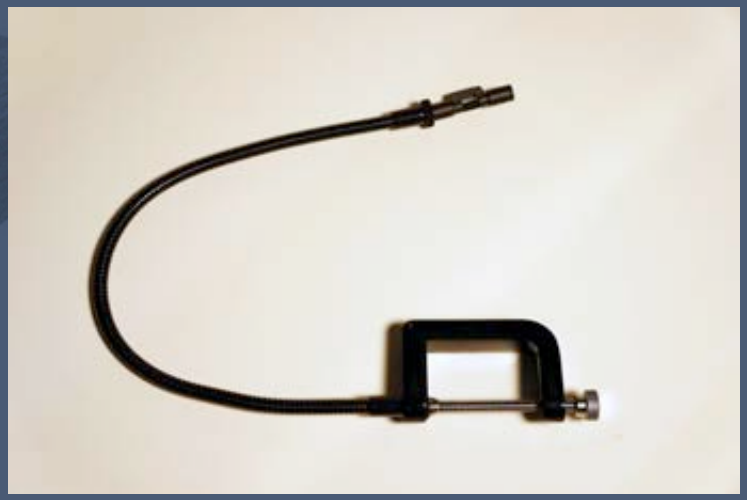

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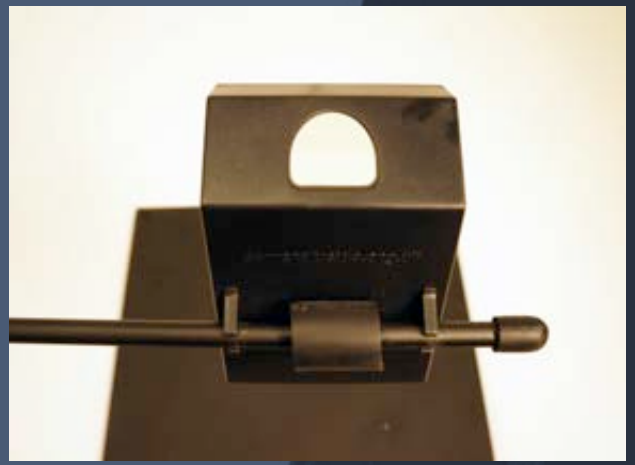

http://www.cameralucida.org.uk/

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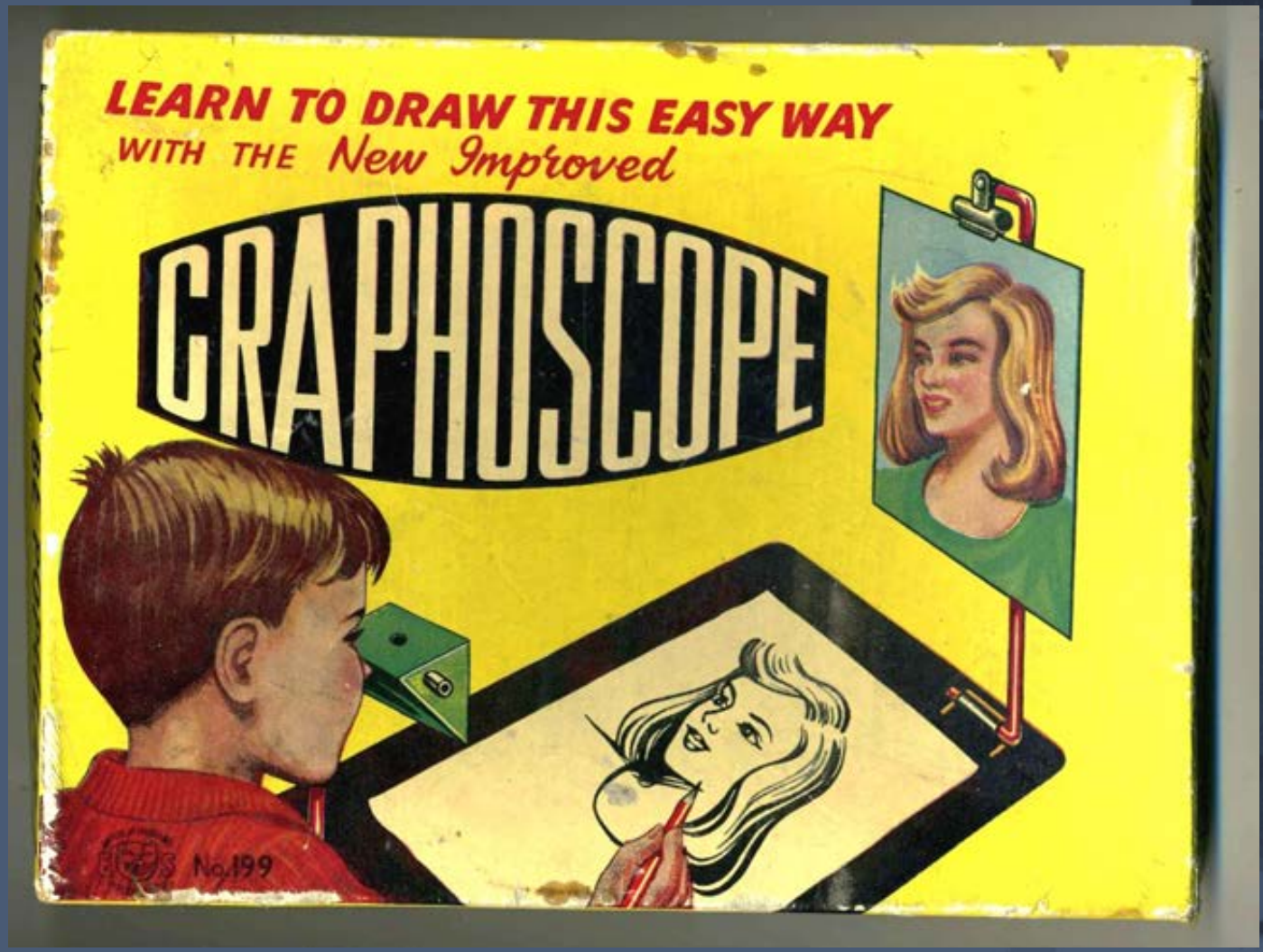

Graphoscope, drawing toy based on the camera lucida, 1960s

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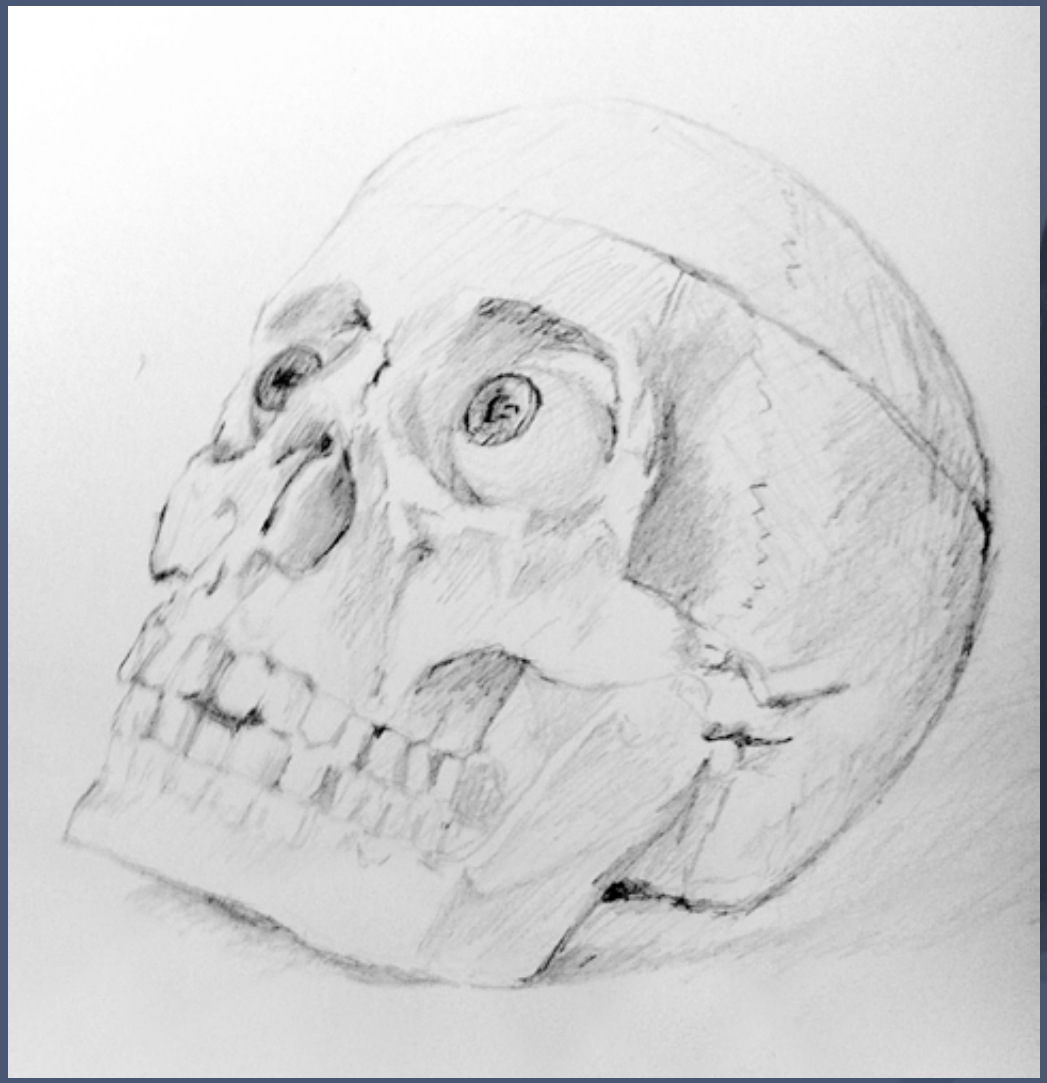

