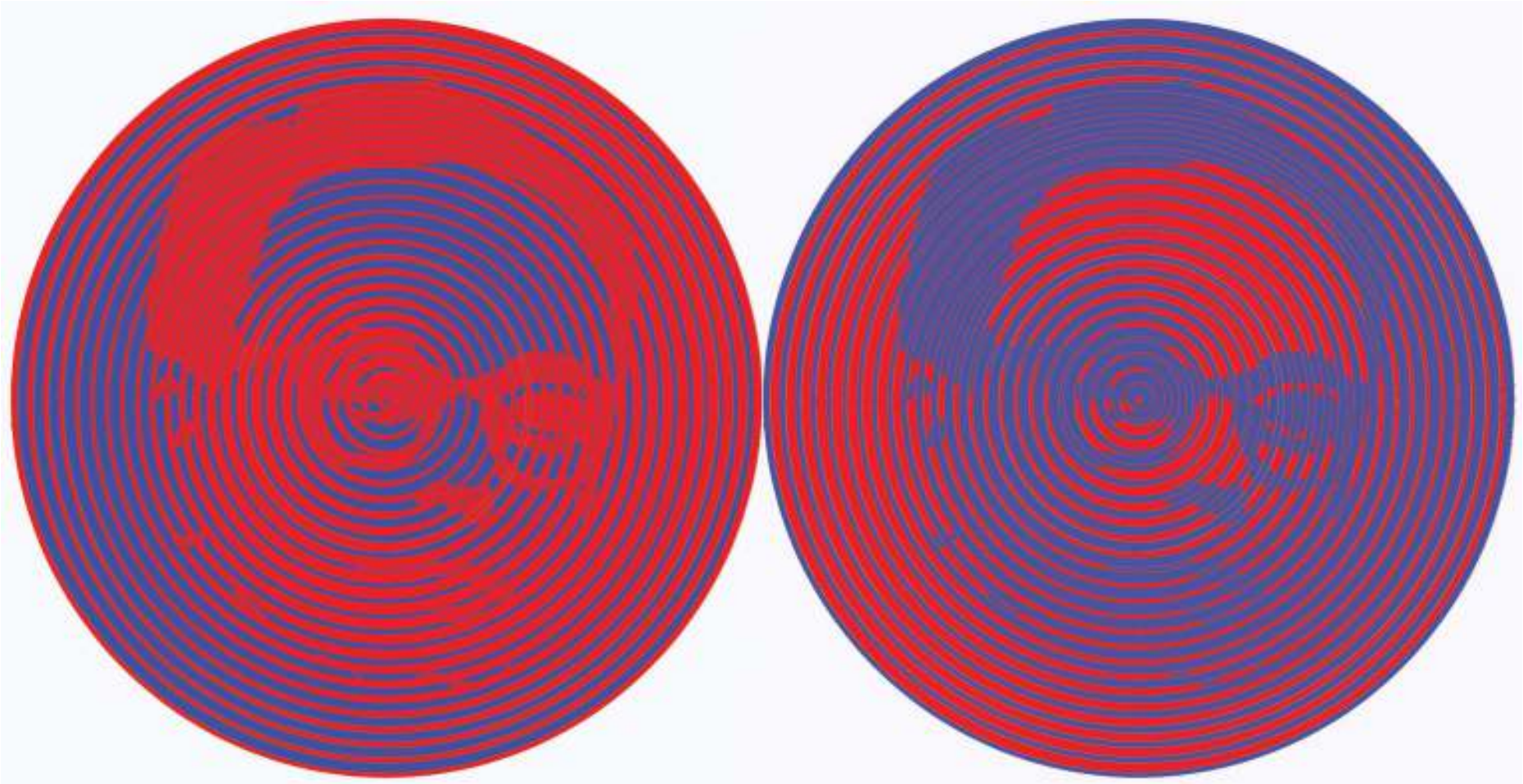
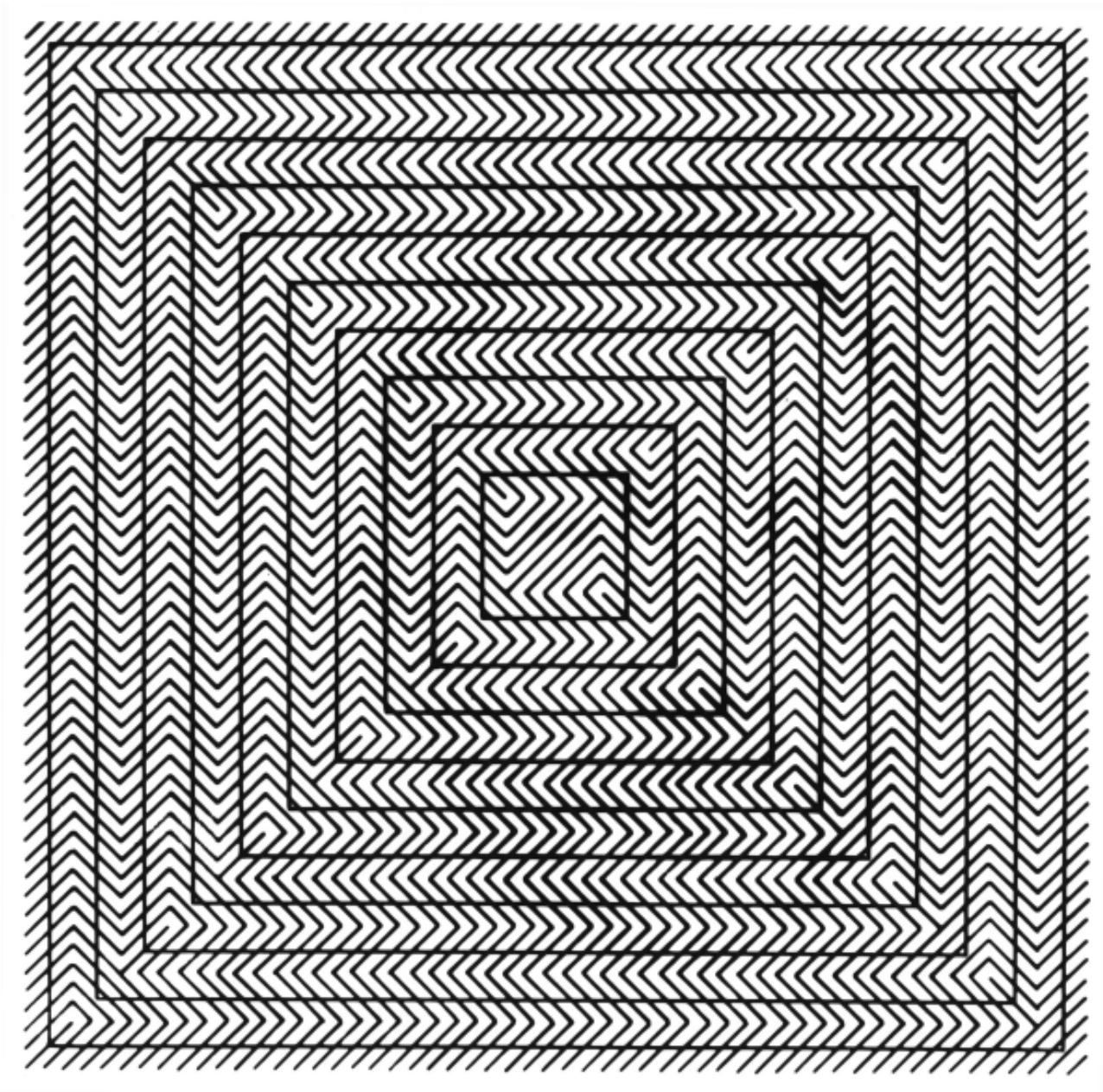
Scientific Art or Artistic Science?



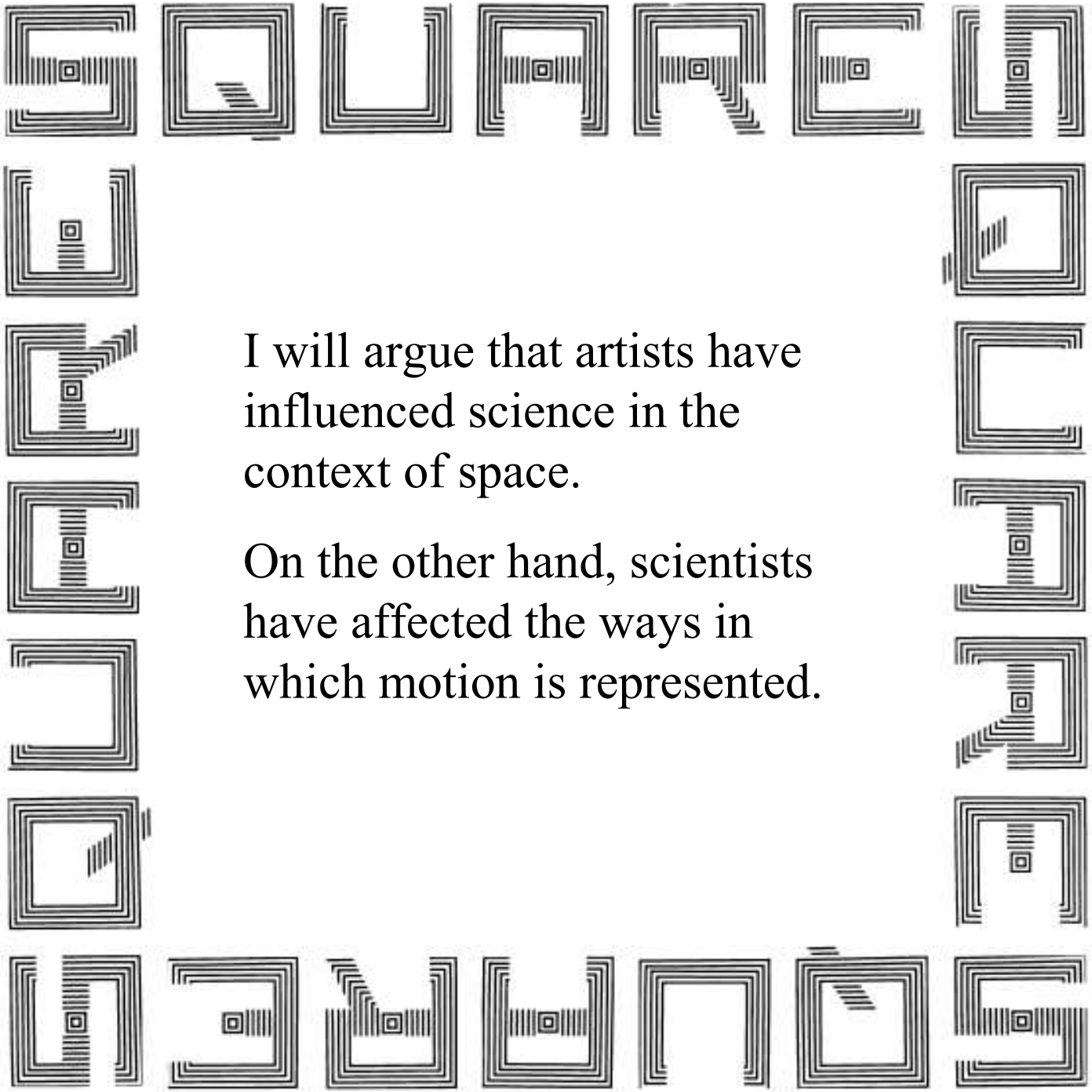
Nicholas Wade, University of Dundee

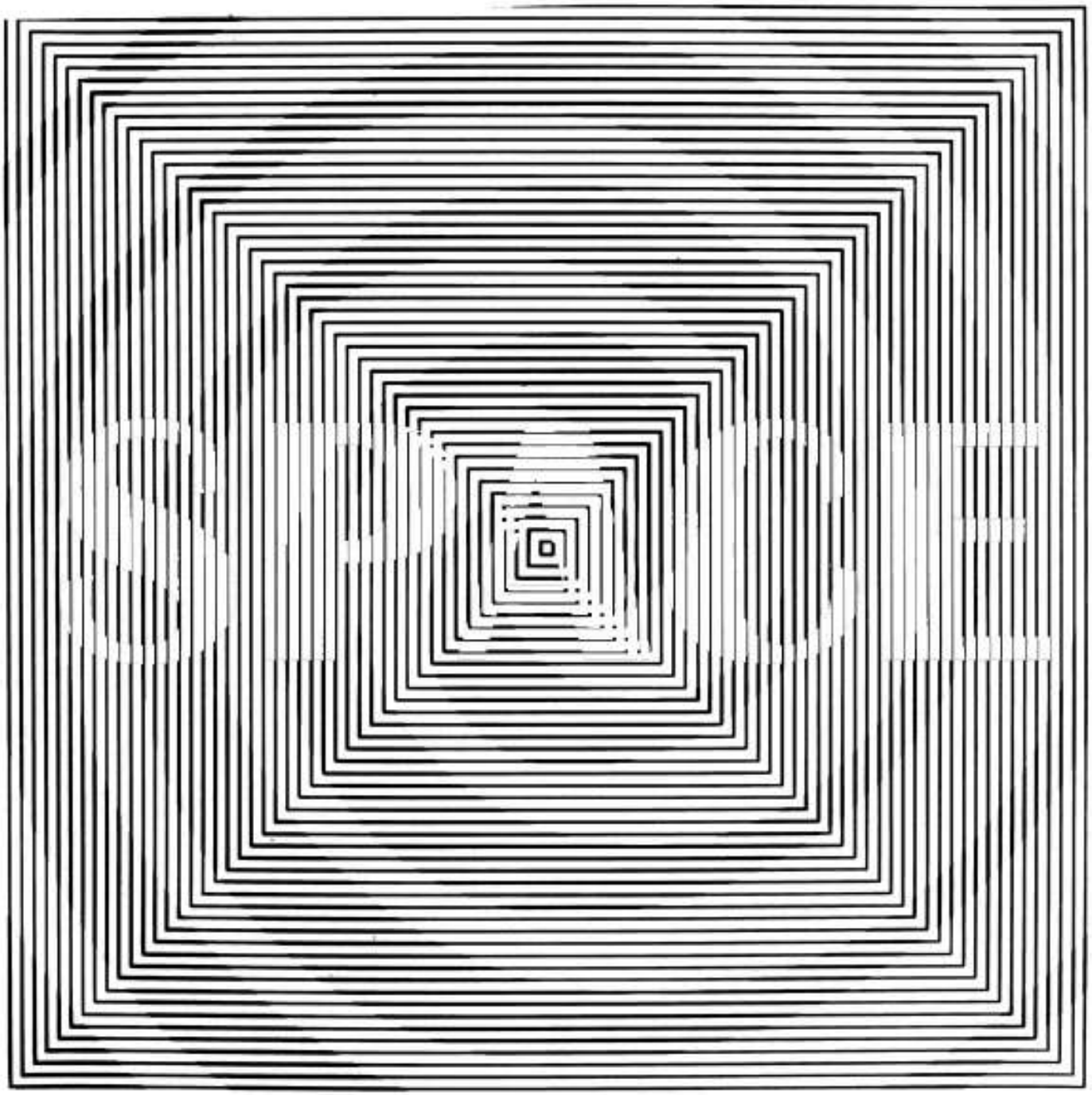
Artists represent natural phenomena whereas scientists interpret them.

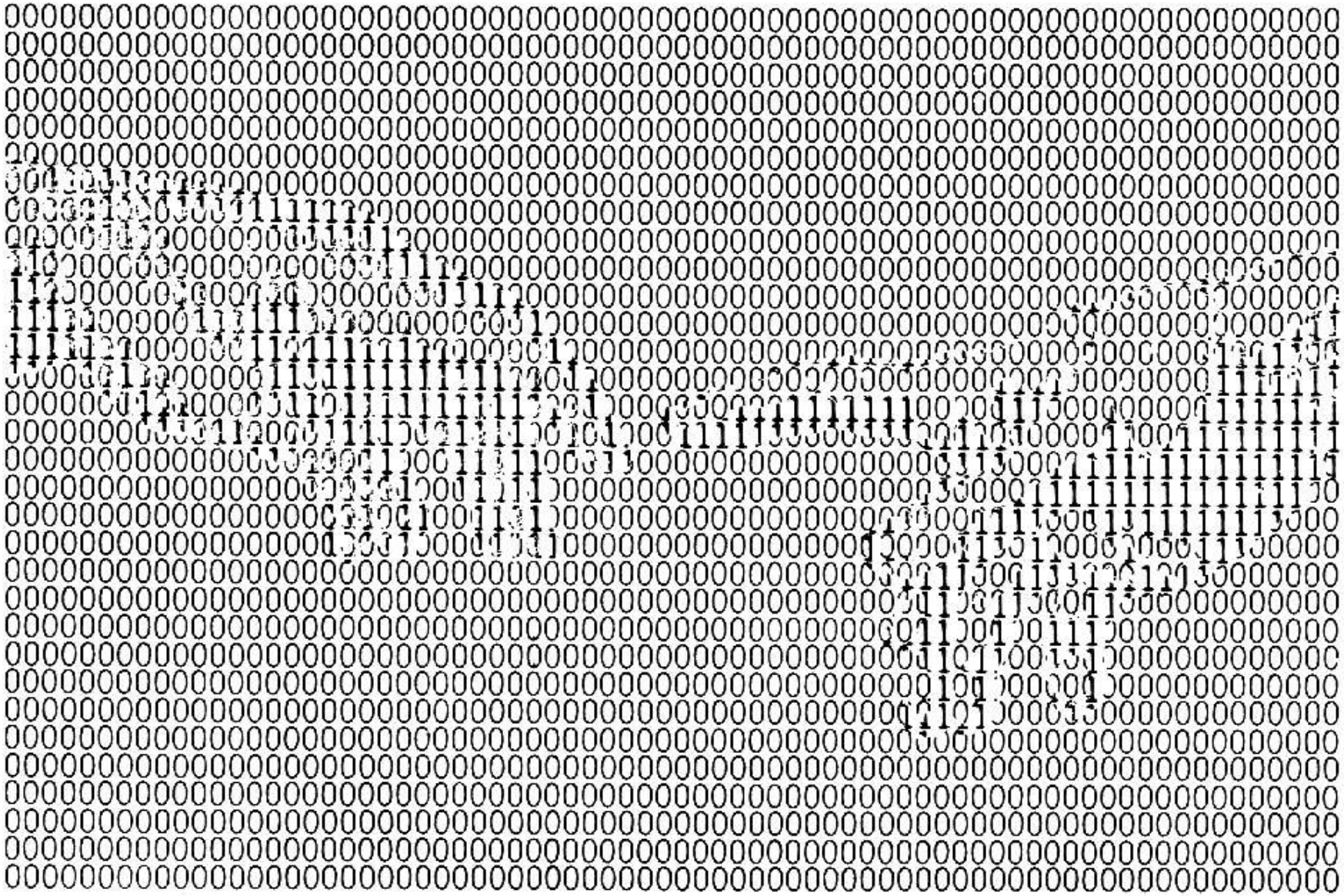


“Visual illusions”

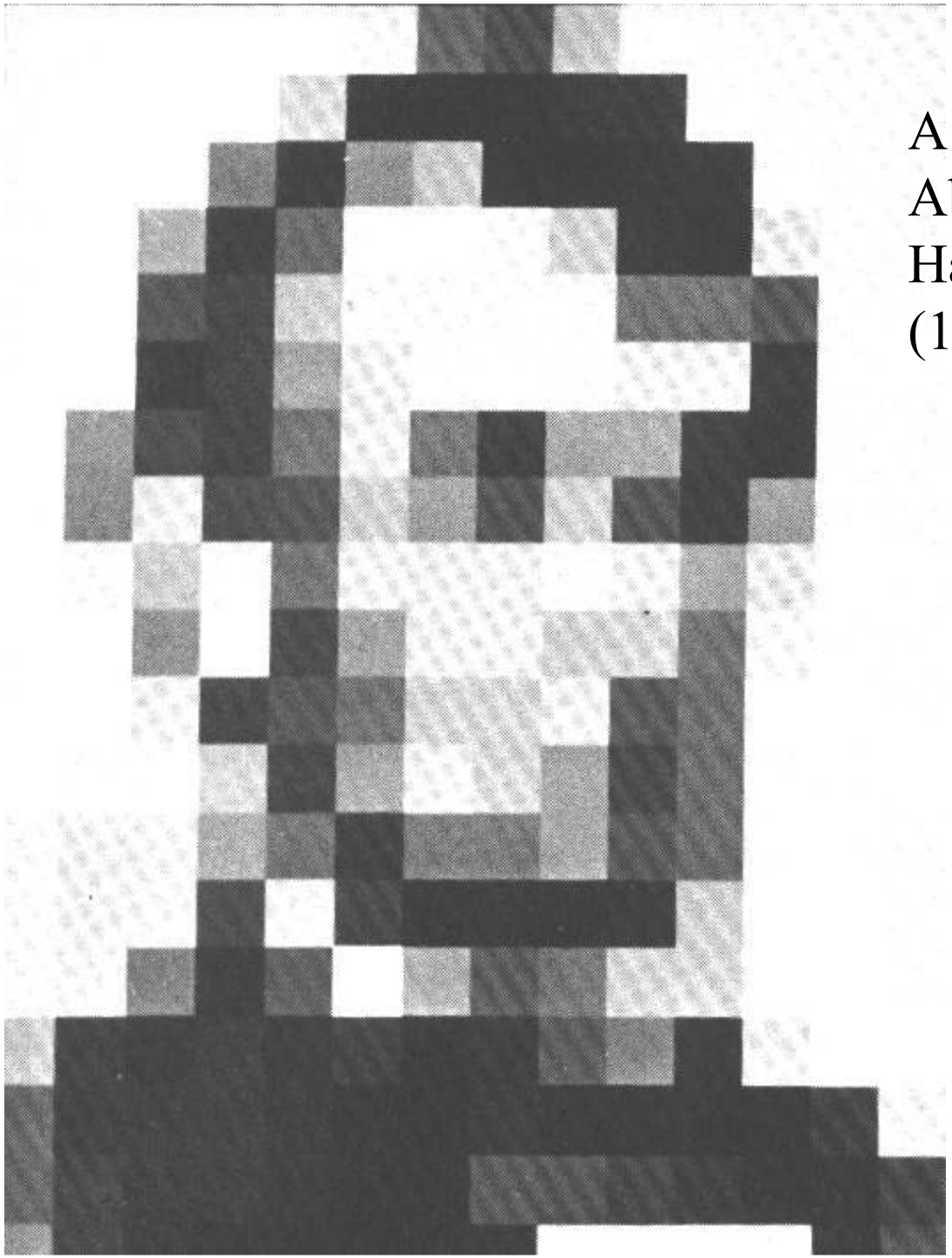
Pictures are devoid of two dimensions present in objects – depth and motion. The depth is allusory and the motion is implied.


I will argue that artists have influenced science in the context of space.
On the other hand, scientists have affected the ways in which motion is represented.