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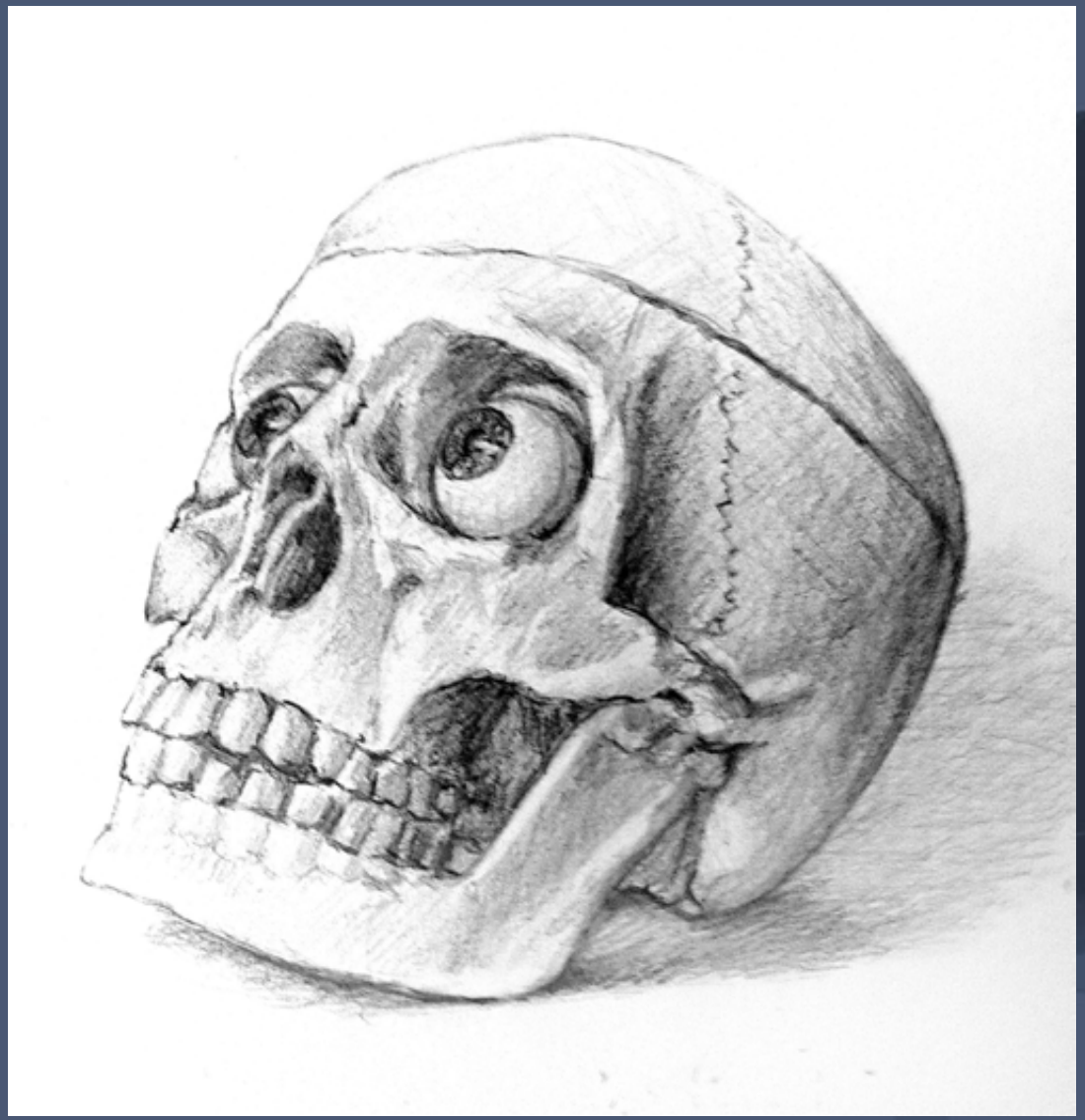

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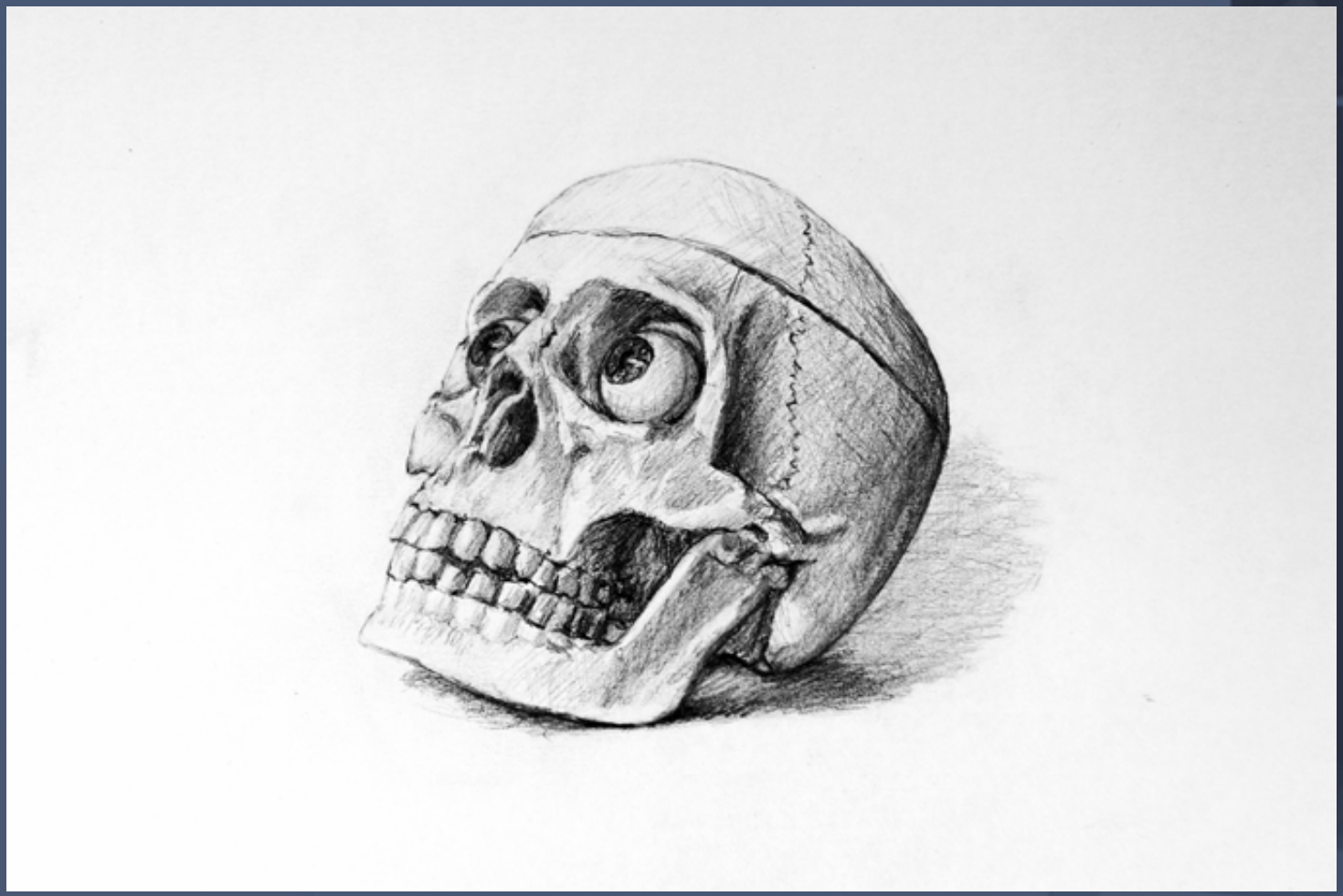

José Vicente Martin, camera lucida drawing, 2014

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José Vicente Martin, camera lucida drawing, 2014

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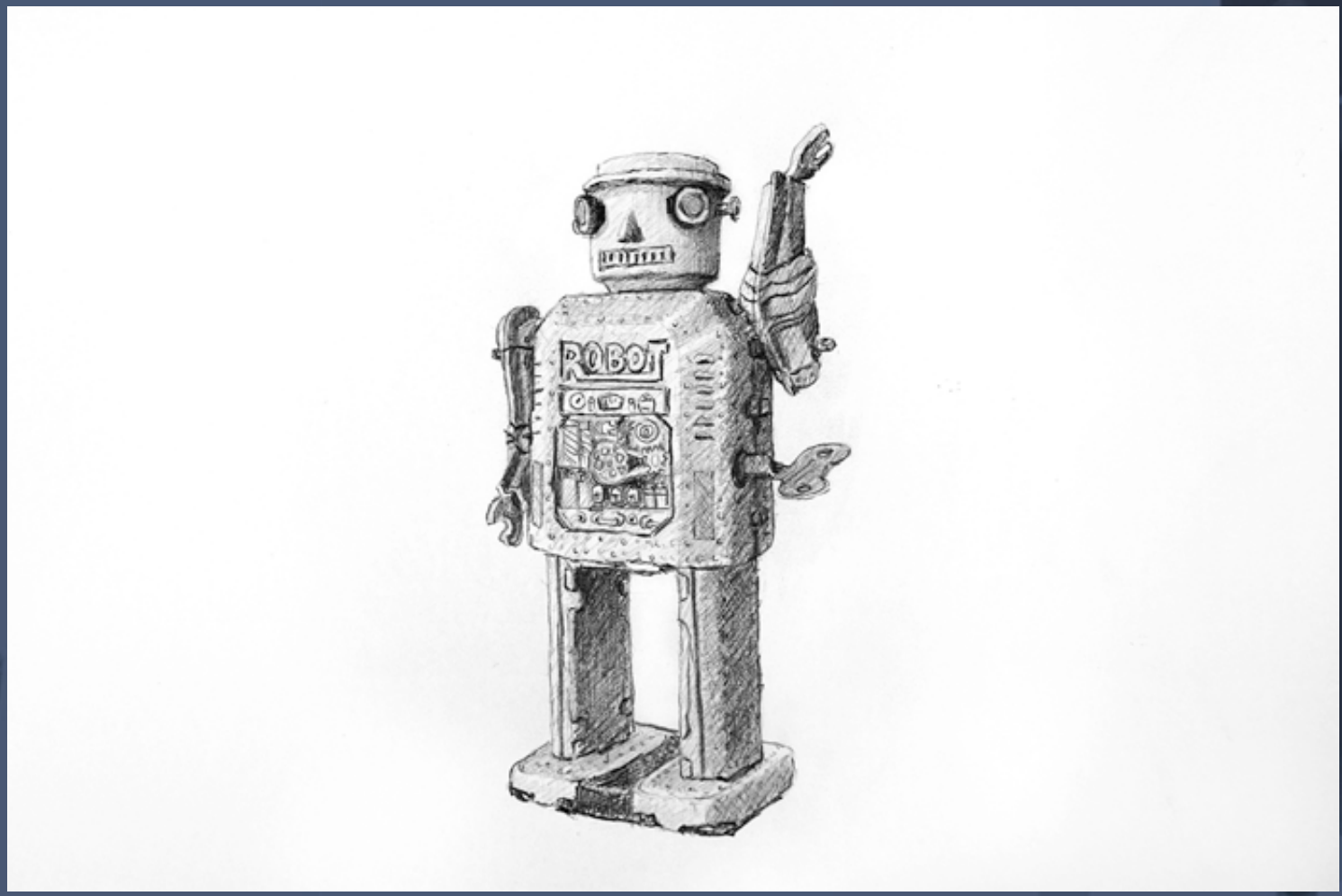

José Vicente Martin, camera lucida drawing, 2014

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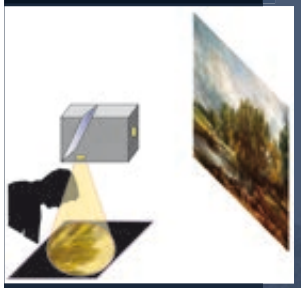

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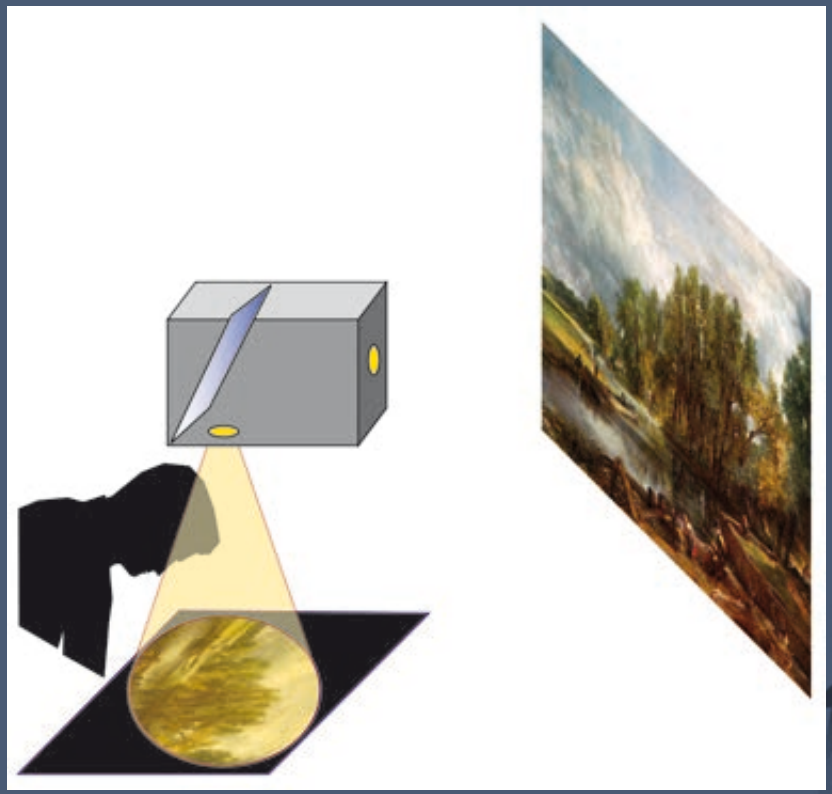
A2. IMAGE OVER



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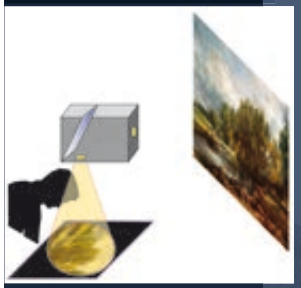

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Tent camera obscura, Edmund Atkinson, 1875

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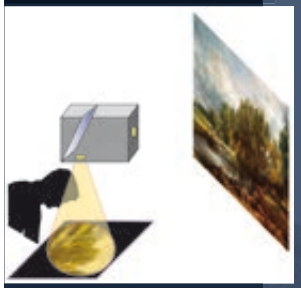