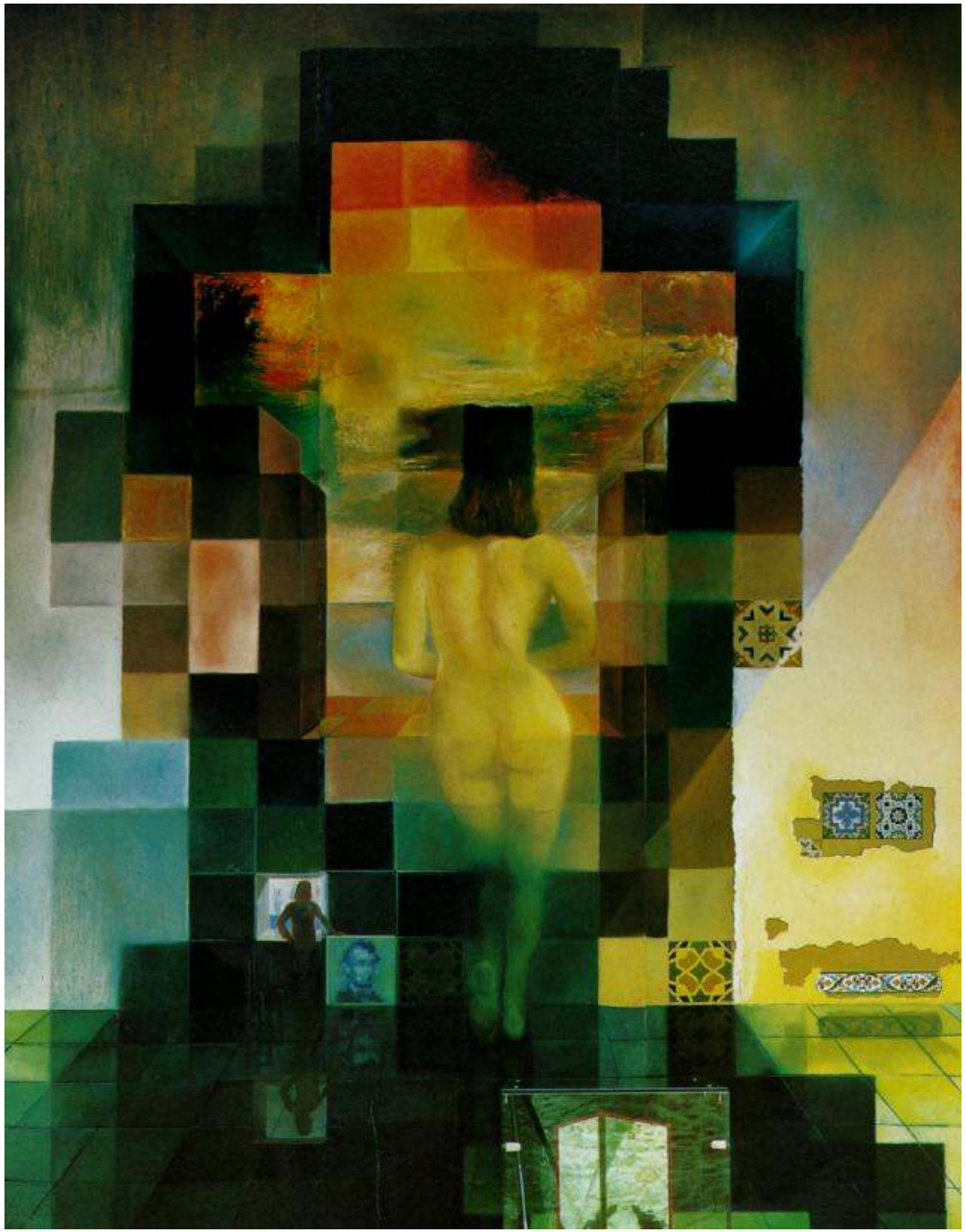




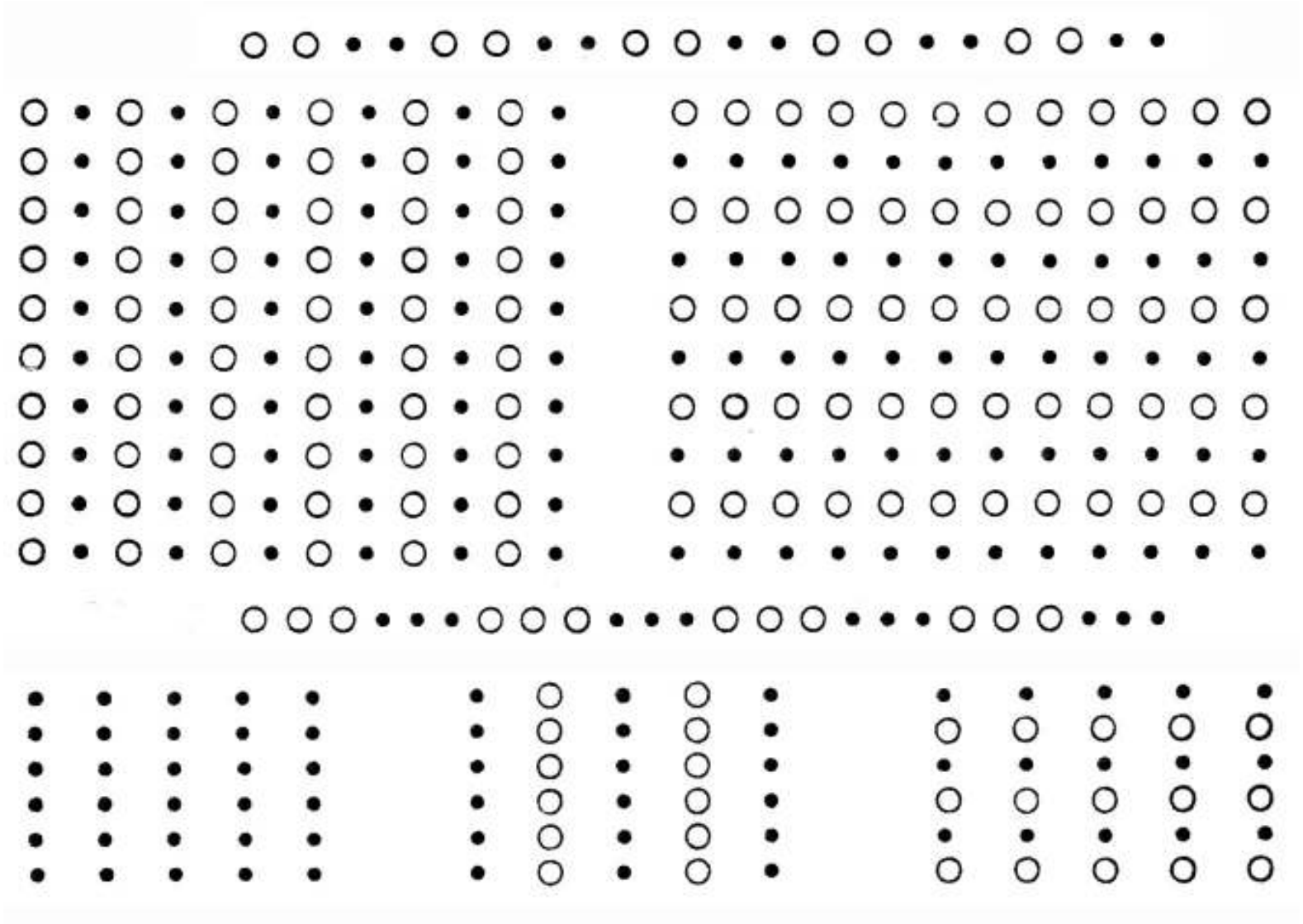
“Digital picture”



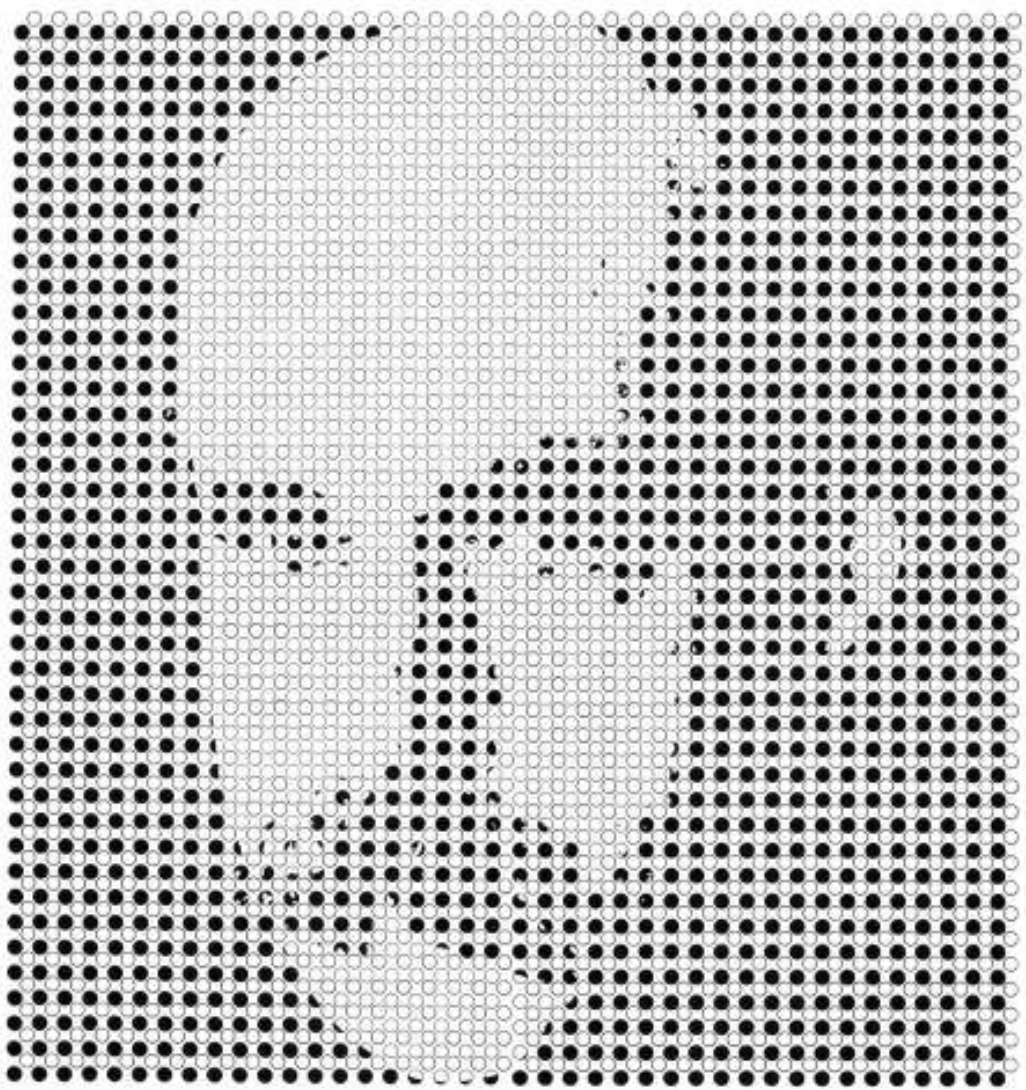
A digitised image of Abraham Lincoln by Harmon and Julesz (1973)



Salvador Dali's painting "Gala Contemplating the Meditteranean Sea" (1976)

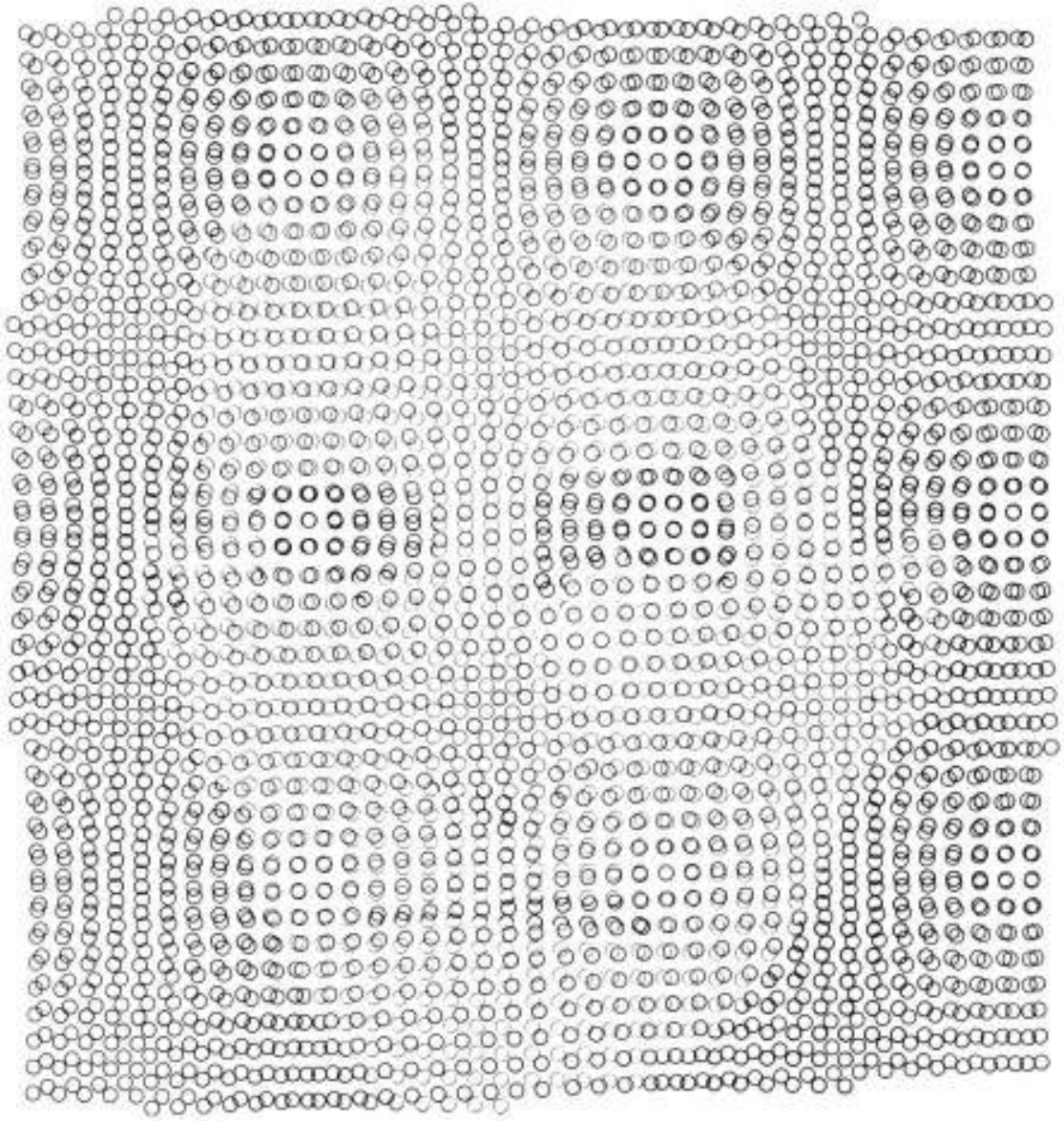


In the 1920s, Gestalt psychologists described the ways in which elements of patterns are grouped together perceptually.



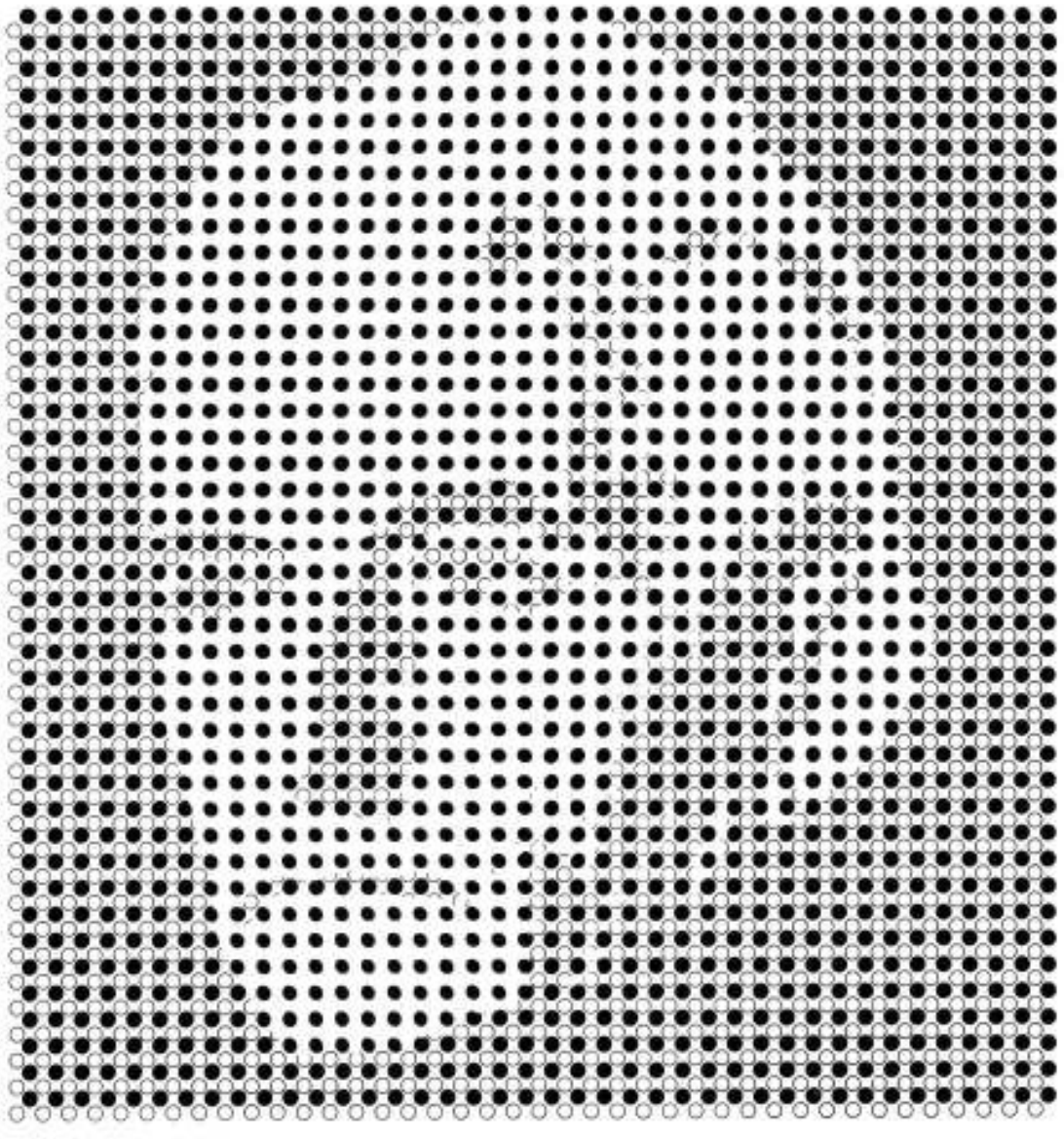
“Good Gestalt I”

Max Wertheimer (1880-1943)



“Good Gestalt II”

Franz Koffka (1886-1941)



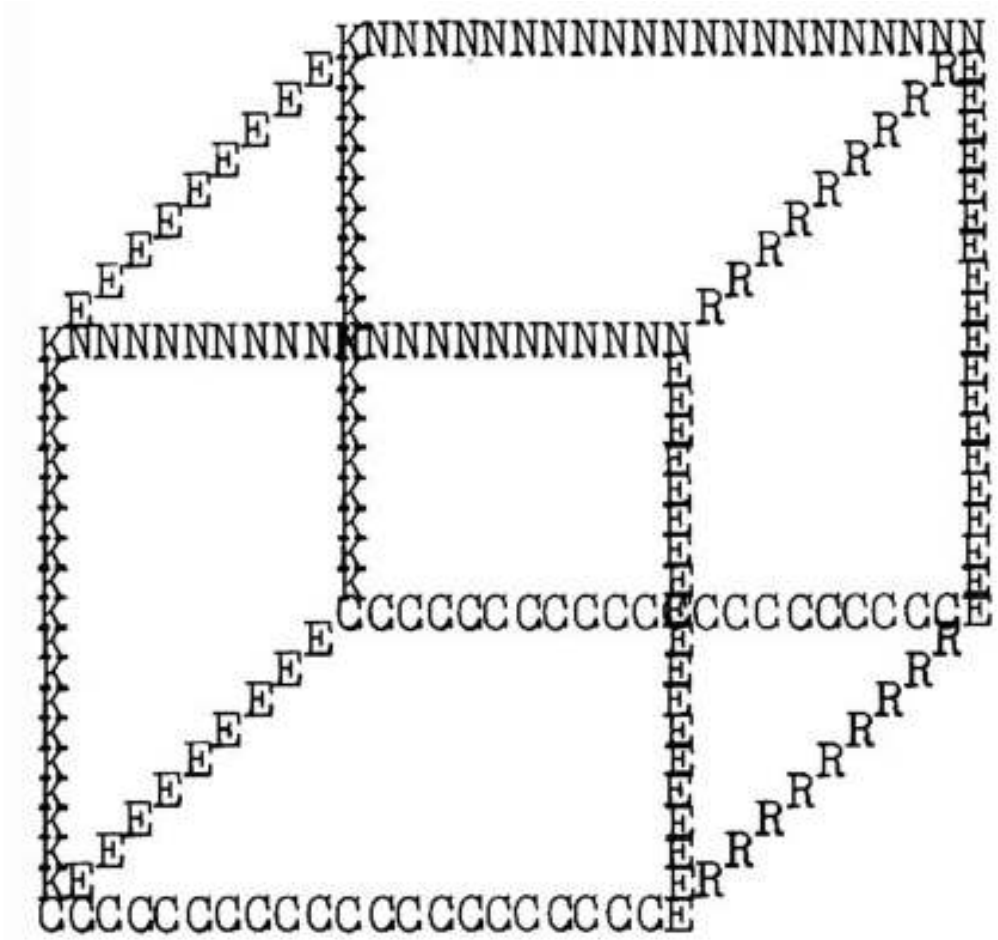
“Good Gestalt III”

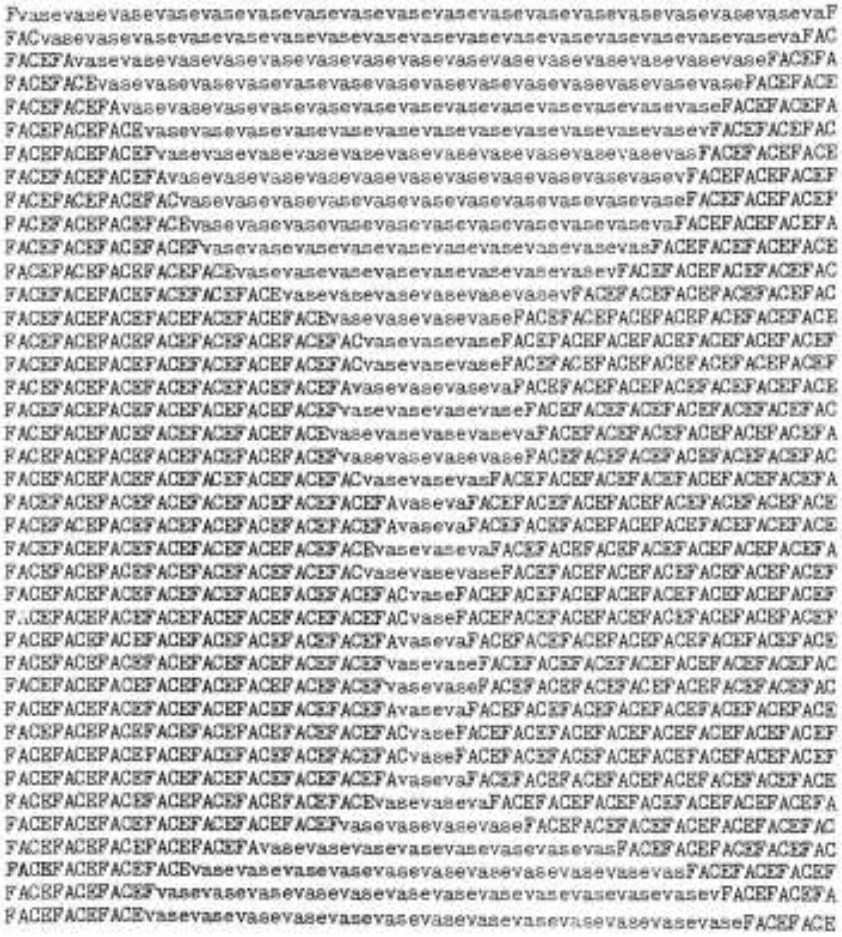
Wolfgang Köhler (1887-1967)

Mosaic of Ocean (from the 2nd century). Roman mosaics manipulated the elements of pictures (tesserae) to produce complex Gestalten. The artists demonstrated their knowledge of pictorial principles rather than the interpretations of them.