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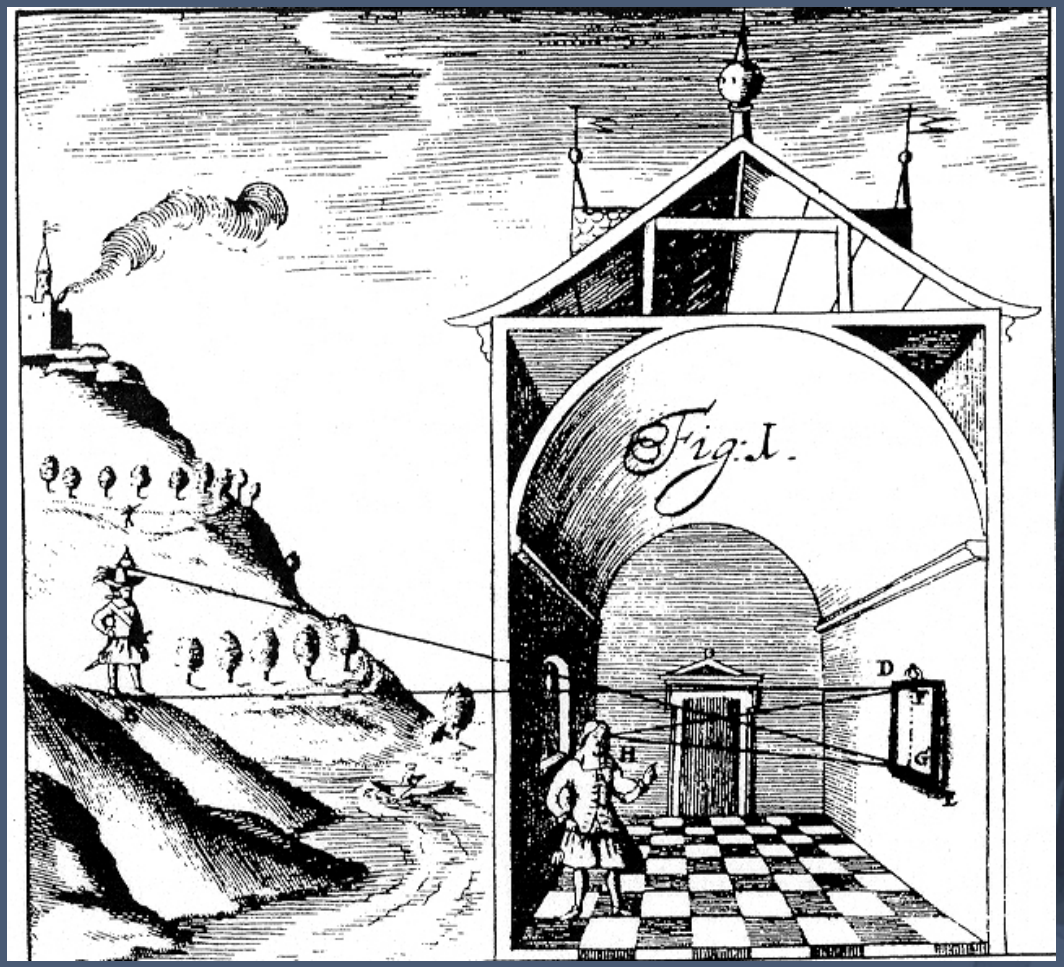

Camera obscura in Magia Universalis by Gaspar Schott, 1657

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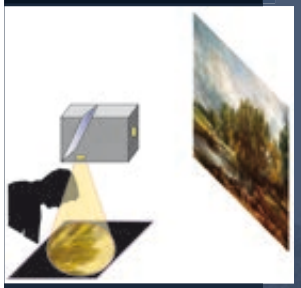

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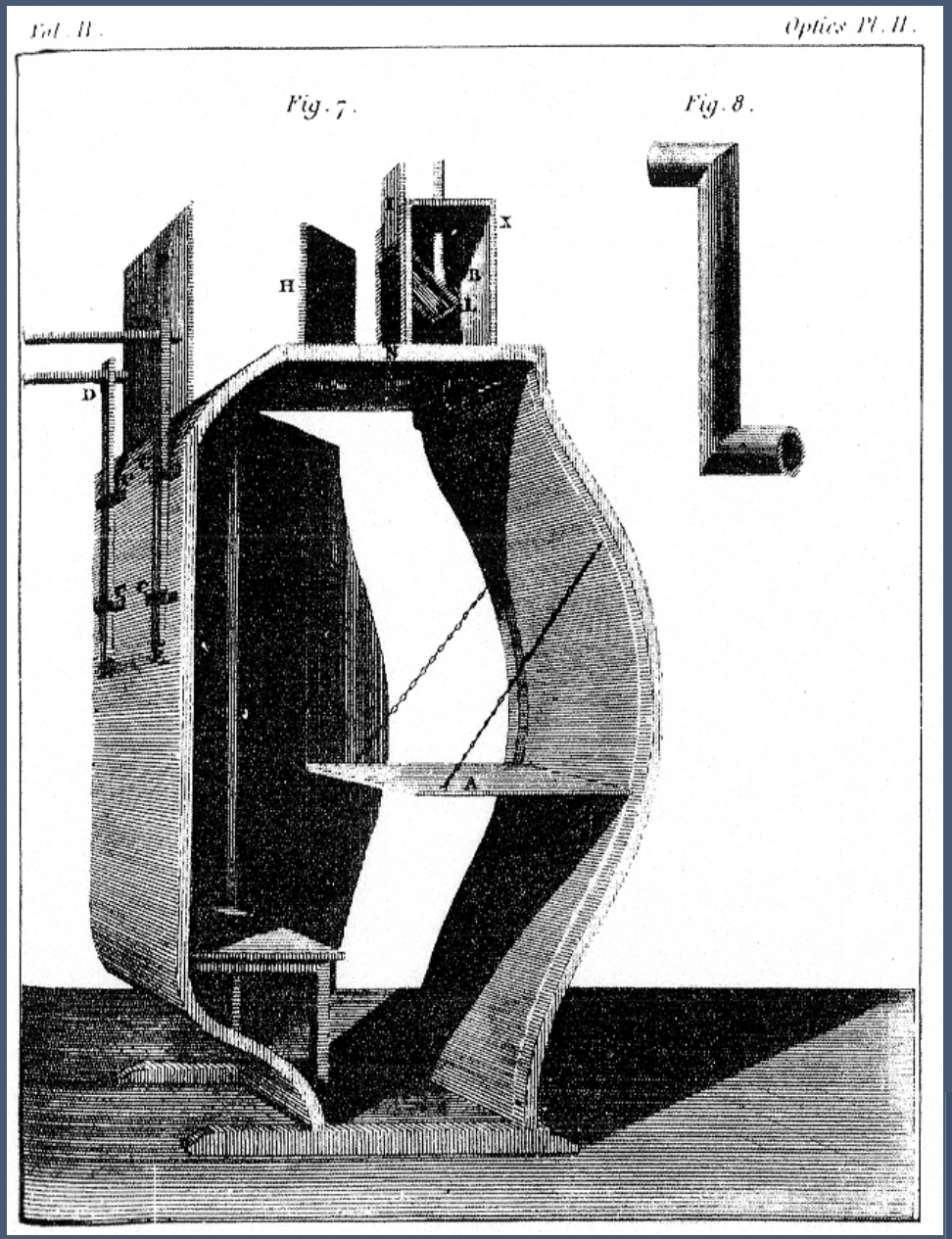

Camera obscura chair type, W. Jacob's Gravesande, 1711

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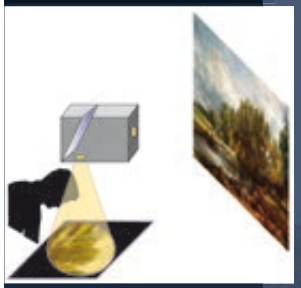

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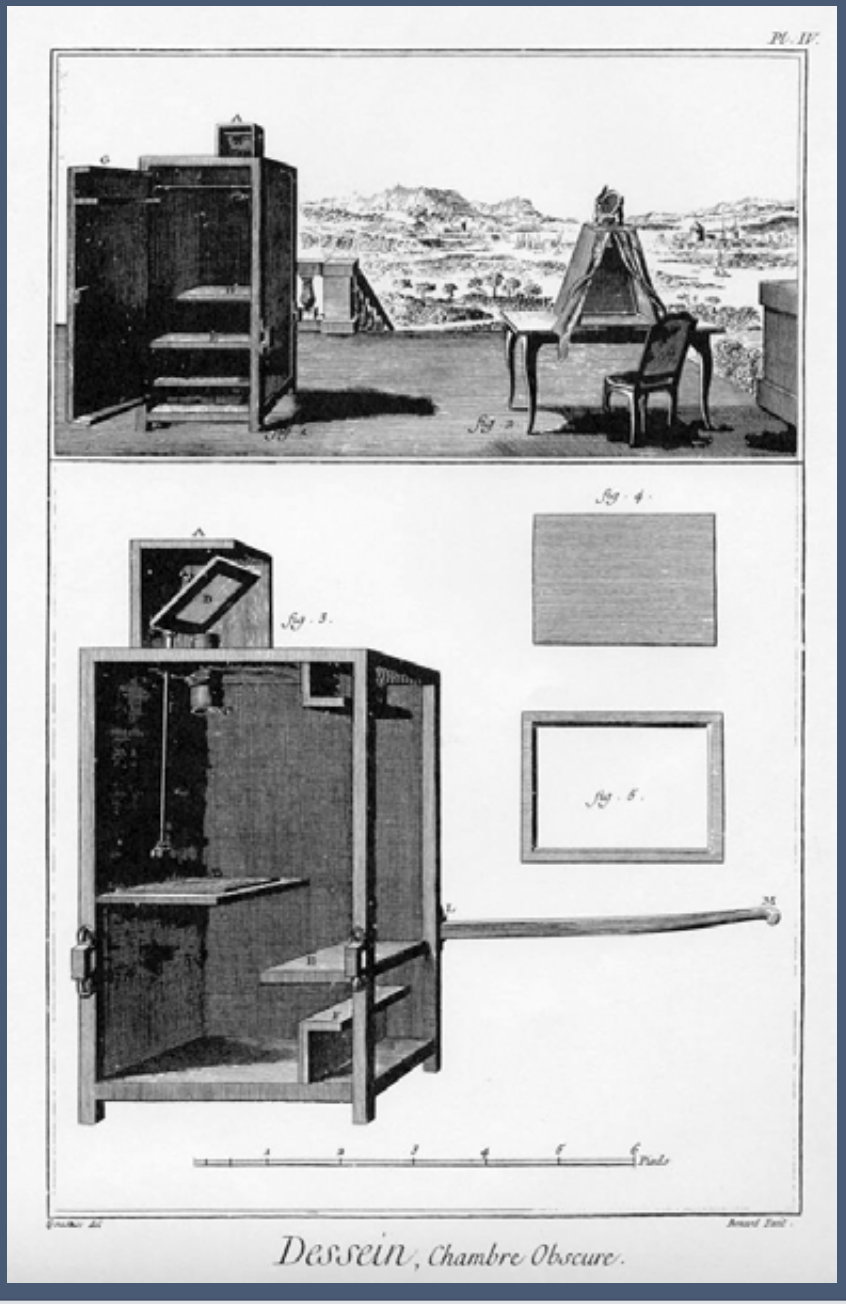

Cameras obscura , Enciclopedy of Diderot and D'Alembert, 1750

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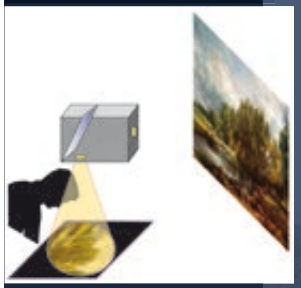

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Giant Camera obscura over image, San Francisco, USA

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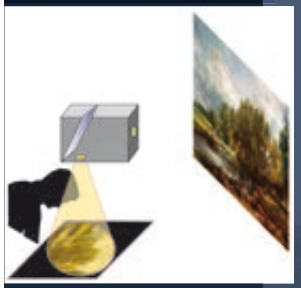

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Inside of a camera obscura

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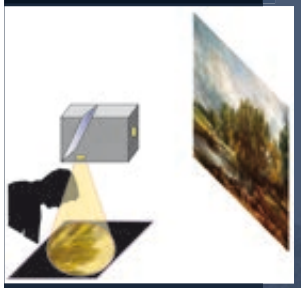

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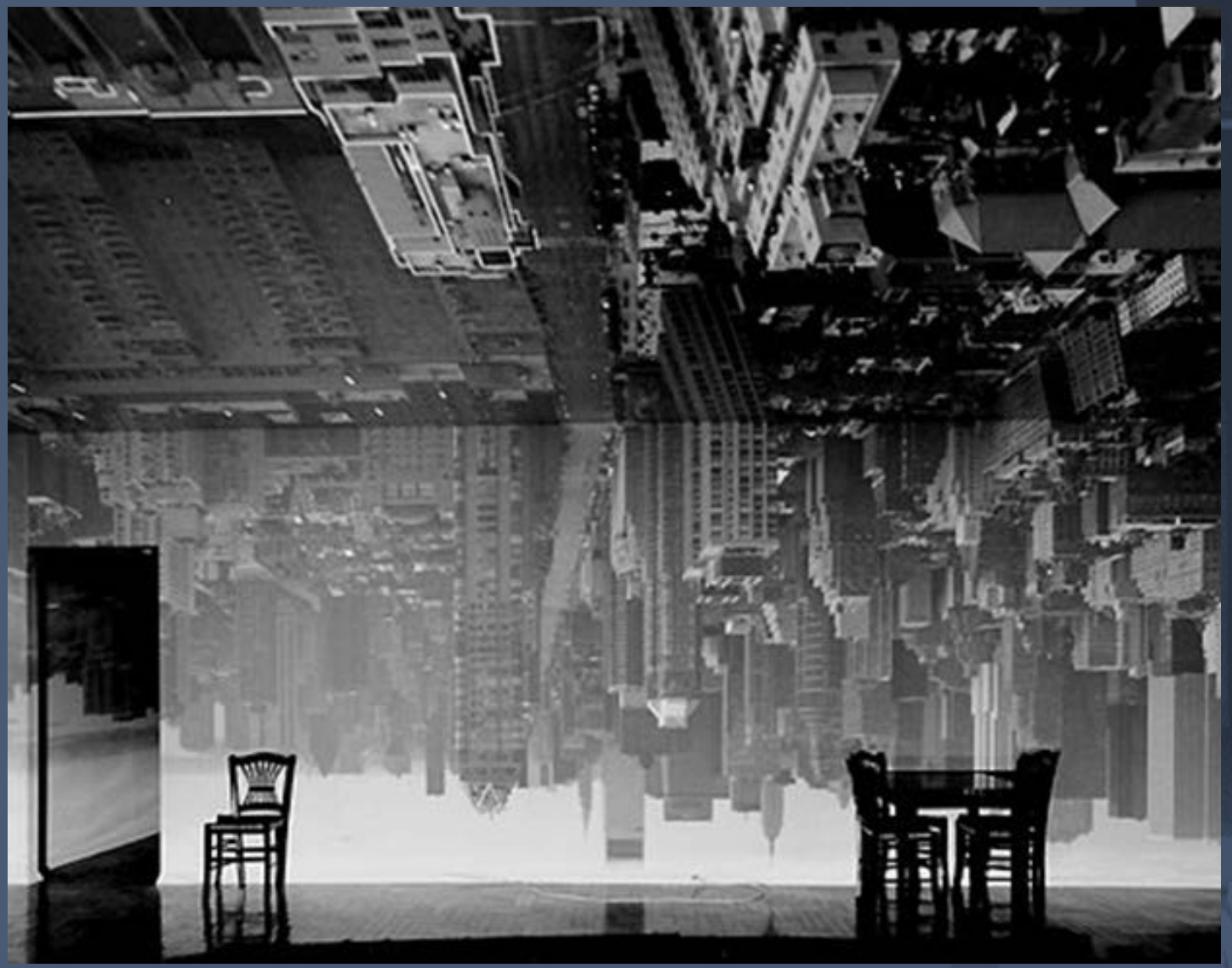

Abelardo Morell, *Camera obscura: Manhattan South*, 2010

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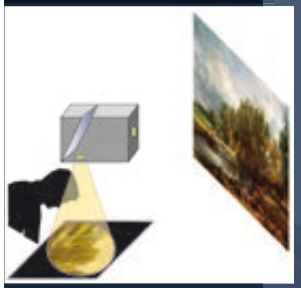

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Abelardo Morell,
Camera obscura: View of the Brooklyn Bridge in Bedroom, 2009

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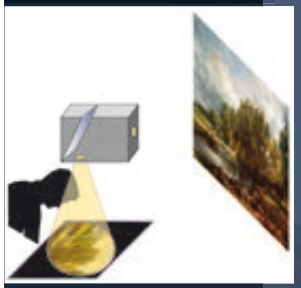

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Abelardo Morell, *Camera obscura: View of the Manhattan Bridge*, 2010

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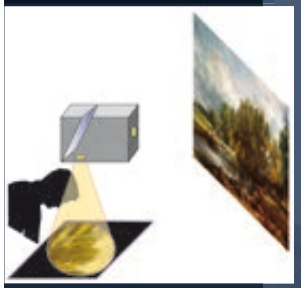

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Camera with lens. David Hockney's still life

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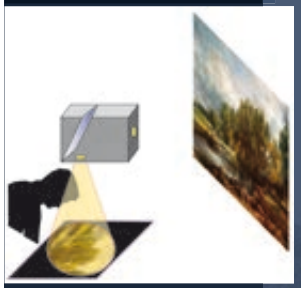

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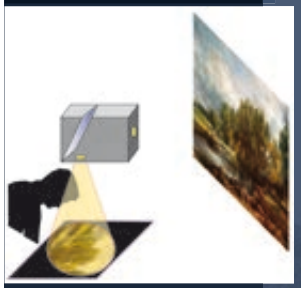

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Chardin's still life, middle 18th Century