Mosaic from House of the Evil Eye, Antioch (2nd century)

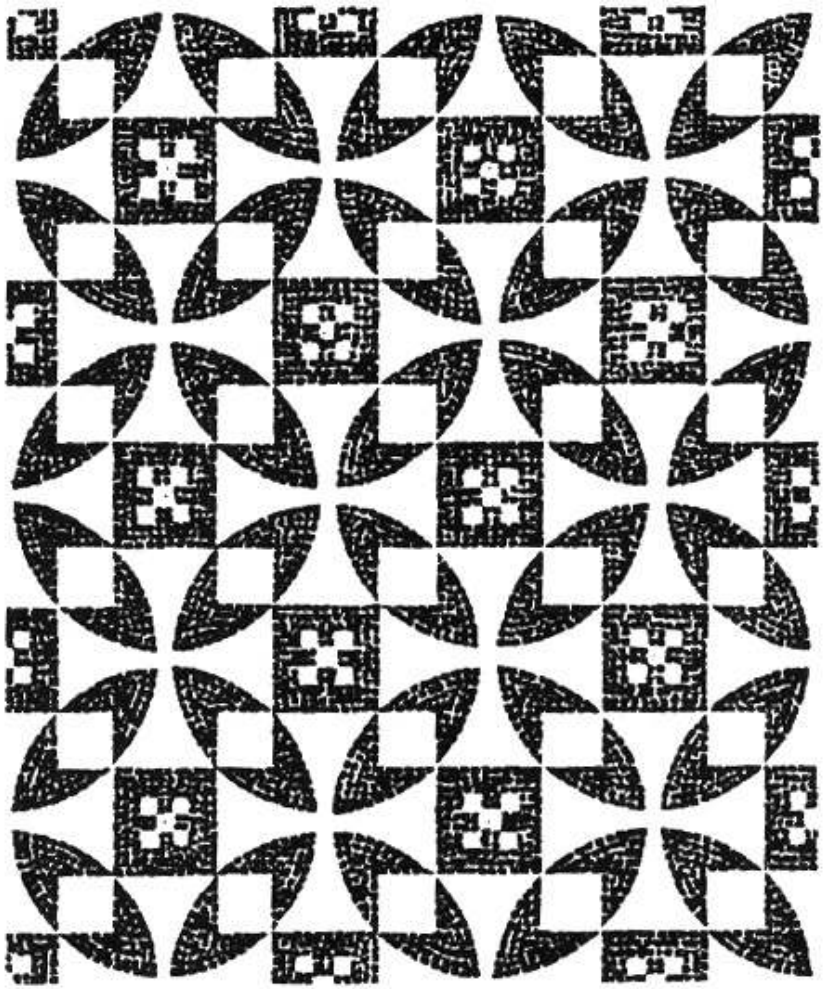
A 4th century mosaic floor from London

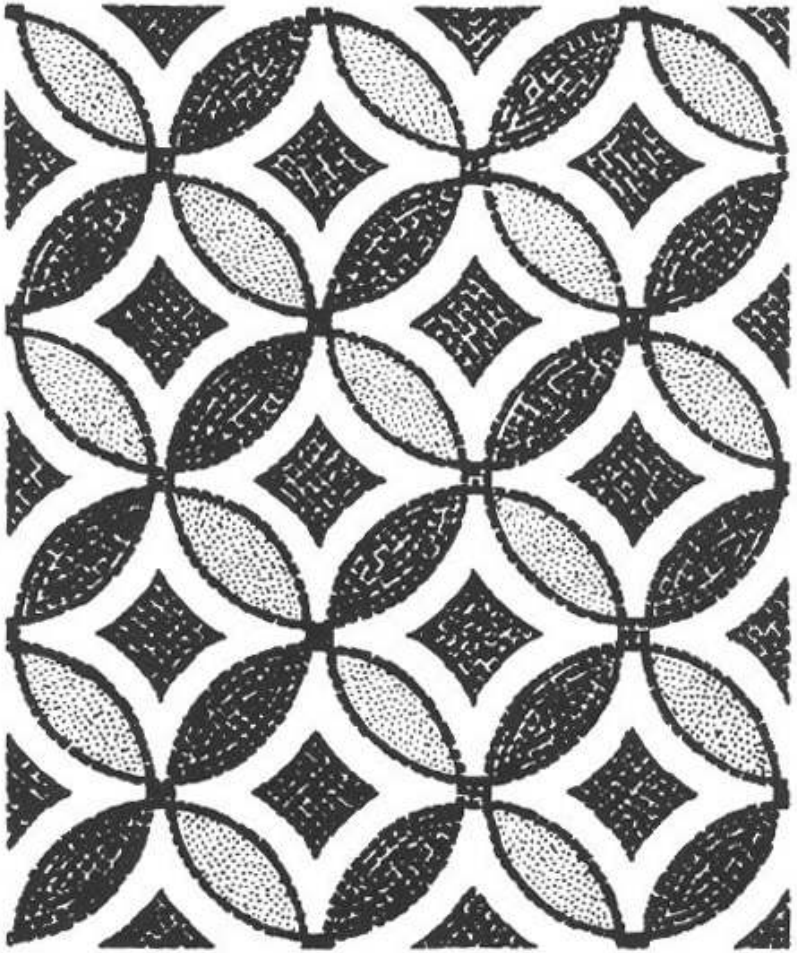




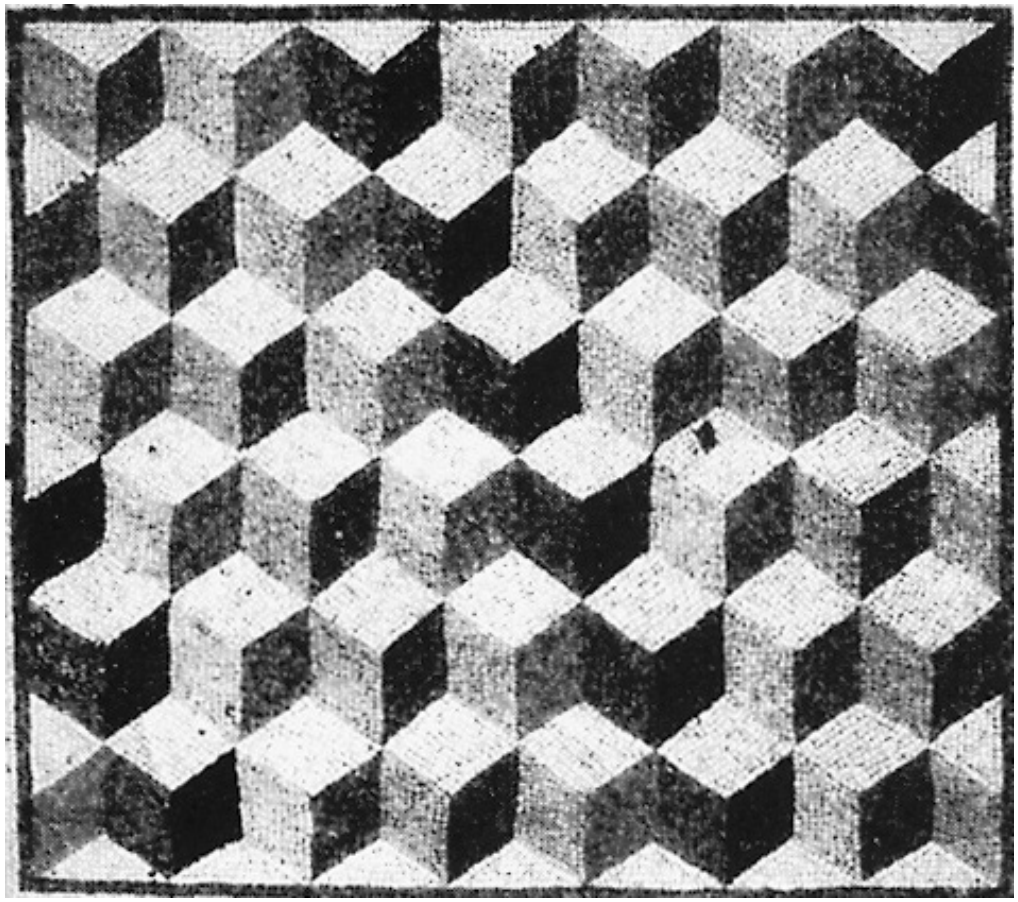
Gestalt psychologists were also intrigued by perceptual ambiguities, like the Necker cube and Rubin's vase/faces figure, literal variants of which are shown here.

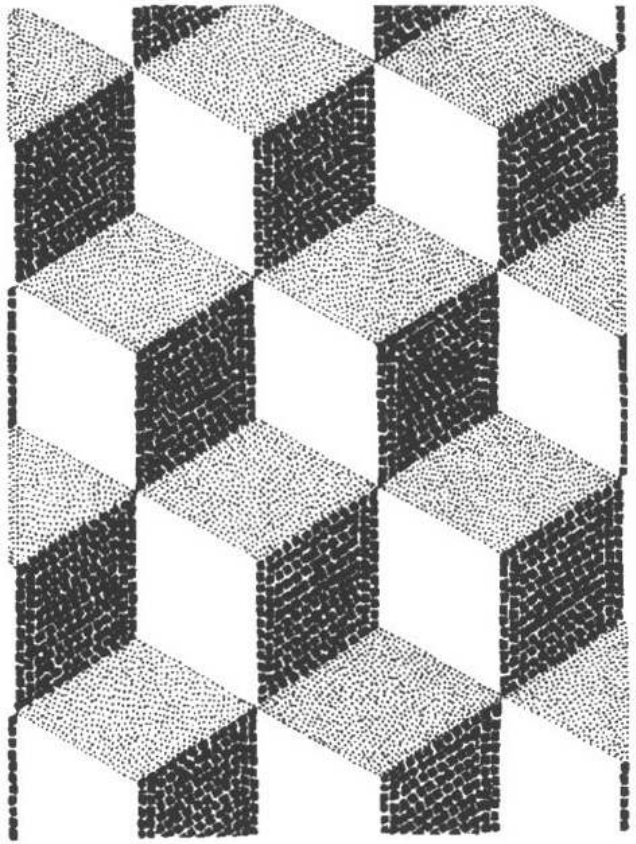
Ambiguities of profiles and vases (like that by Crussaire in 1799) were exploited in art long before they were examined in visual science.



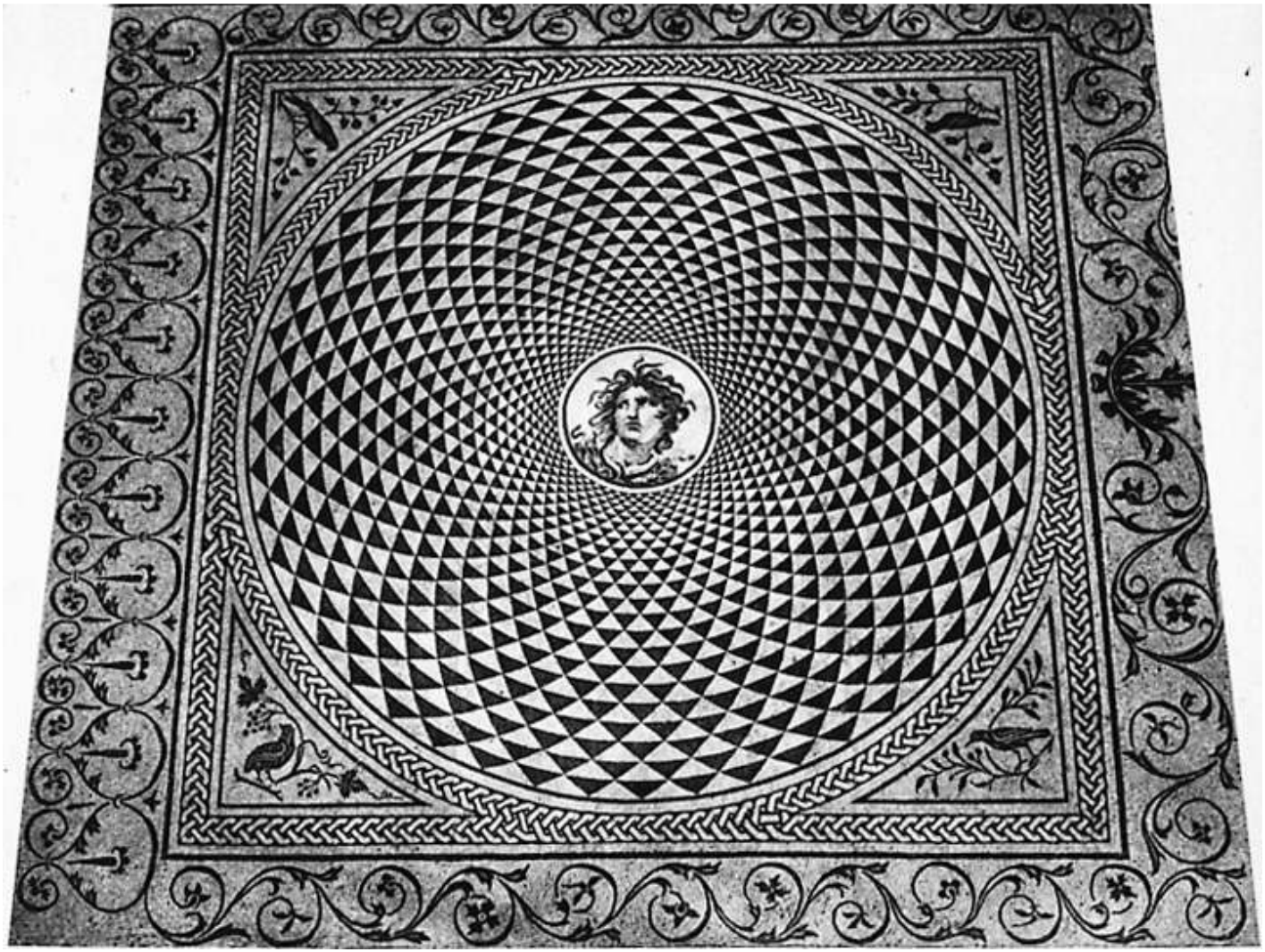


Mosaic figure-ground alternation in circular designs (Antioch 2nd century).

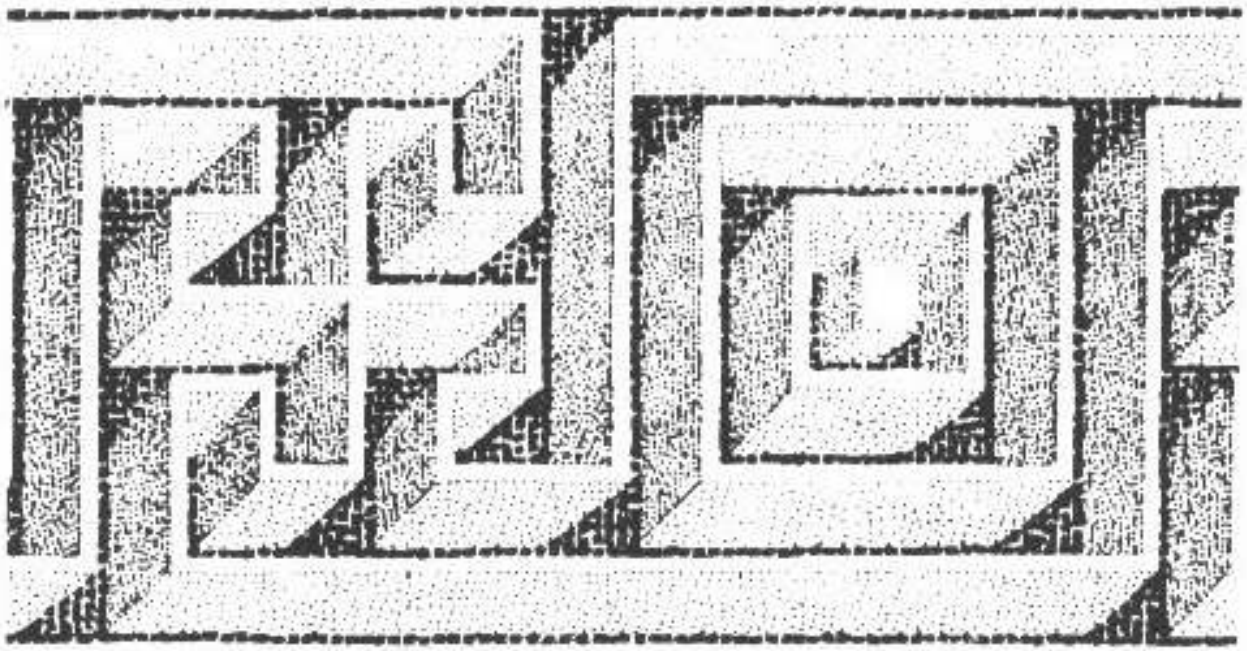


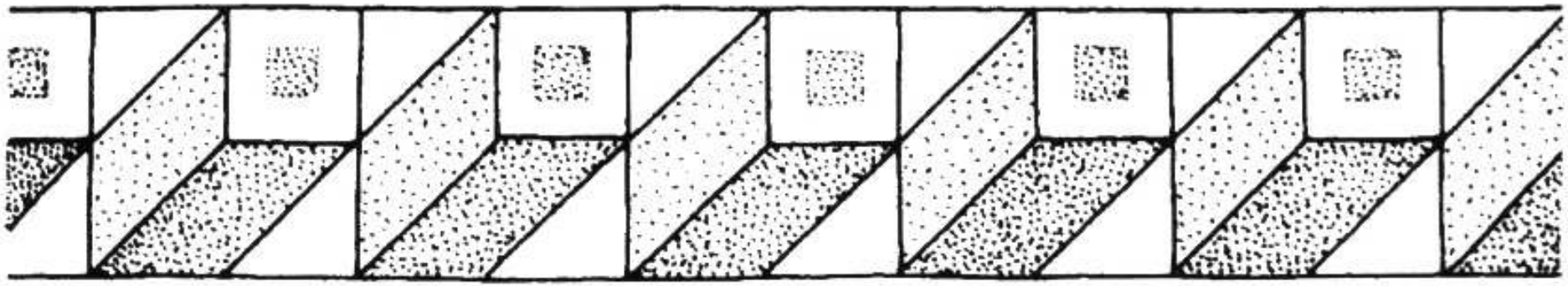


Reversible perspective cubes from a mosaic at Antioch (2nd century)

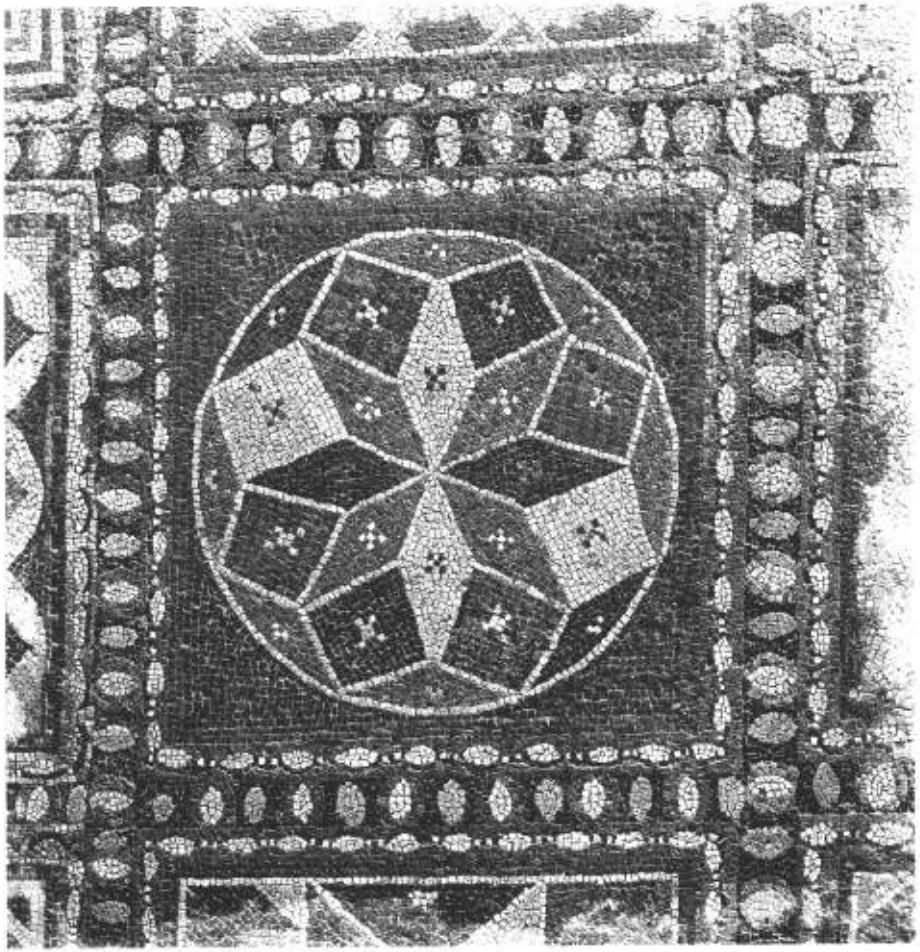


Good continuations occur with both radiations and circles. Mosaic floor from Rome (2nd century).