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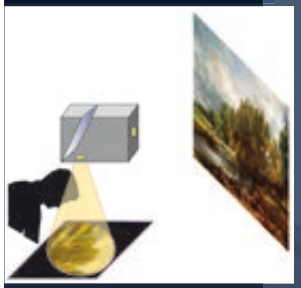

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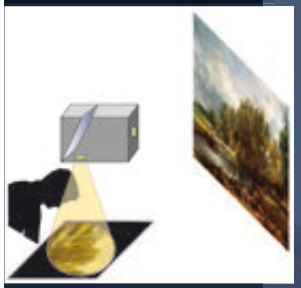

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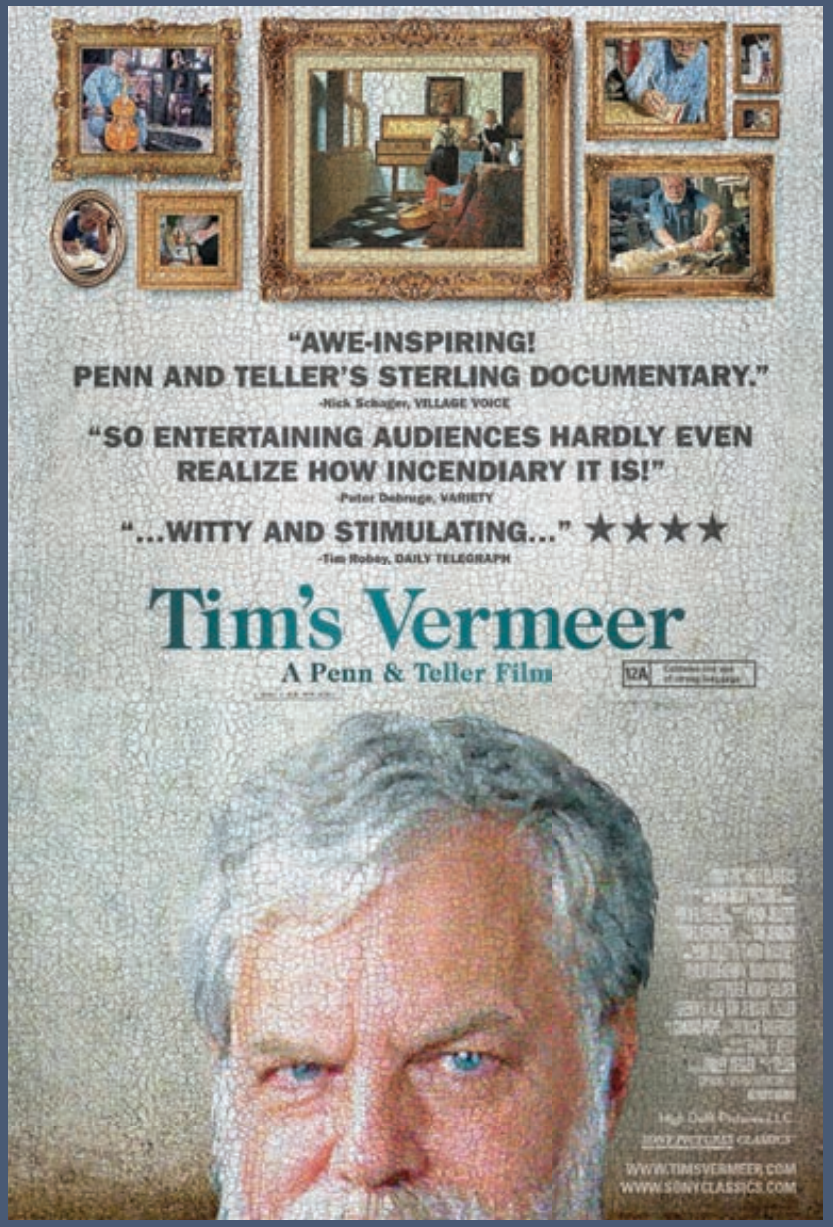

Tim's Vermeer, 2013

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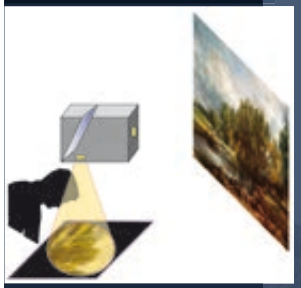

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Canaletto's drawings made with camera obscura, 1735-40

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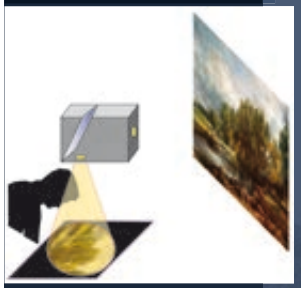

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The Piazzetta , Canaletto, 1725

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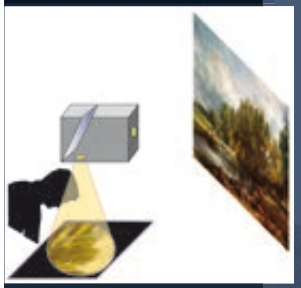

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The Piazzetta, looking toward the Clock Tower by Canaletto, 1726-1728

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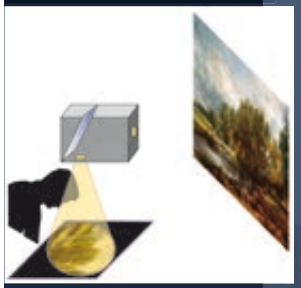

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Iván Albalate at the Museum of cinema , Girona, Spain

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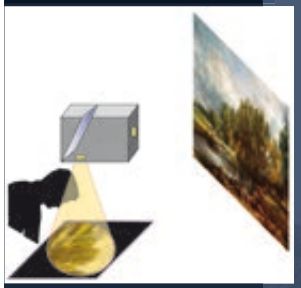

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Mariano Sánchez, *Channel of Trocadero from Puntales*, 1782

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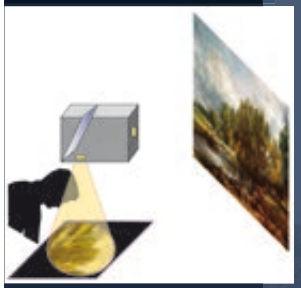

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Mariano Sánchez, *Suazo bridge*, 1782

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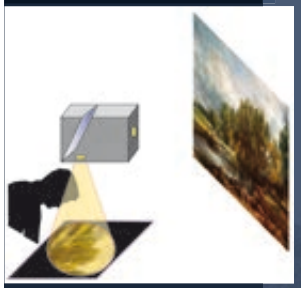

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Mariano Sánchez, *Málaga*, 1785

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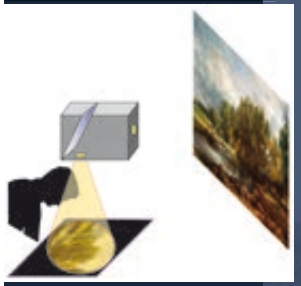

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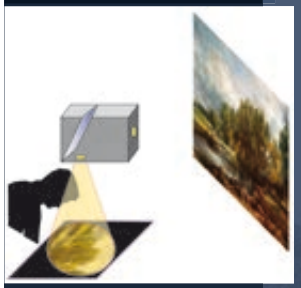
Camera obscura, 18th century

Tent camera obscura, 18th century

SEEING THE REALITY
TYPES
IN PAINTING
CAMERA LUCIDA

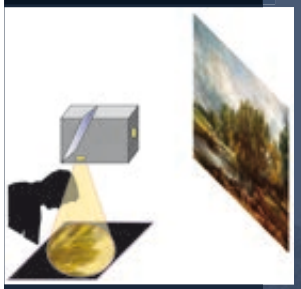


COPYING THE REALITY
TYPES
IN PAINTING
OUR RESEARCH

Replica camera obscura, 18th century

Replica tent camera obscura, 18th century

SEEING THE REALITY
TYPES
IN PAINTING
CAMERA LUCIDA



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TYPES
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OUR RESEARCH

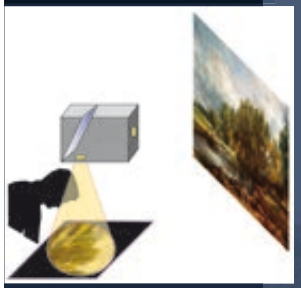
Mariano Sánchez, *Castle of Alicante*, 1785

SEEING THE REALITY

TYPES

IN PAINTING

CAMERA LUCIDA



COPYING THE REALITY

TYPES

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OUR RESEARCH

Using the tent camera

SEEING THE REALITY
TYPES
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CAMERA LUCIDA