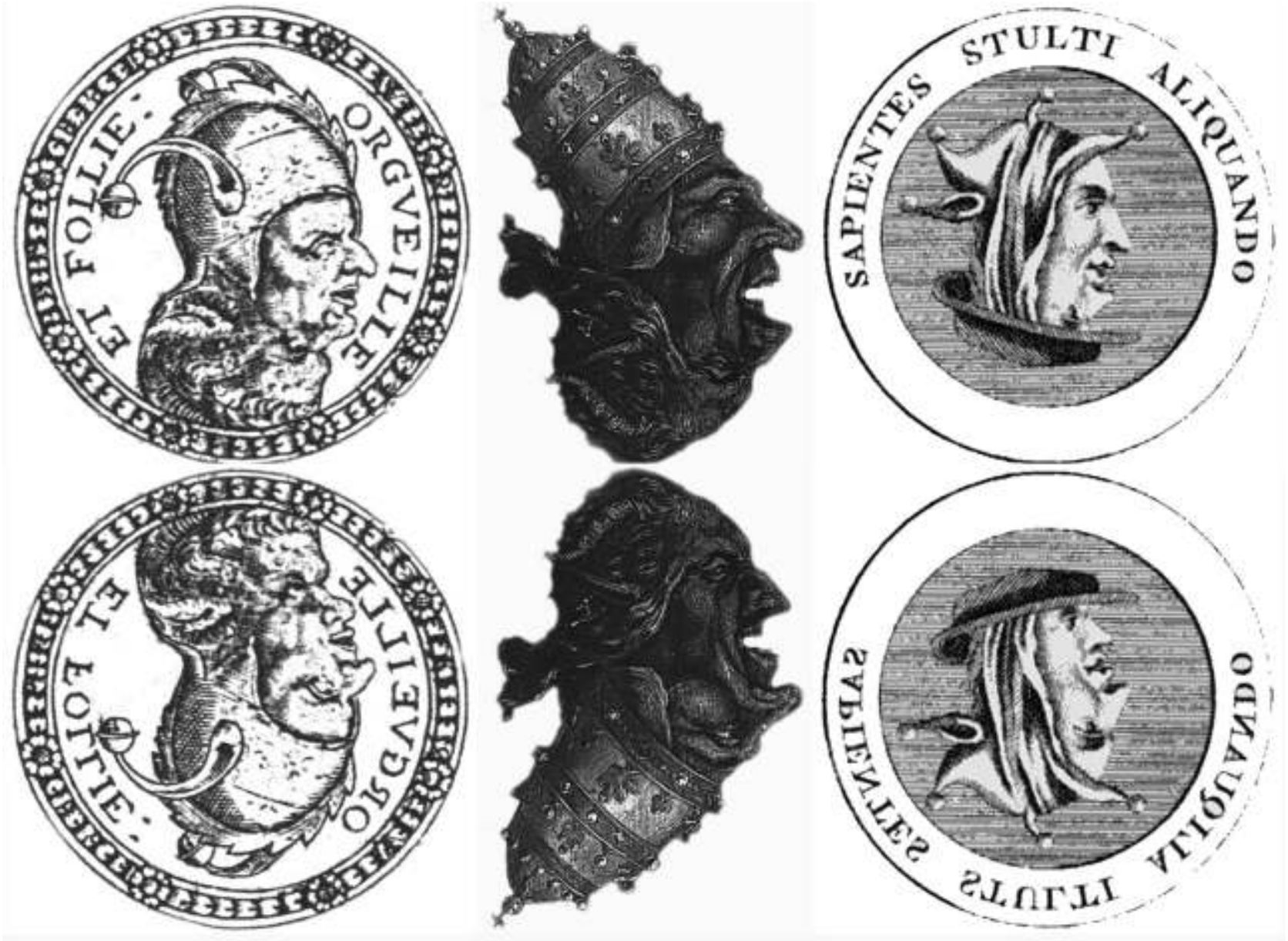


Shape from shading. A relief swastika design, and ambiguous perspectival blocks (Antioch 2nd century).

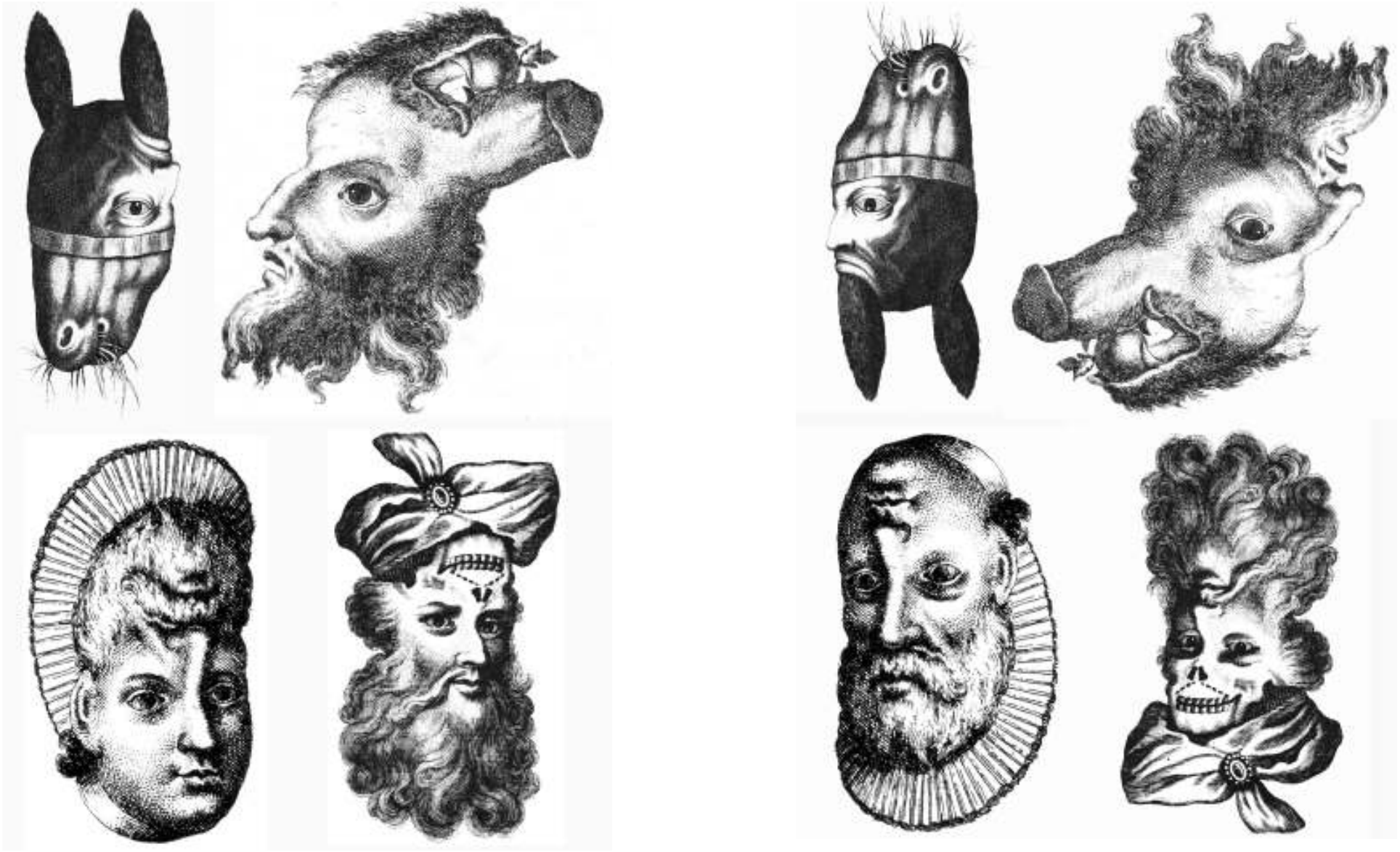


Geometrical mosaics displaying ambiguous depth, from (left) the House of Dionysos, Cyprus, late 3rd century, and (right) House of the Evil Eye, Antioch, 2nd century.

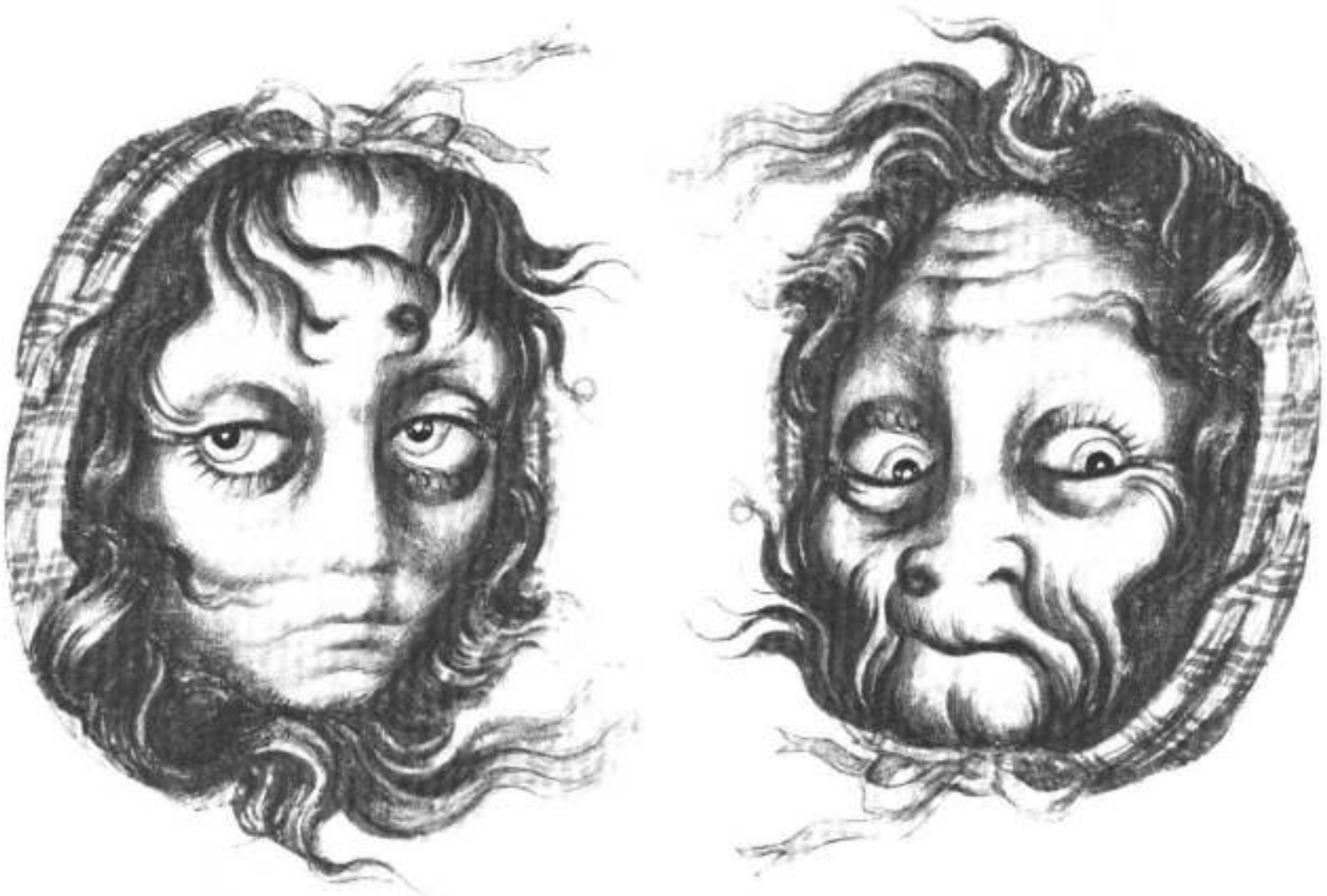
A 2nd century Roman beaker with an upright and inverted head.



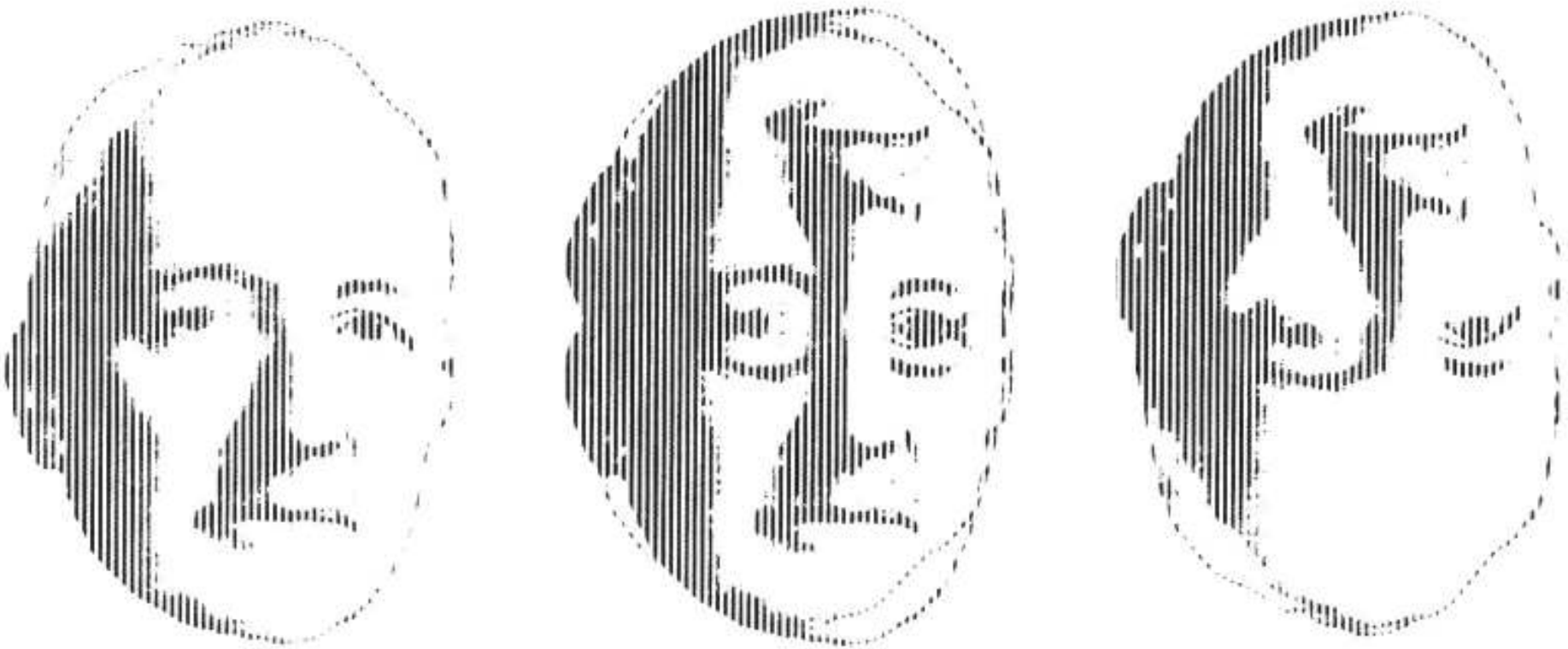
16th and 17th century representations of arrogance and folly as well as a *Double Head of Pope and Devil*.



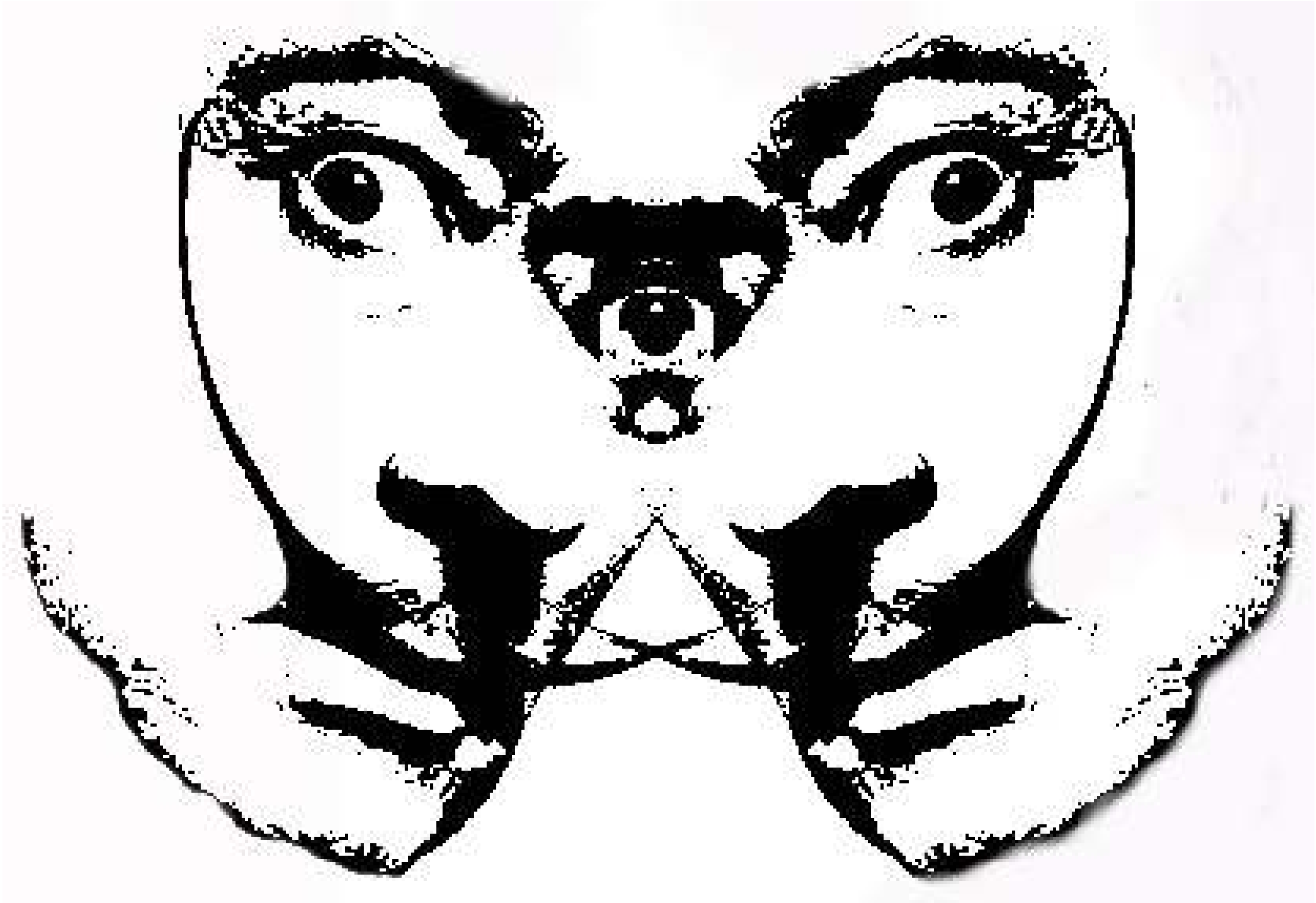
An Italian artist called Giuseppe from around 1700 showed that species and gender barriers could be crossed with inverted figures!



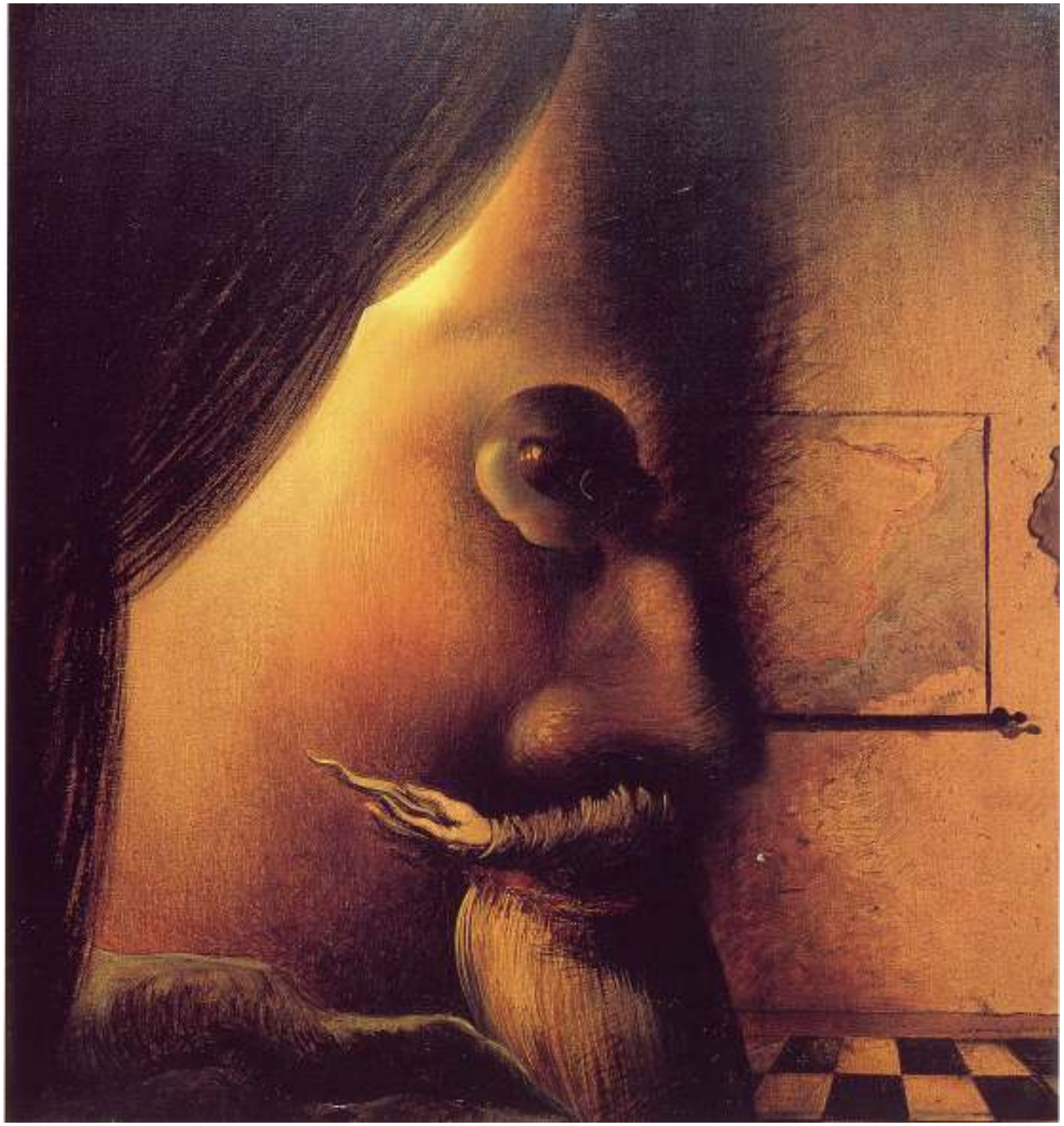
Rex Whistler (1905-1944) used the technique extensively.



George Malcolm Stratton (1867-1937) studied inversion using mirrors and prisms.



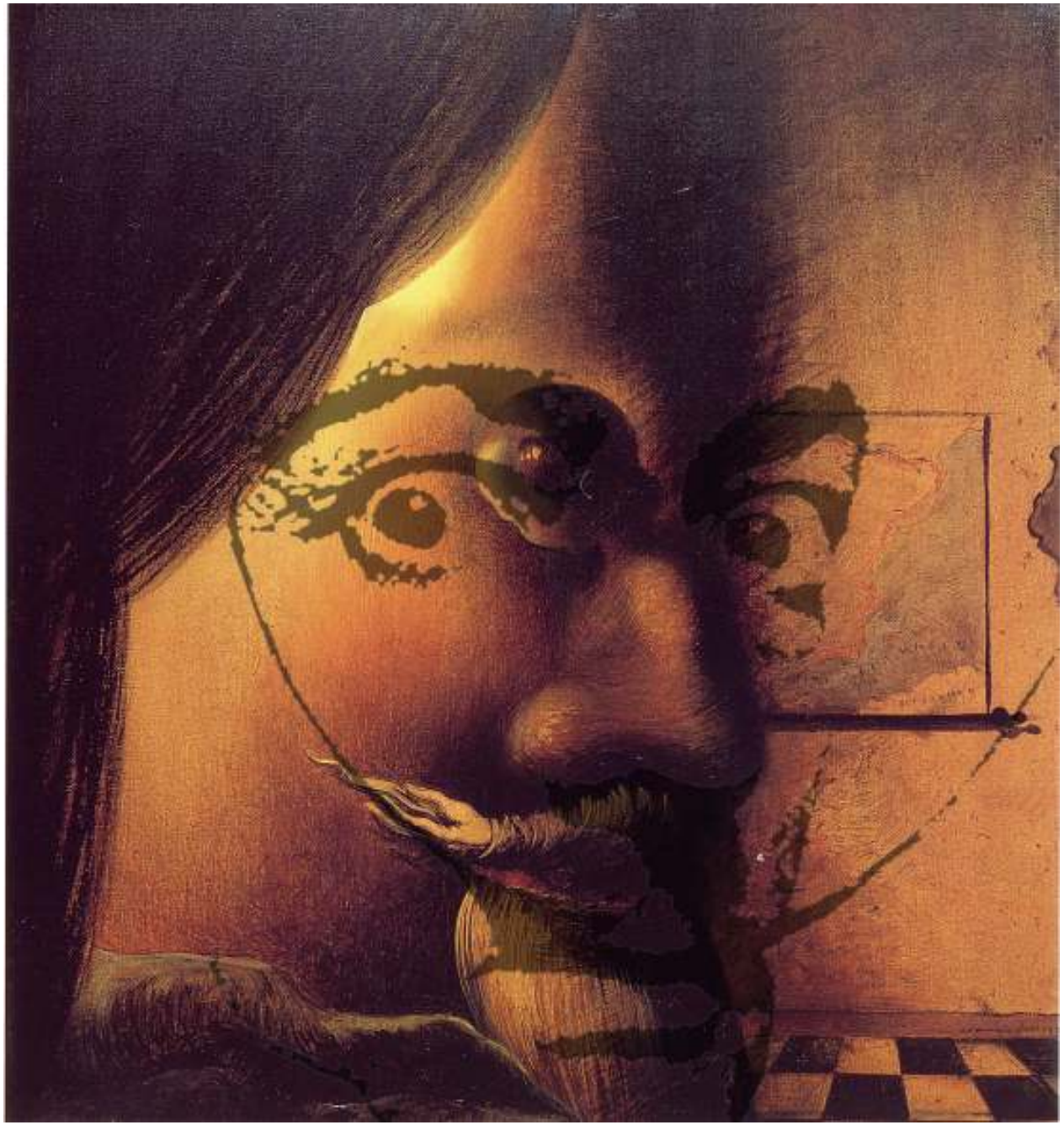
Artists have revelled in the ambiguity afforded by the compression of three dimensions to two, and few more so that Salvador Dali



Dali's

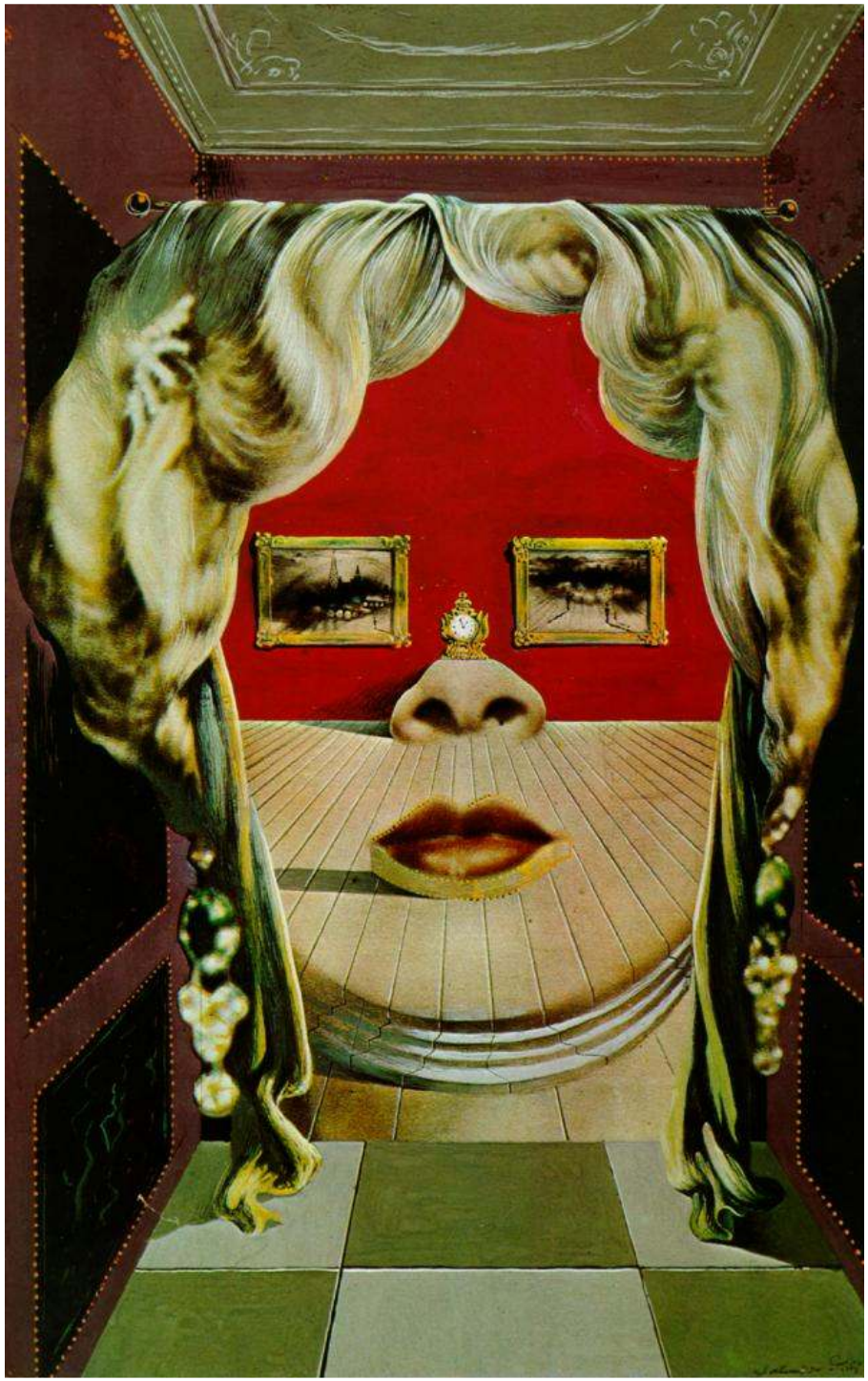
"The image disappears"

is a homage to Vermeer

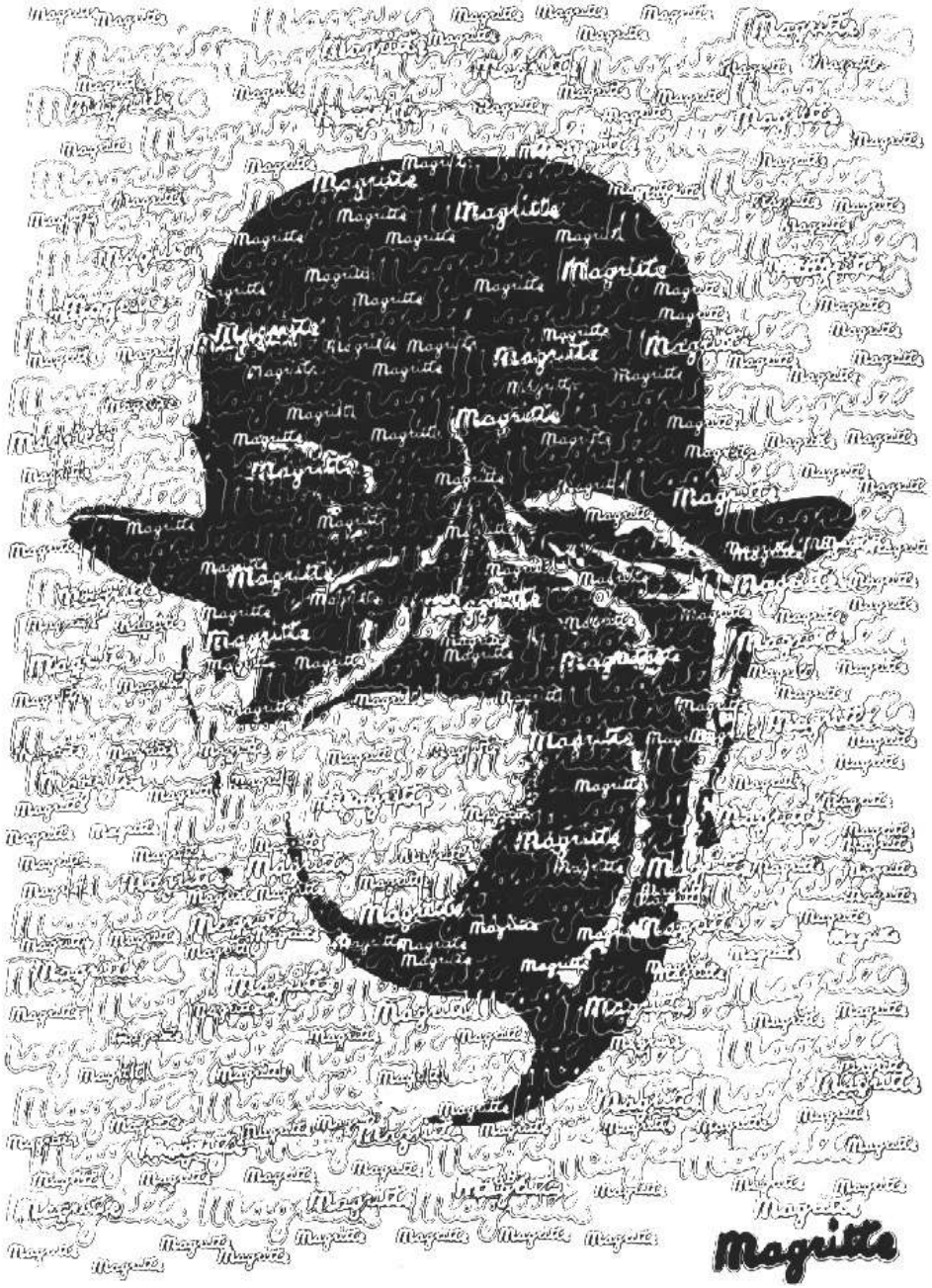


"Dali's image disappears"

"The Skull of Dali"

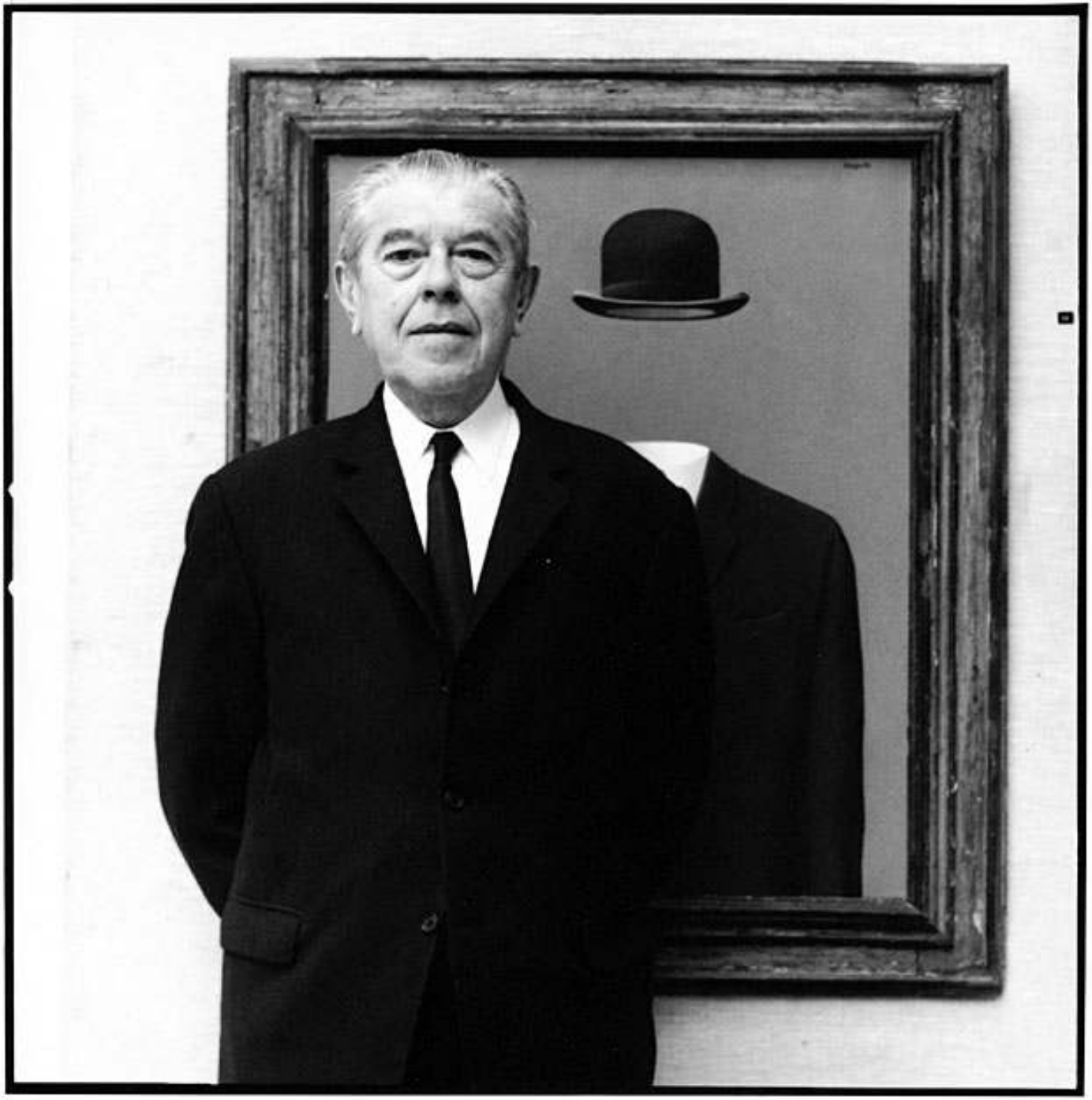


Dali's "Mae West"



“Ceci n’est pas Magritte”

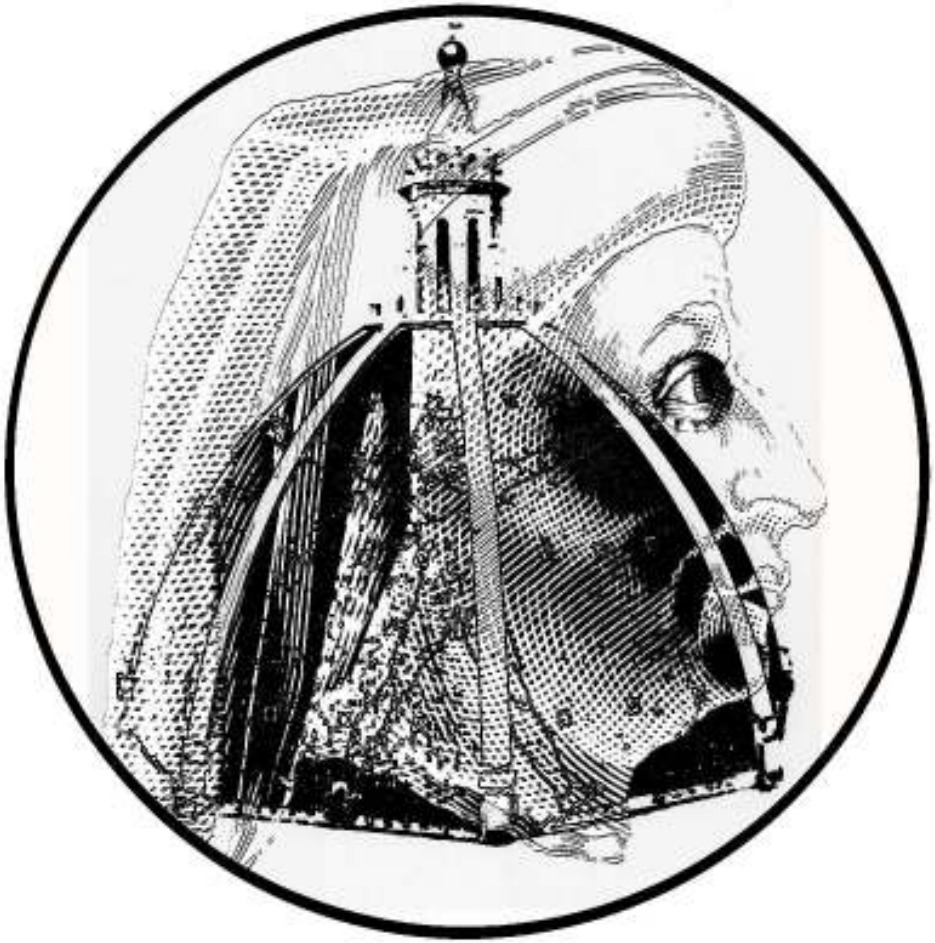
René Magritte revelled in the ambiguity of the picture plane and also that between word and image.

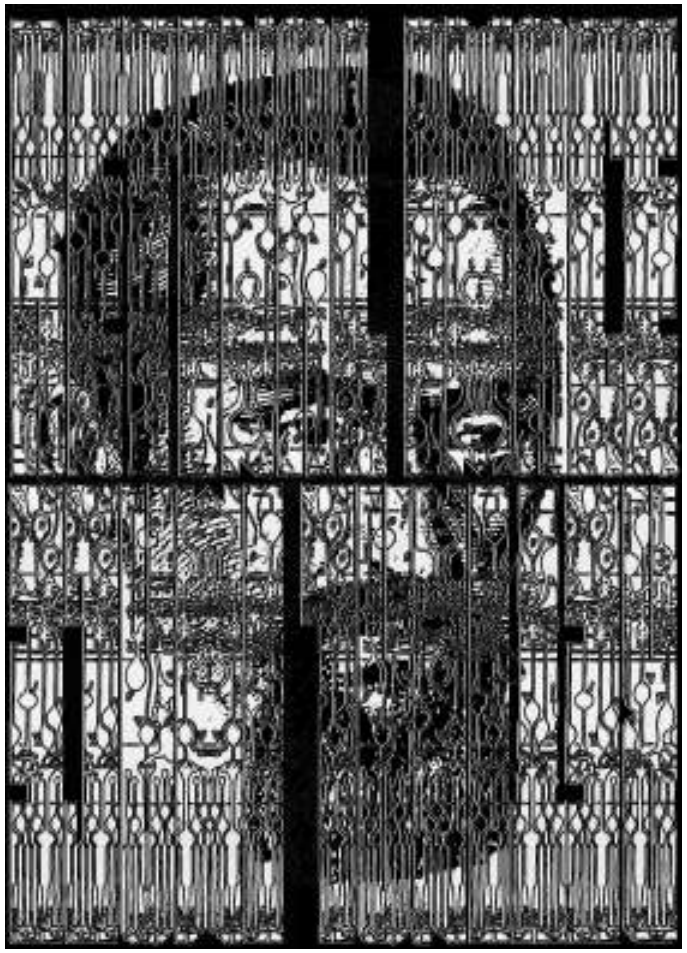


"The Rape of Magritte"

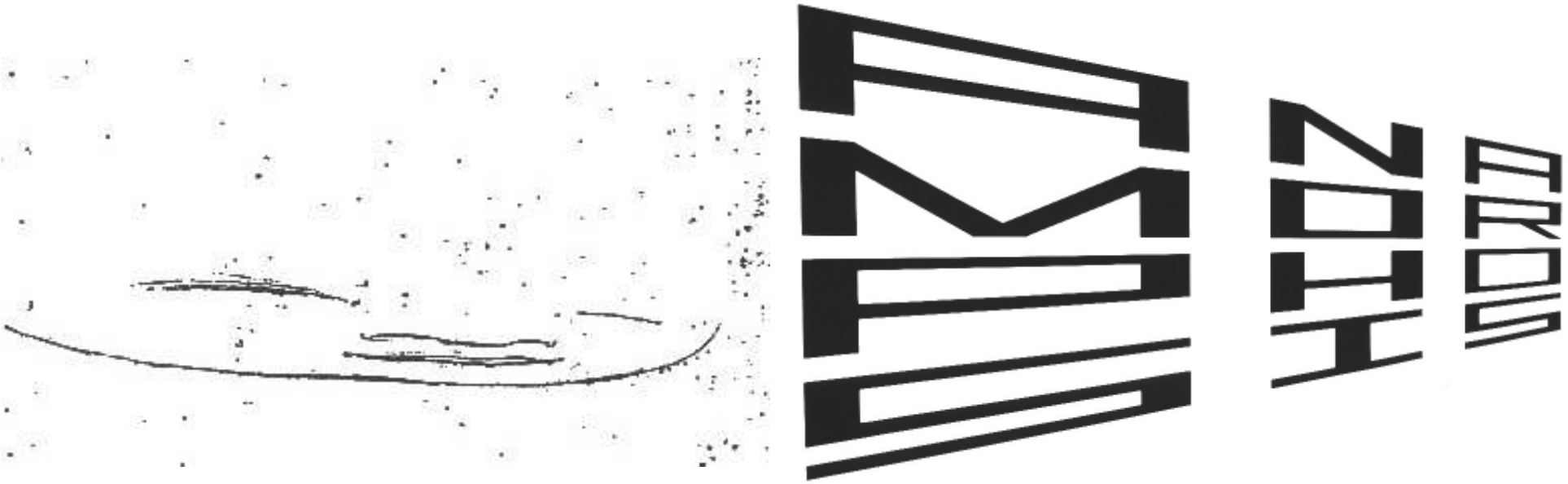
Magritte's "The perfidy of images"

“The integrity of words”

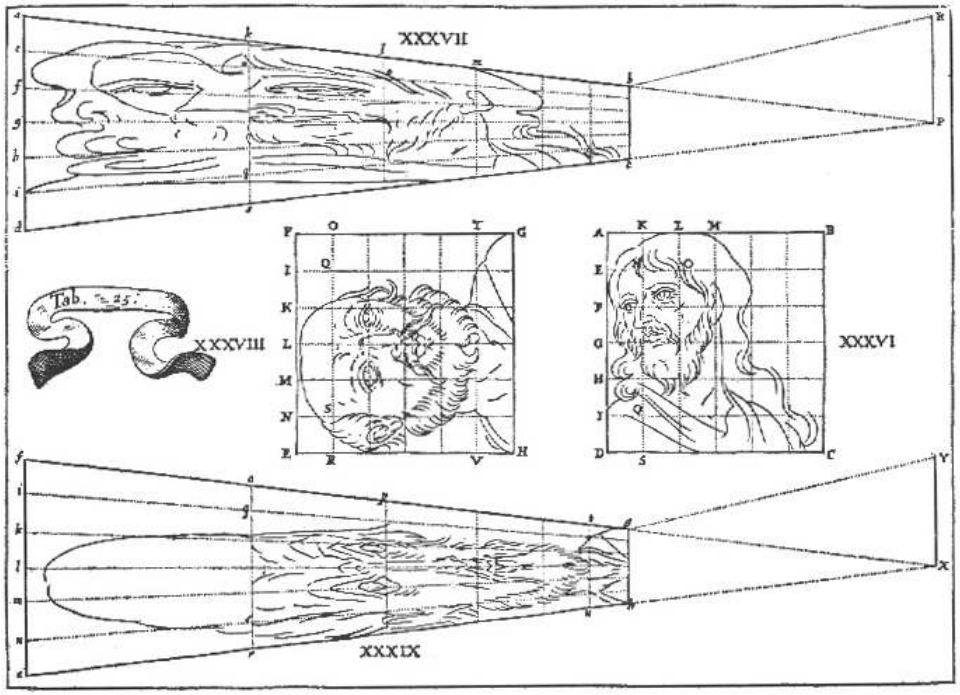




The rules of image formation on a picture were determined two centuries before the same principles were applied to the eye. Filippo Brunelleschi (left) produced pictures in perspective before 1420, whereas Johannes Kepler (right) described the formation of an image on the retina in 1604.