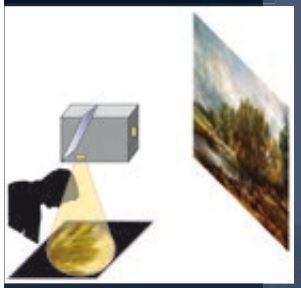

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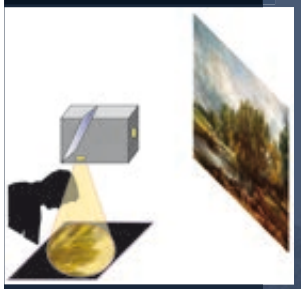
Image behind camera

Image over tent camera

SEEING THE REALITY
TYPES
IN PAINTING
CAMERA LUCIDA



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Using the tent camera

SEEING THE REALITY

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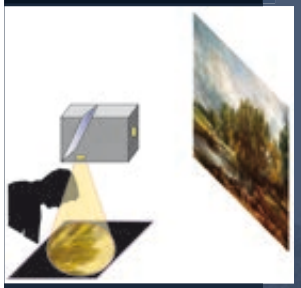

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Drawing made with tent camera

SEEING THE REALITY

TYPES

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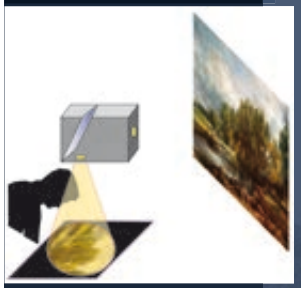

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Drawing made with tent camera

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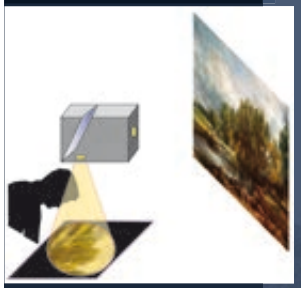

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Tracing drawings to the picture

SEEING THE REALITY
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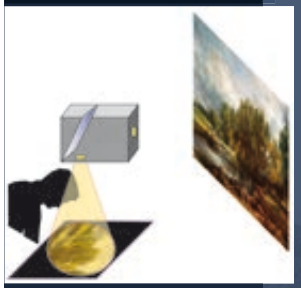
CAMERA LUCIDA



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First layer in painting process

SEEING THE REALITY

TYPES

IN PAINTING

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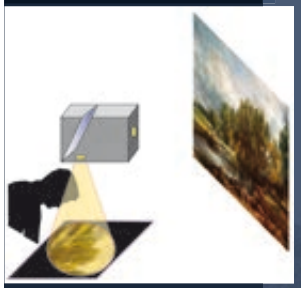

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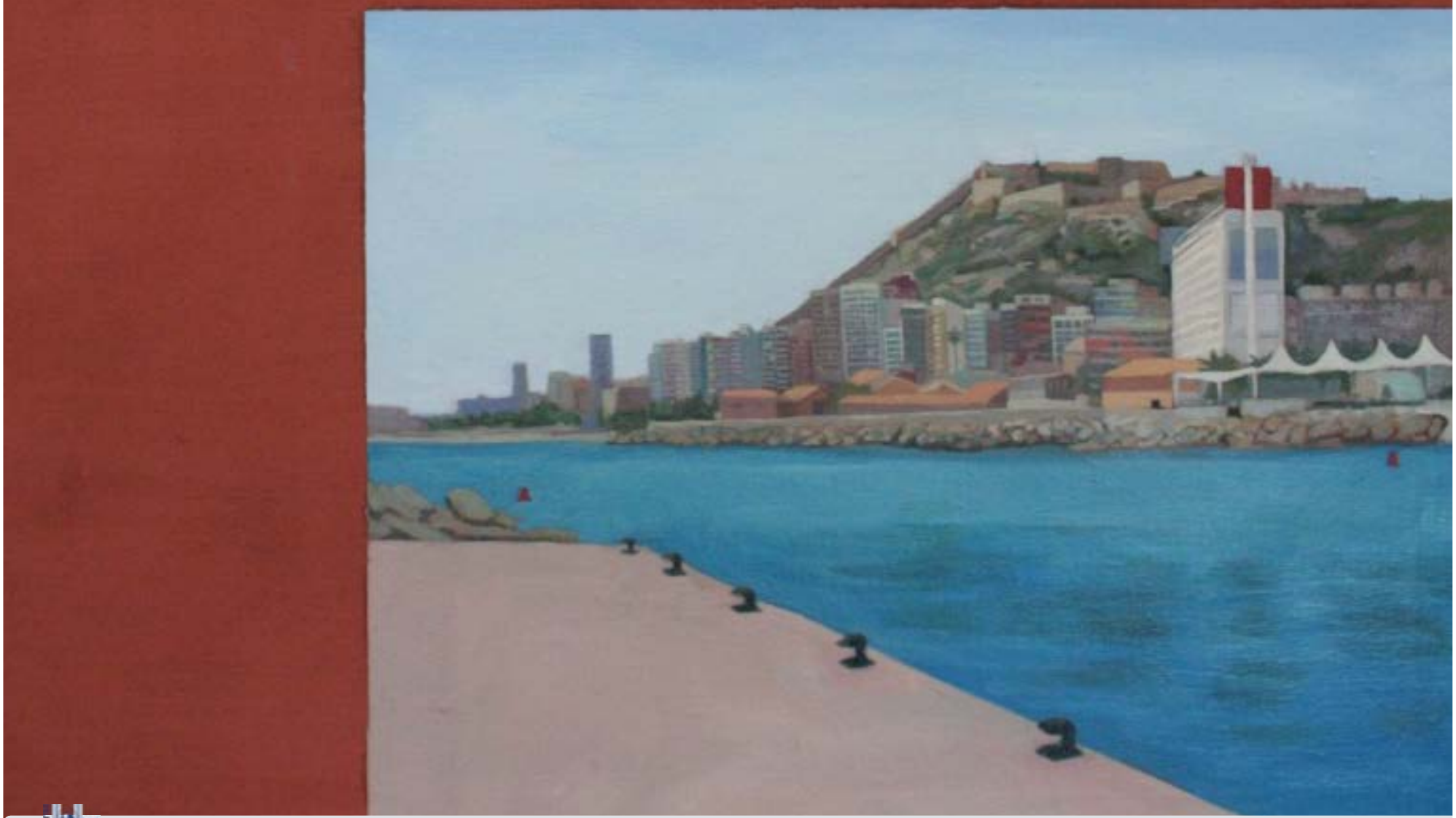
Final result of the painting



SEEING THE REALITY
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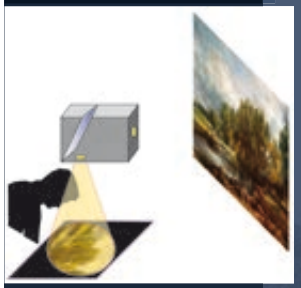

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Iván Albalate, *after Mariano Sánchez.*

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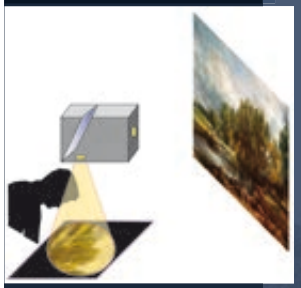