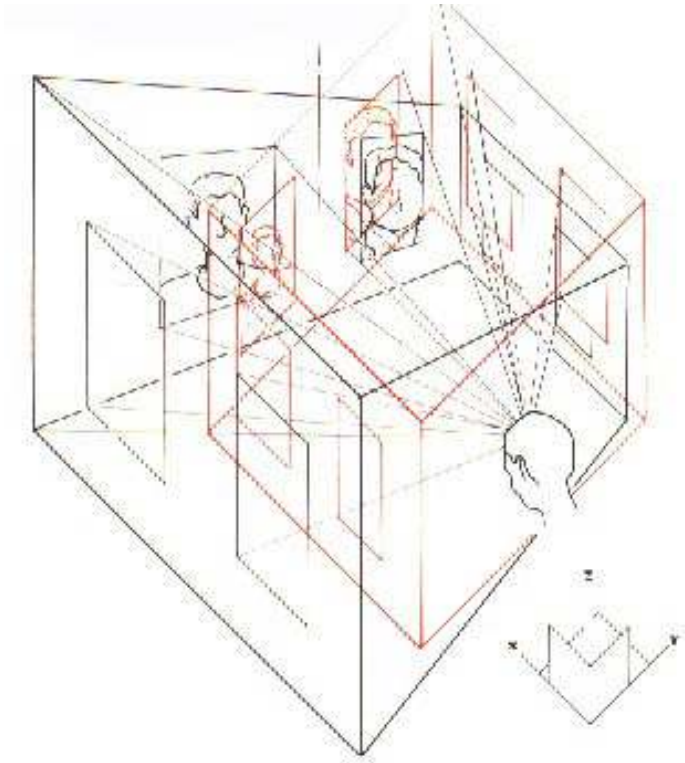


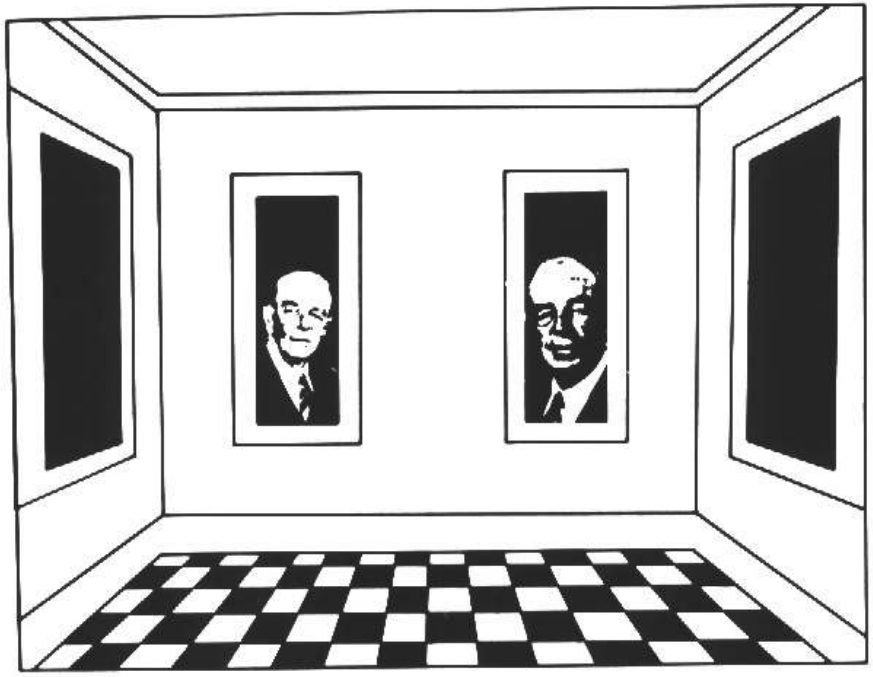
No sooner had the rules of perspective been formulated than they were distorted. Leonardo da Vinci produced examples of distorted perspectives or anamorphoses.

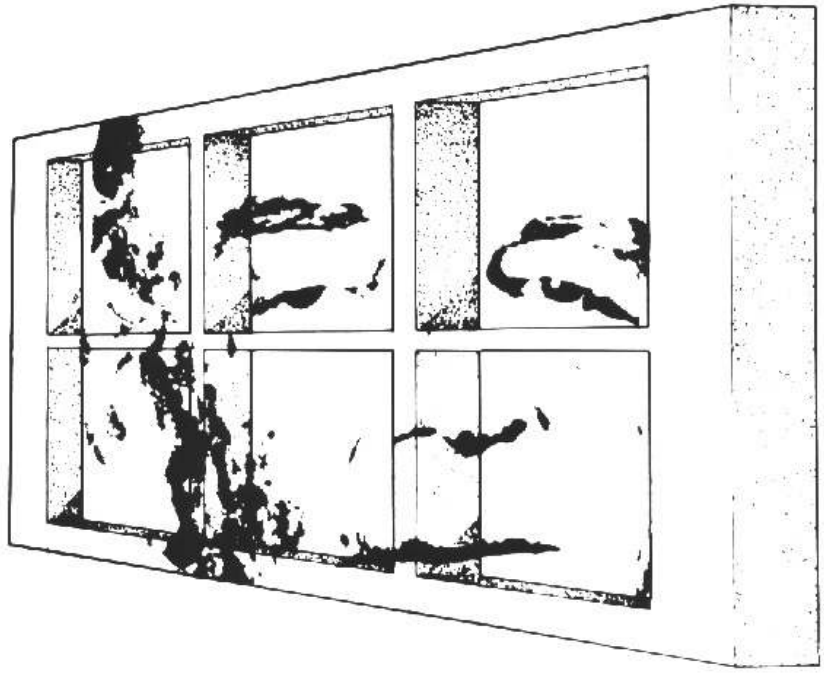


Jean-François Niceron (1613-1646) described the construction and mathematics of these curious perspectives. He produced linear, conical, and cylindrical (mirror) anamorphoses.

The optical principles on which anamorphoses are based are precisely those used by Adelbert Ames (1880-1955) in his perceptual demonstrations.



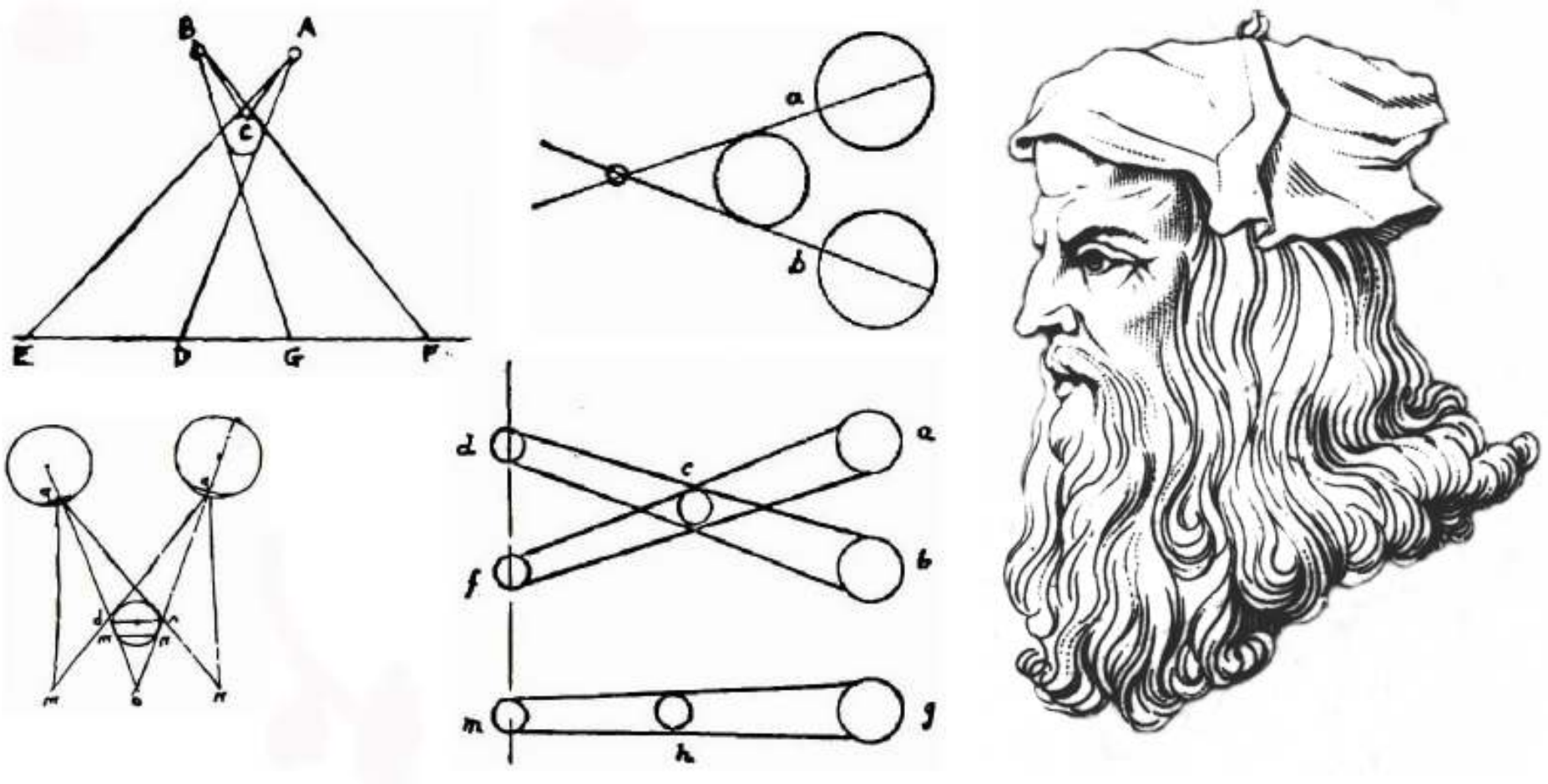




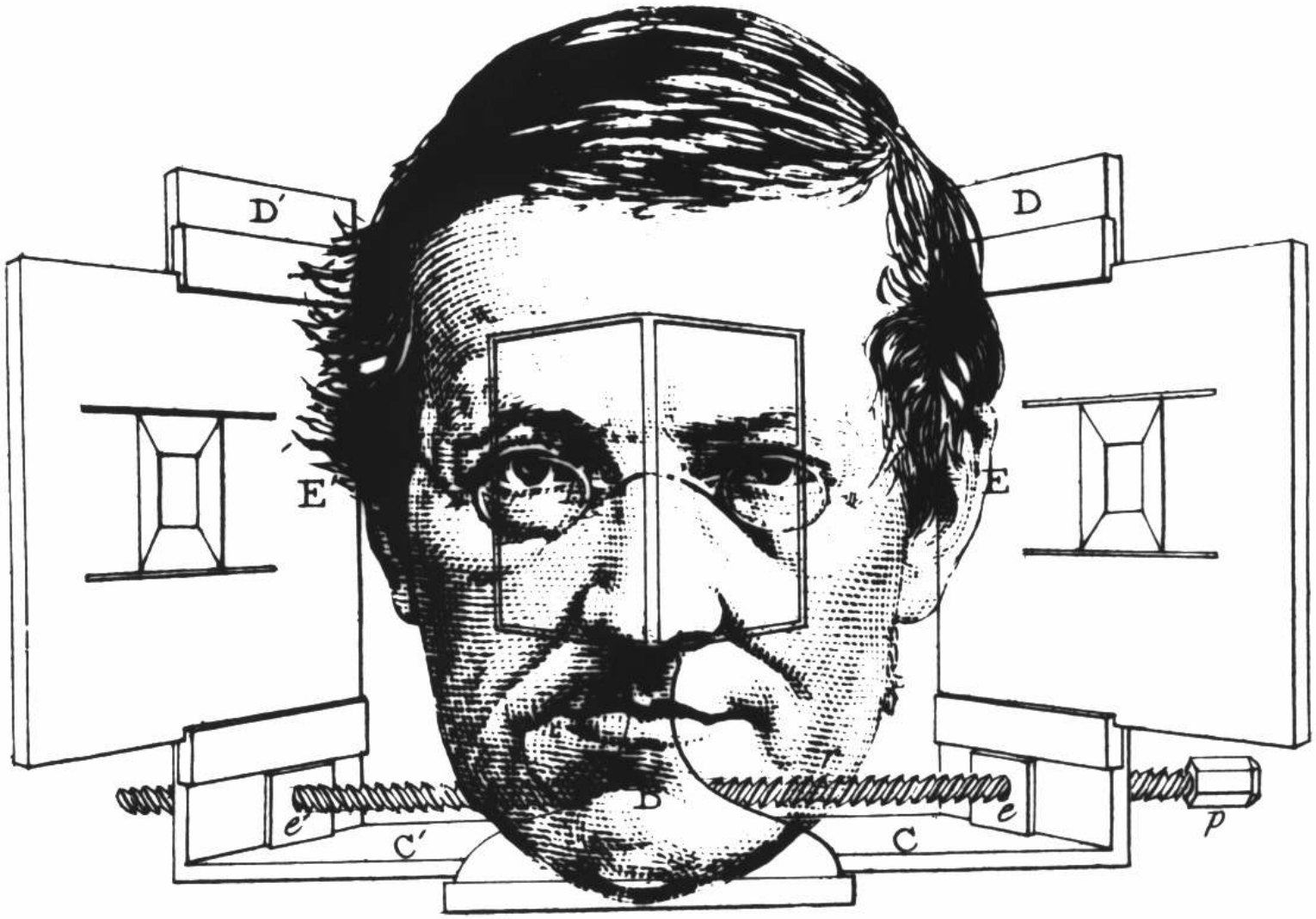
“Cubist”

“2 ½ D sketch”

Cubists, like Pablo Picasso, were producing essentially 2 ½ D sketches related to those depicted by visual scientist David Marr.



Brunelleschi's vision was monocular, whereas that of Leonardo was binocular. His deliberations over 'natural perspective' led him to examine the depth seen with two eyes.



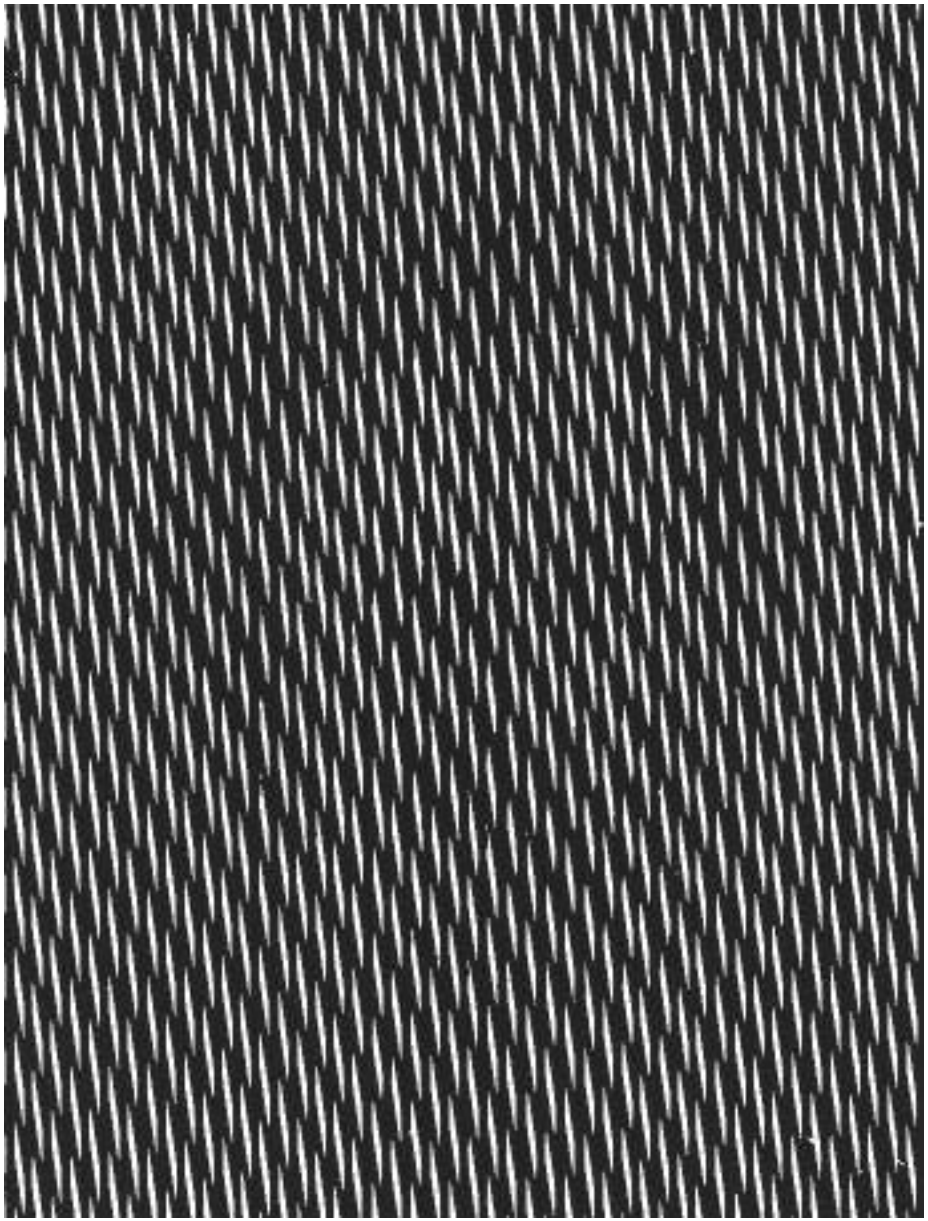
“Mirror stereoscope” Charles Wheatstone (1802-1875)

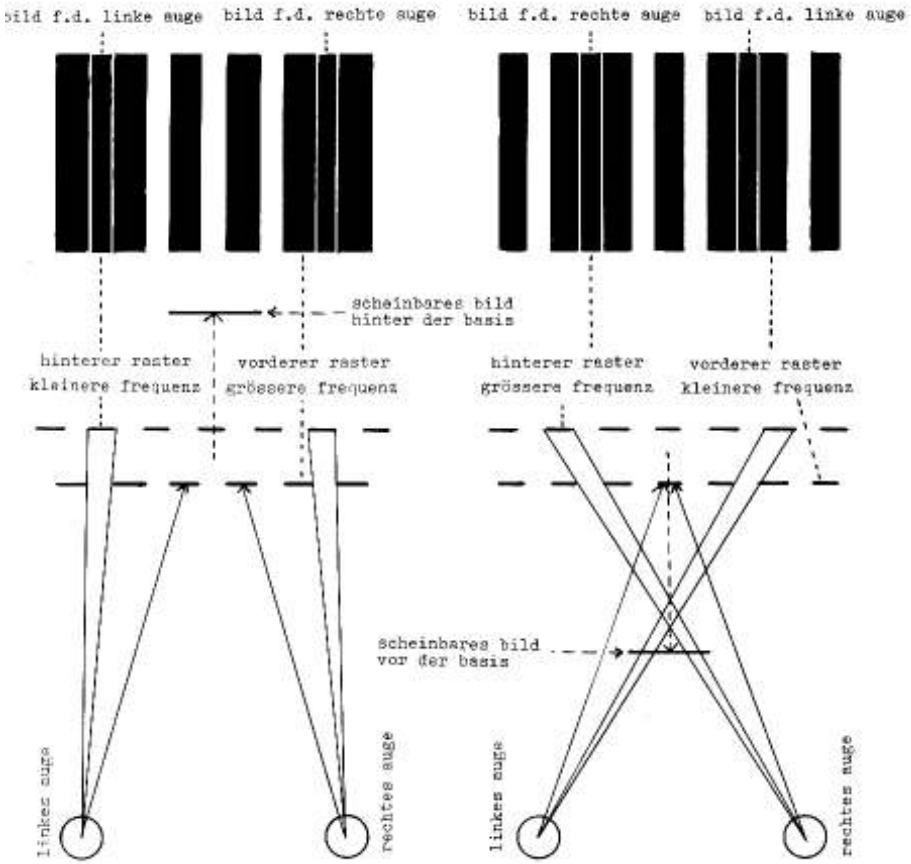
"Lenticular stereoscope"

David Brewster
(1781-1868)

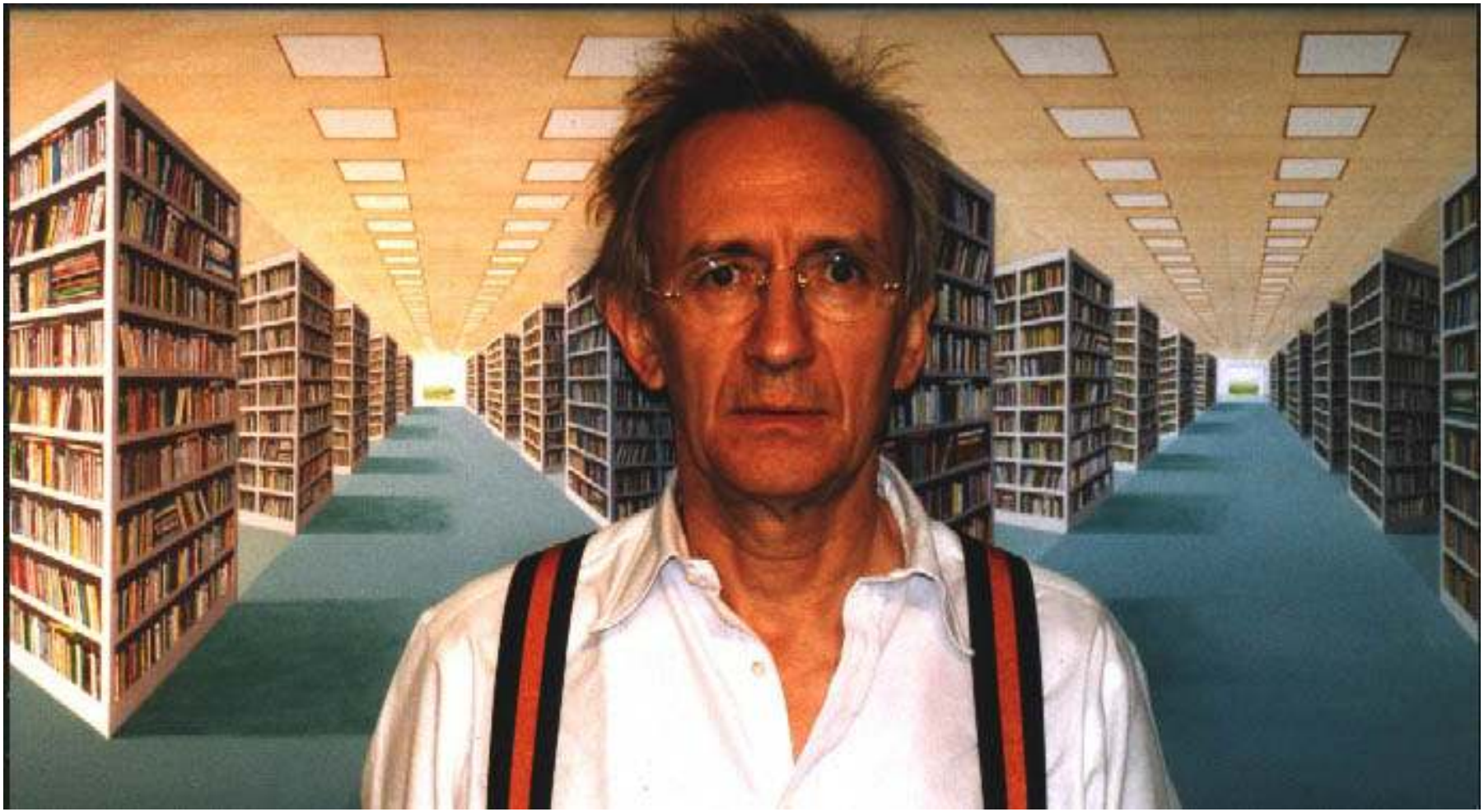
“Random dot stereograms”

Bela Julesz (1928-2003)

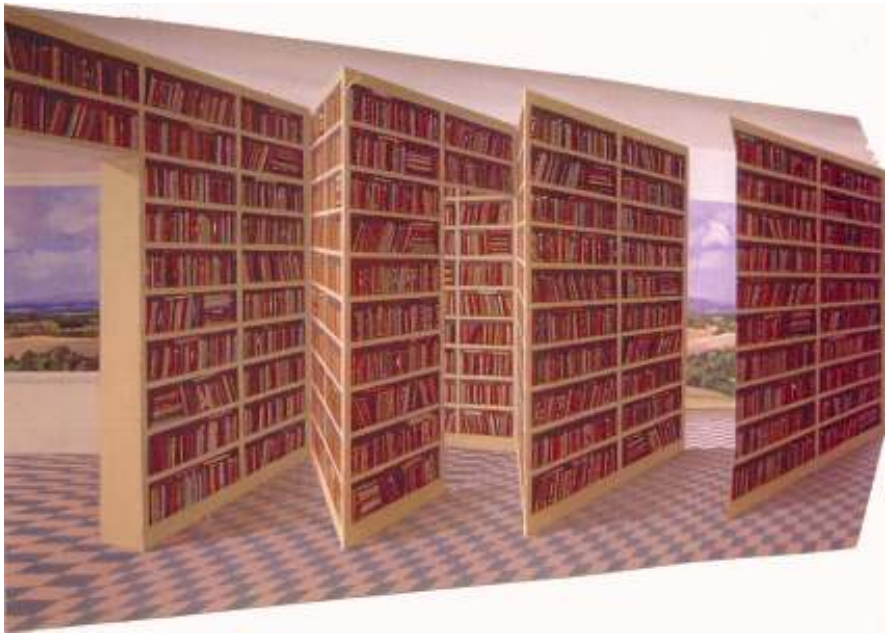




Ludwig Wilding has found a novel method of manipulating relative spatial frequencies to yield stereoscopic depth and apparent motion.

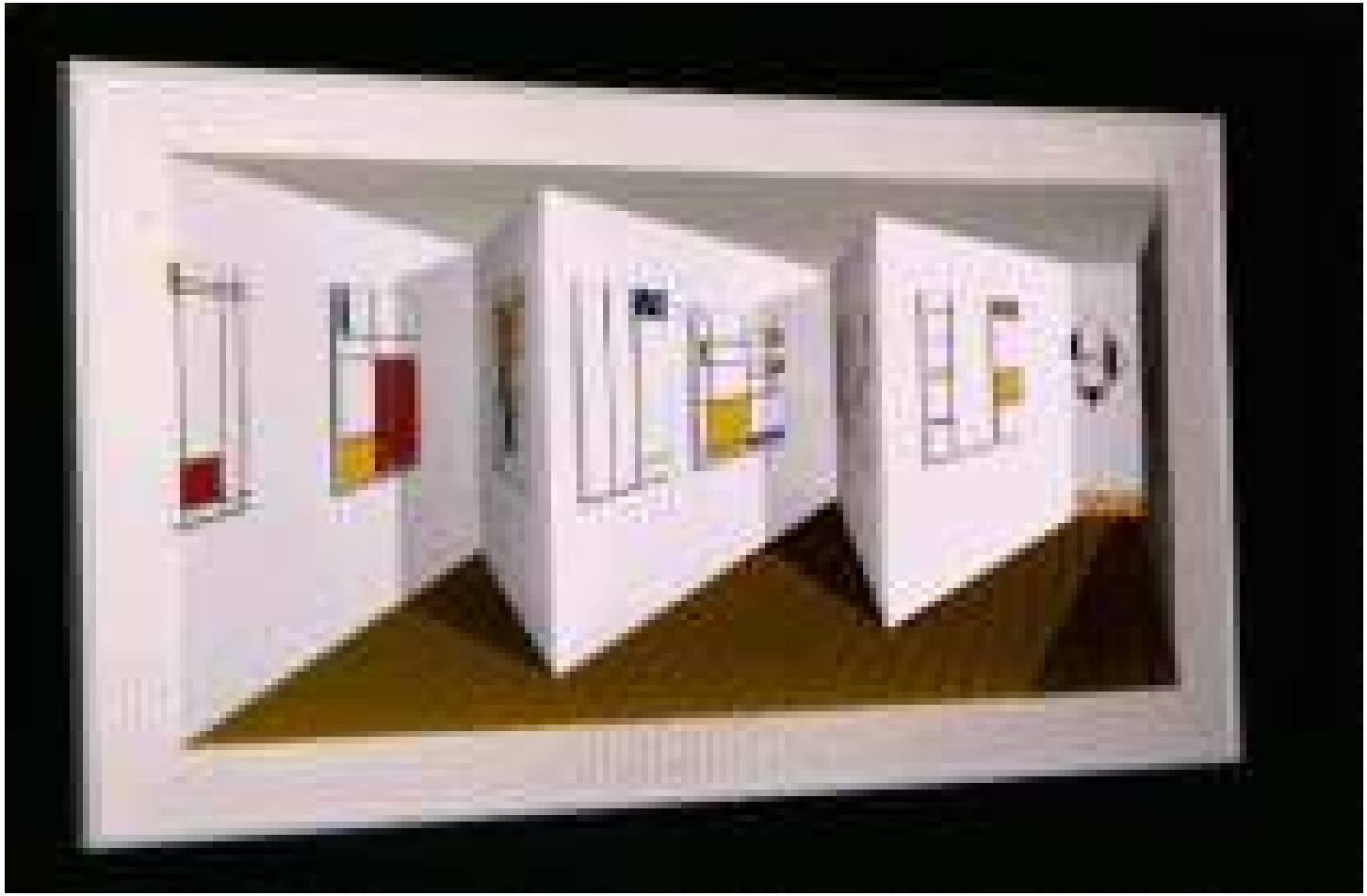


Patrick Hughes is shown standing between the protrusions of one of his works, which are reverse perspectives.



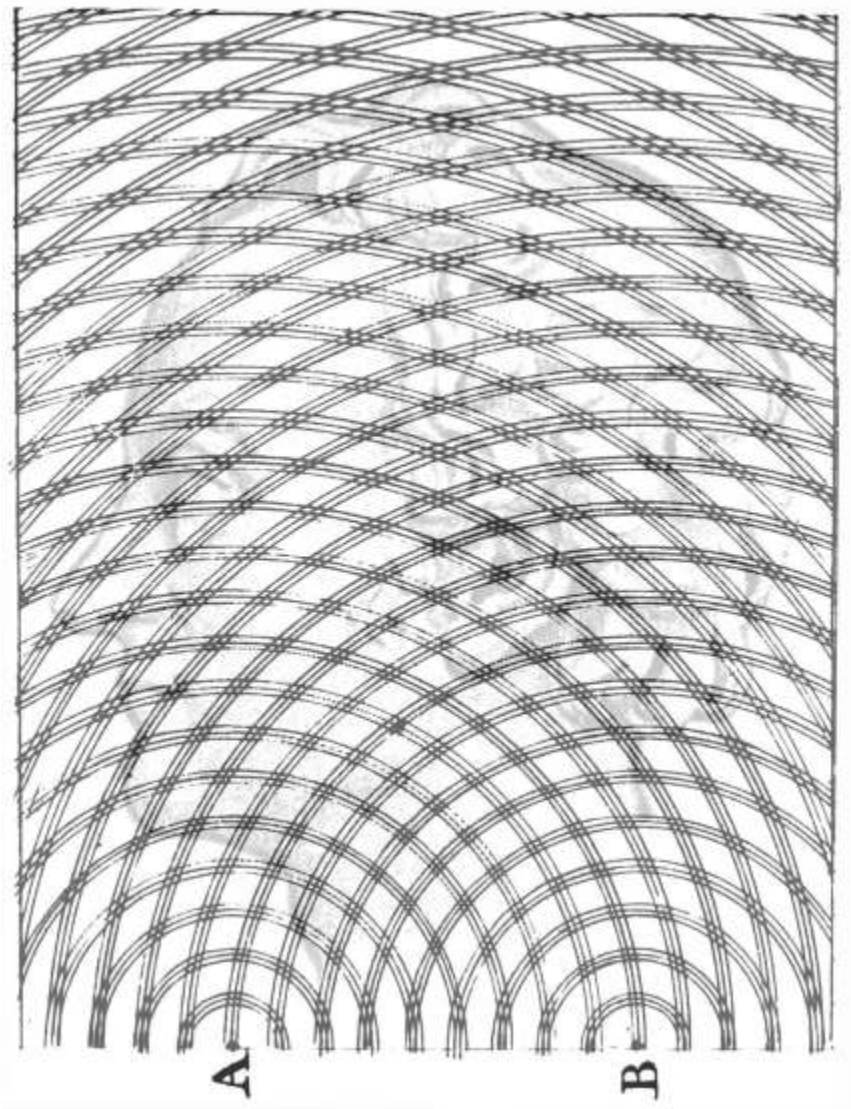
http://www.perceptionweb.com/perc0999/wade.pdf

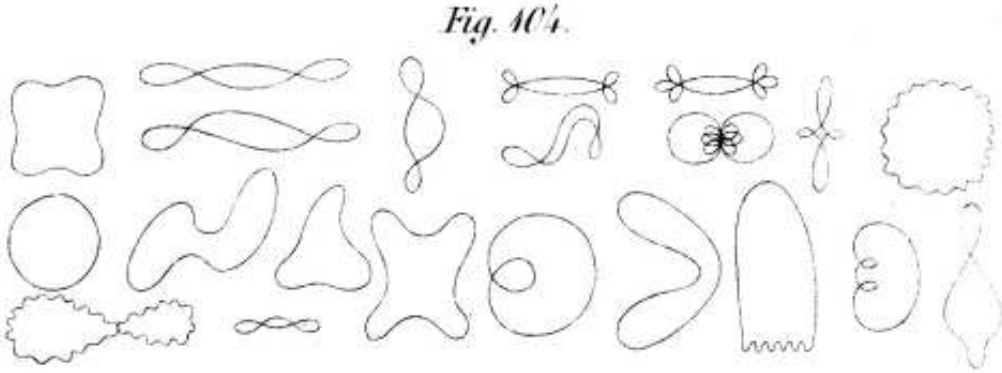
“Mondrians”

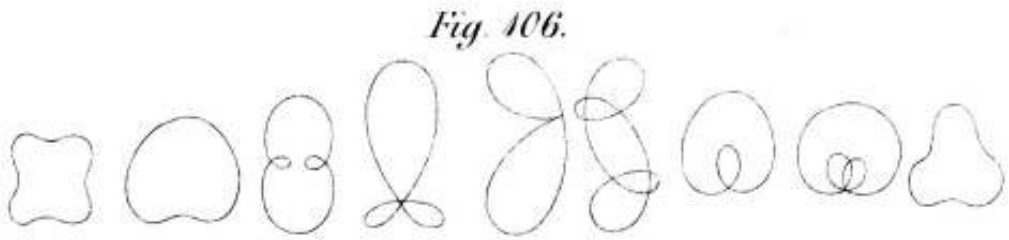


http://www.perceptionweb.com/perc0999/wade.gif

Scientific influences of art have derived mostly from the other lost dimension of pictures – motion. Rather than implying motion scientists synthesised it.



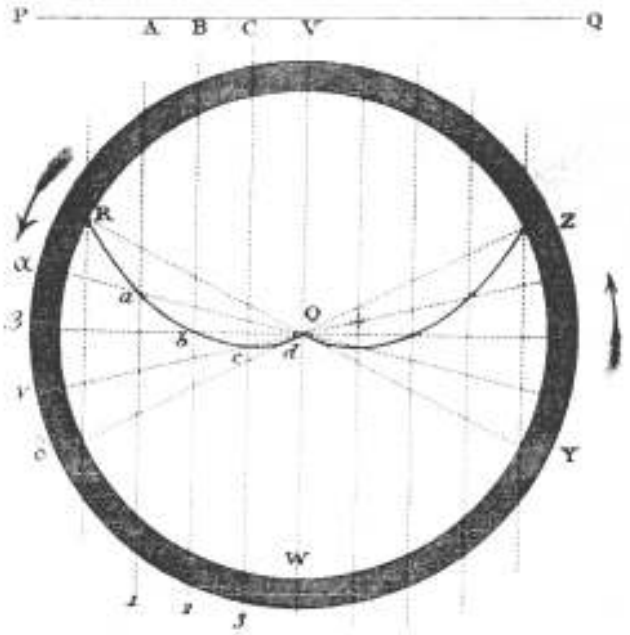




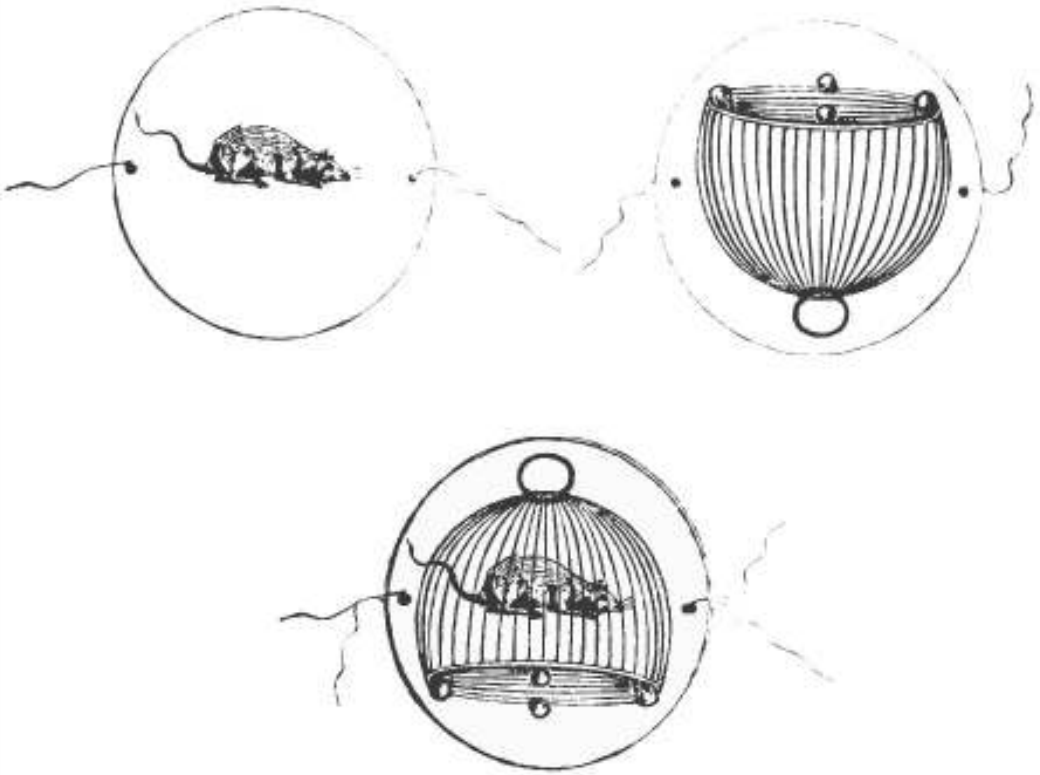
Thomas Young's (1800) diagrams of persisting images reflecting from foil on vibrating piano strings.

Peter Mark Roget (1779-1869) and his spoke pattern

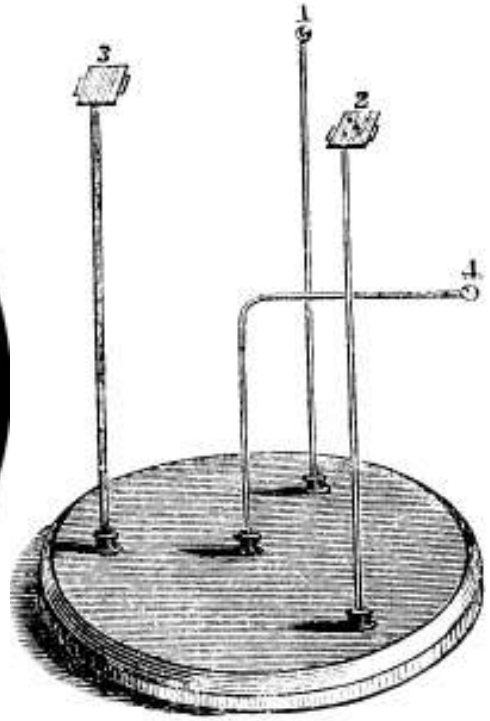
“Thesaurus of Roget”

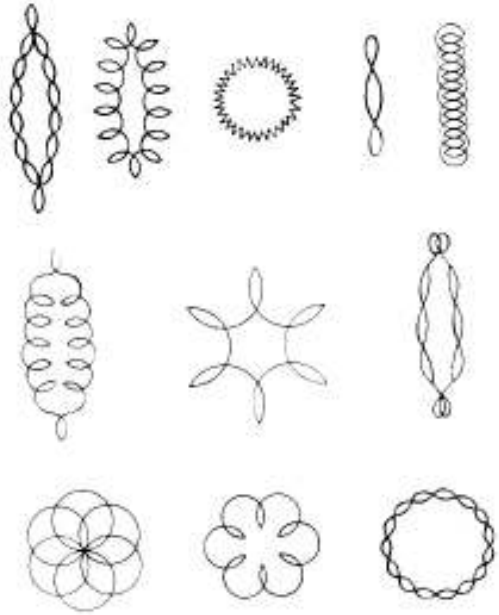


John Ayrton Paris (1785-1856) and the thaumatrope

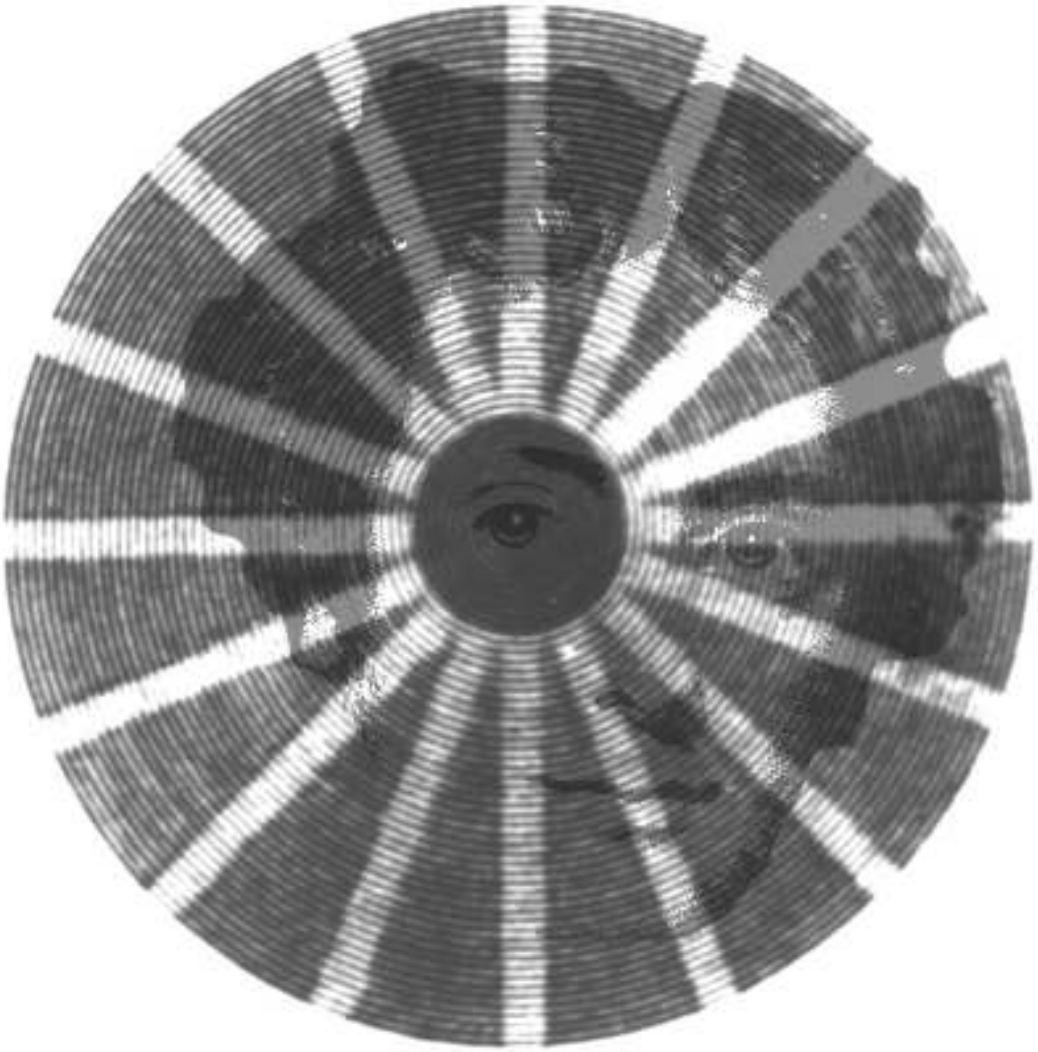


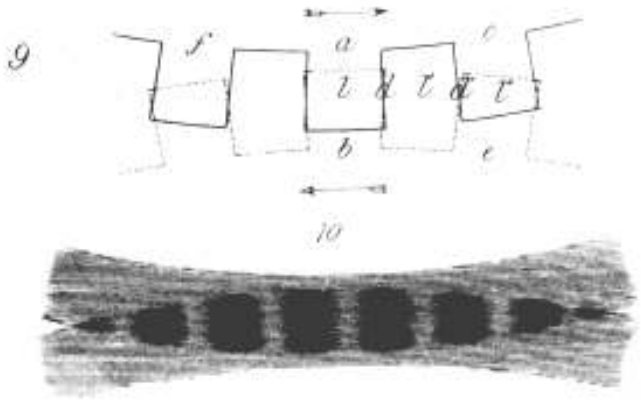
"Wonder turner"

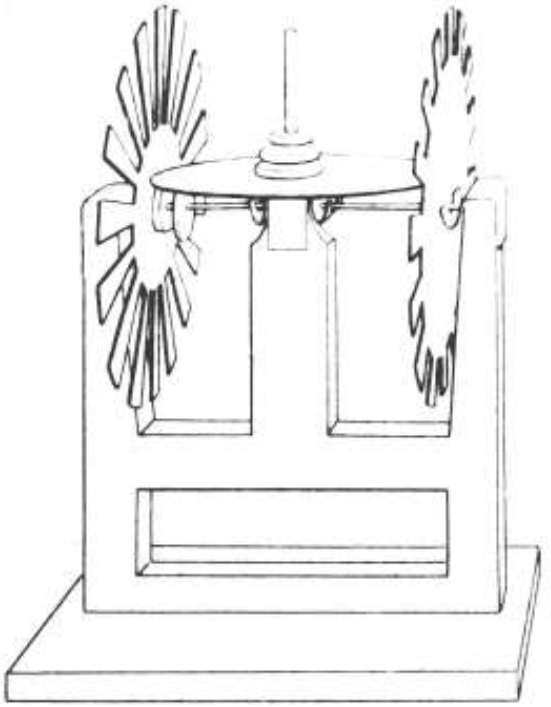




Charles Wheatstone's (1827) kaleidophone, named after Brewster's kaleidoscope.