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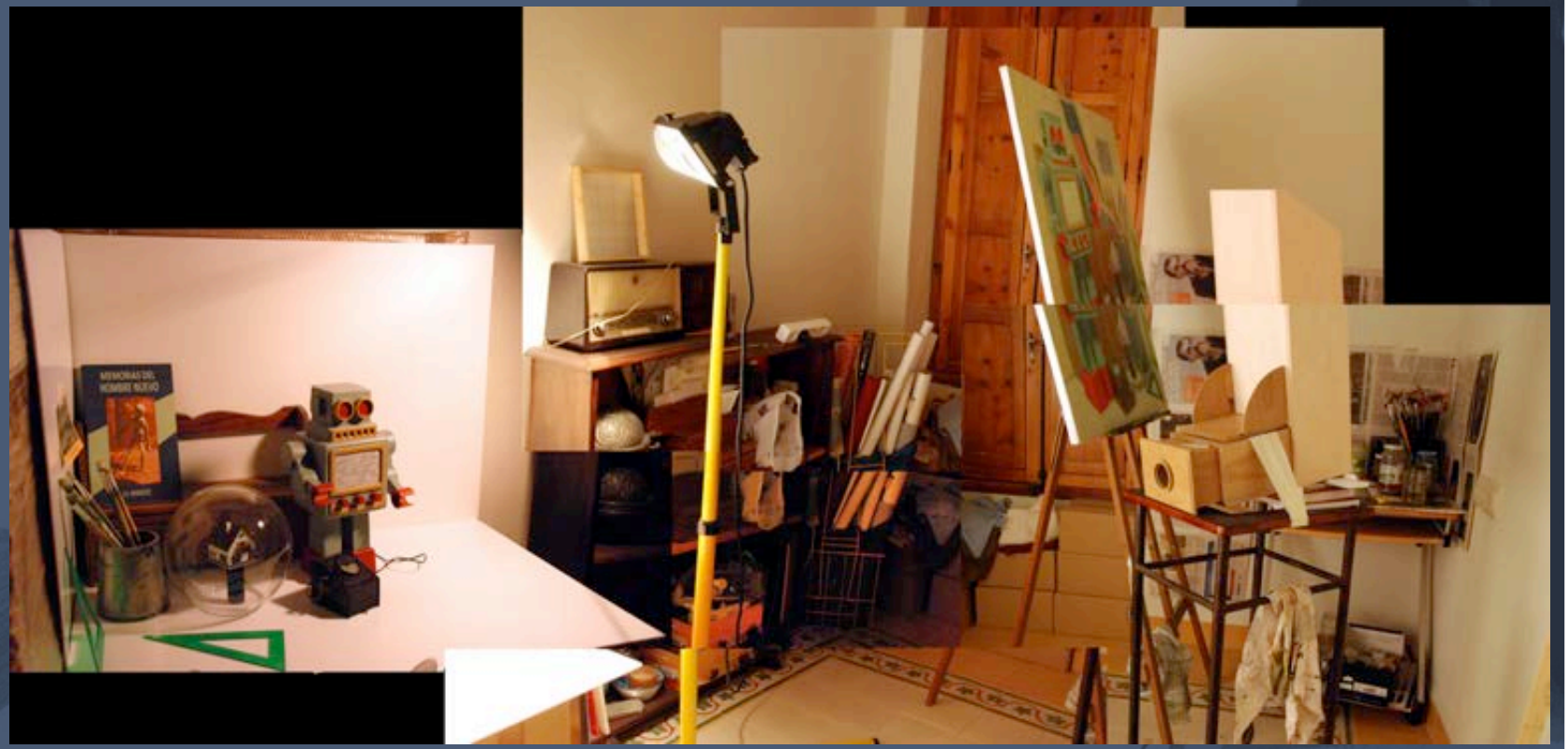

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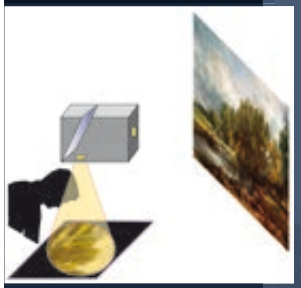

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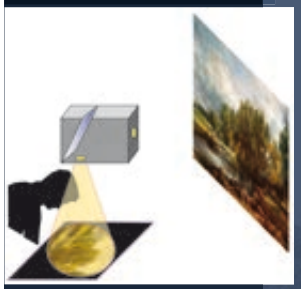

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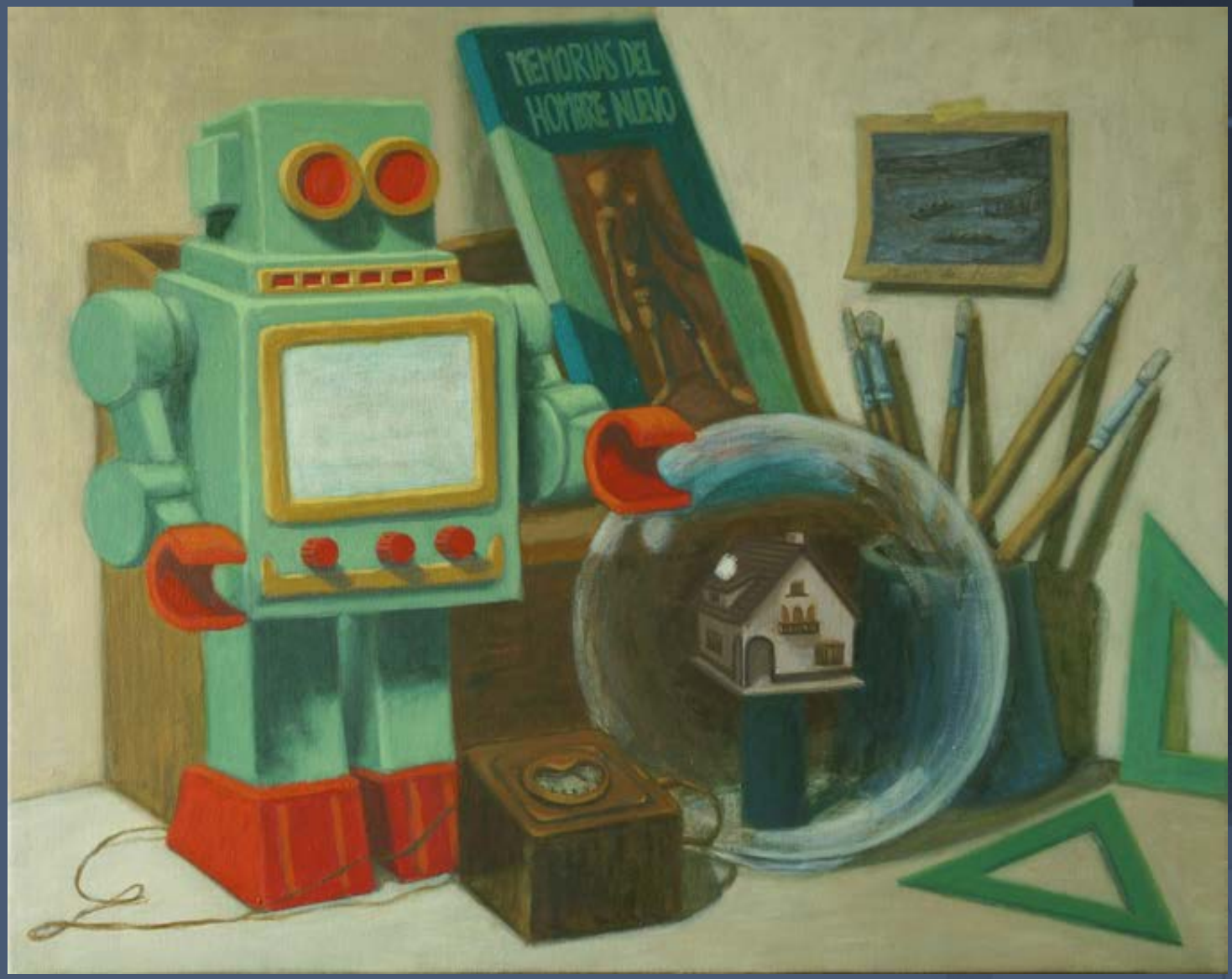

José Vicente Martín, *Memories of the New Man*, 2014. Oil on canvas.

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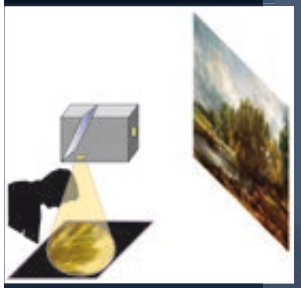

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Franz Hals, *Boy drinking,* 1626-1628

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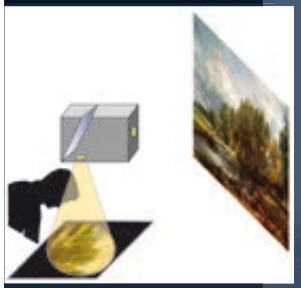

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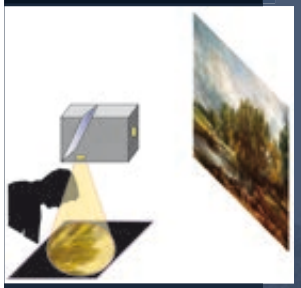

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Caravaggio, *Baco*. 1595-96

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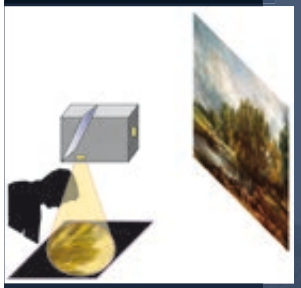

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Caravaggio, *Baco*. 1595-96

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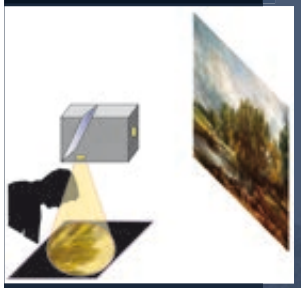

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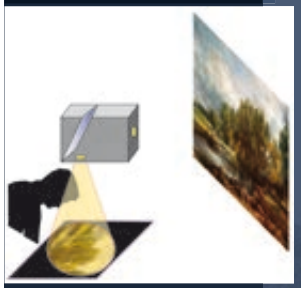

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