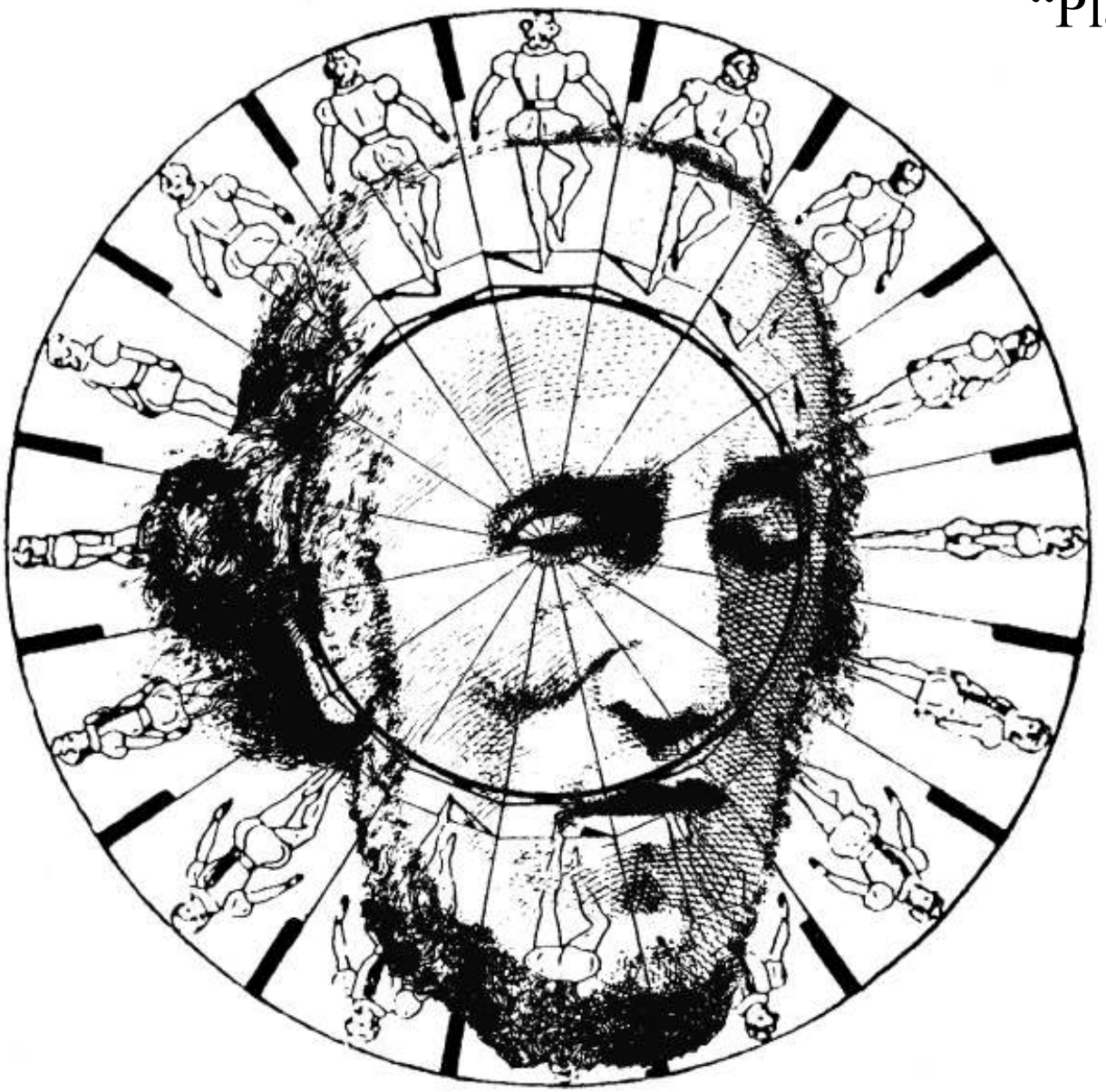




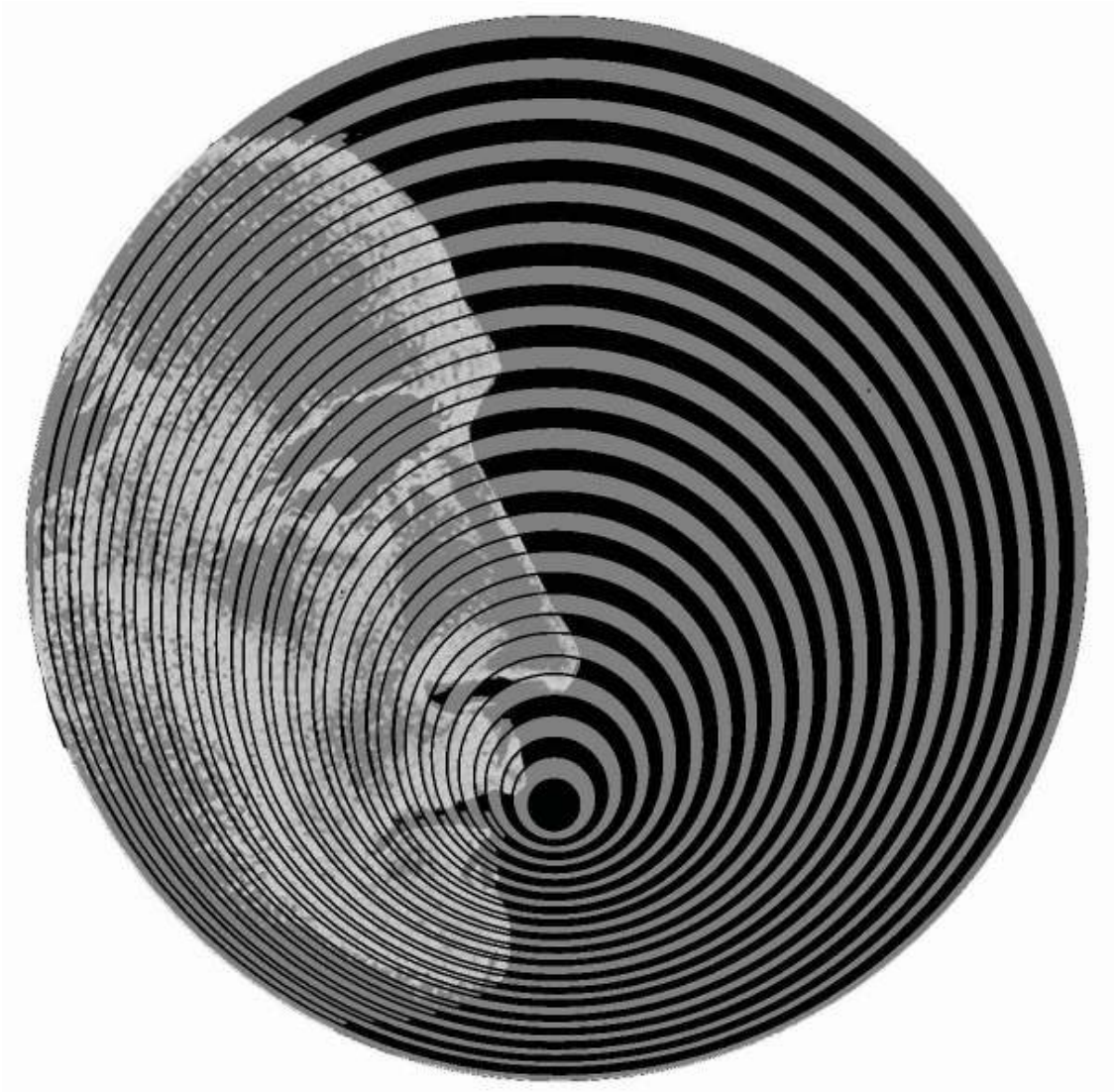


Michael Faraday (1791-1867)

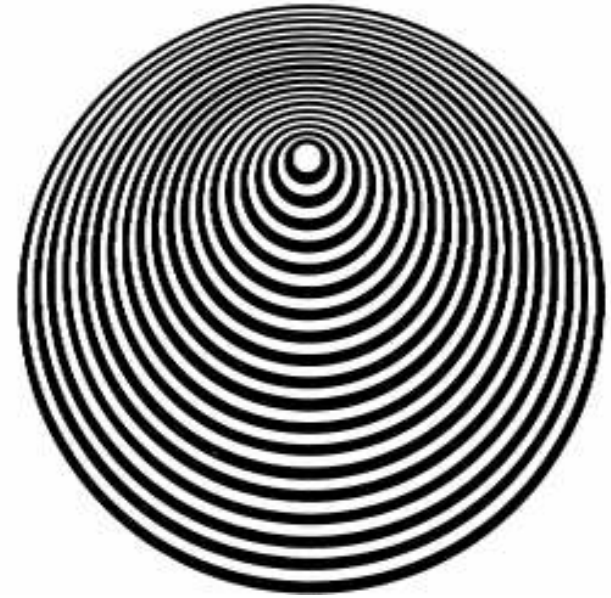
“Plateau’s dancer”



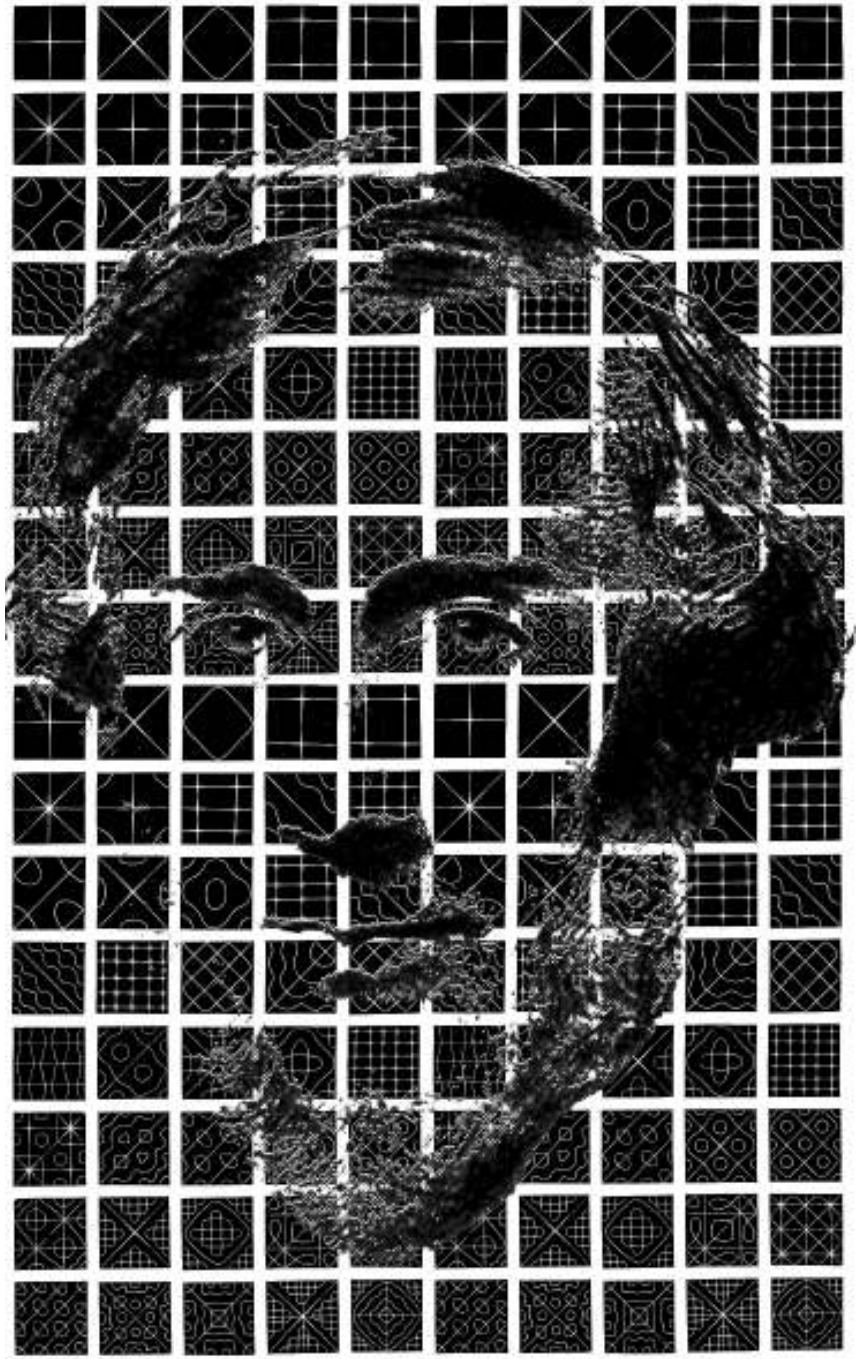
Joseph Plateau
(1801-1883)



Marcel Duchamp utilised visual persistence, and he also made rotoreliefs that induce kinetic depth effects in the 1930s. They were studied in visual science by Musatti (1929)



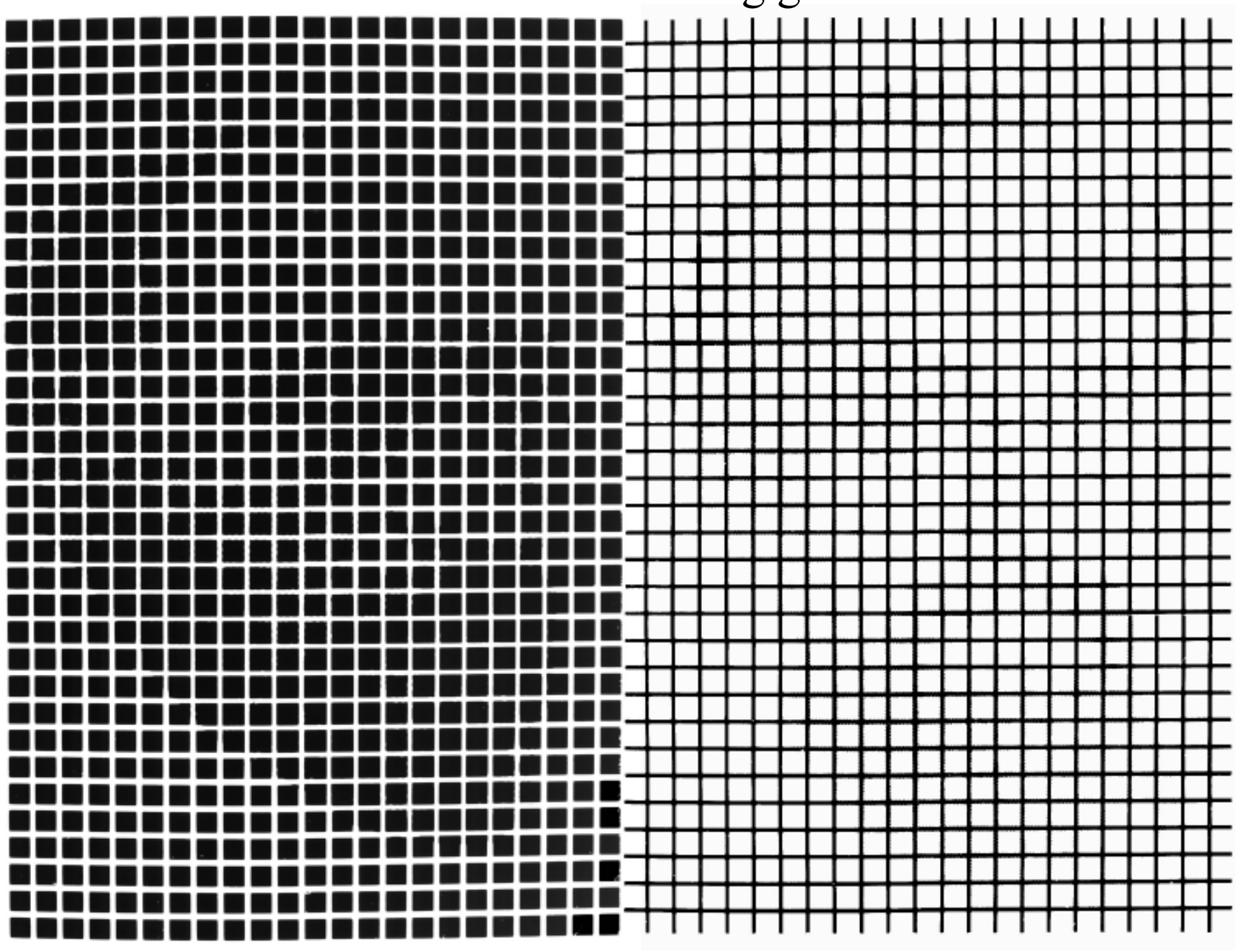
http://www.opprints.co.uk/gallery.php



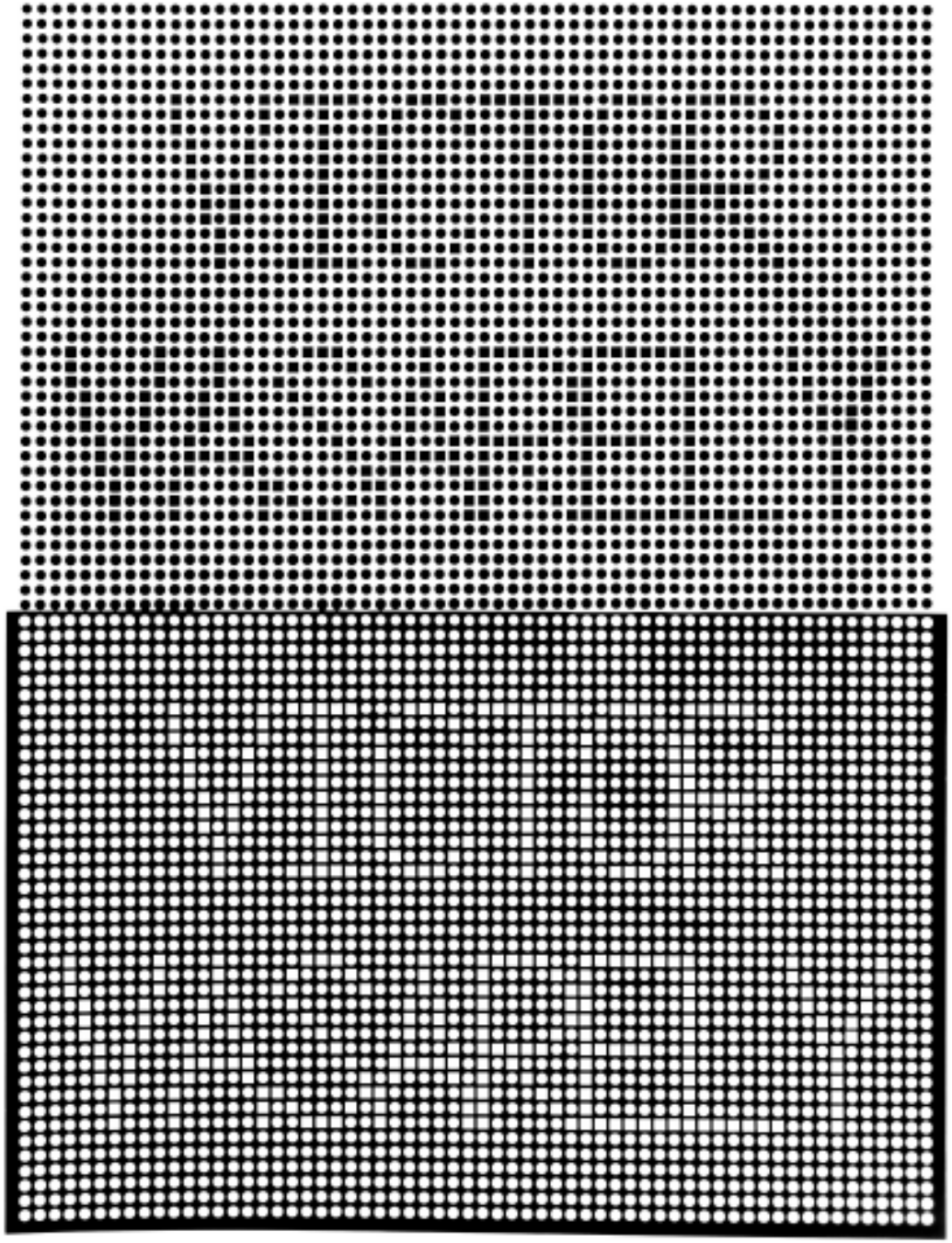
"Tyndall figures"

John Tyndall (1820-1893) wrote a book on *Sound* which included an illustration of Chladni figures.

“Hermann-Hering grids”



Ludimar Hermann (1838-1914) and Ewald Hering (1834-1918)

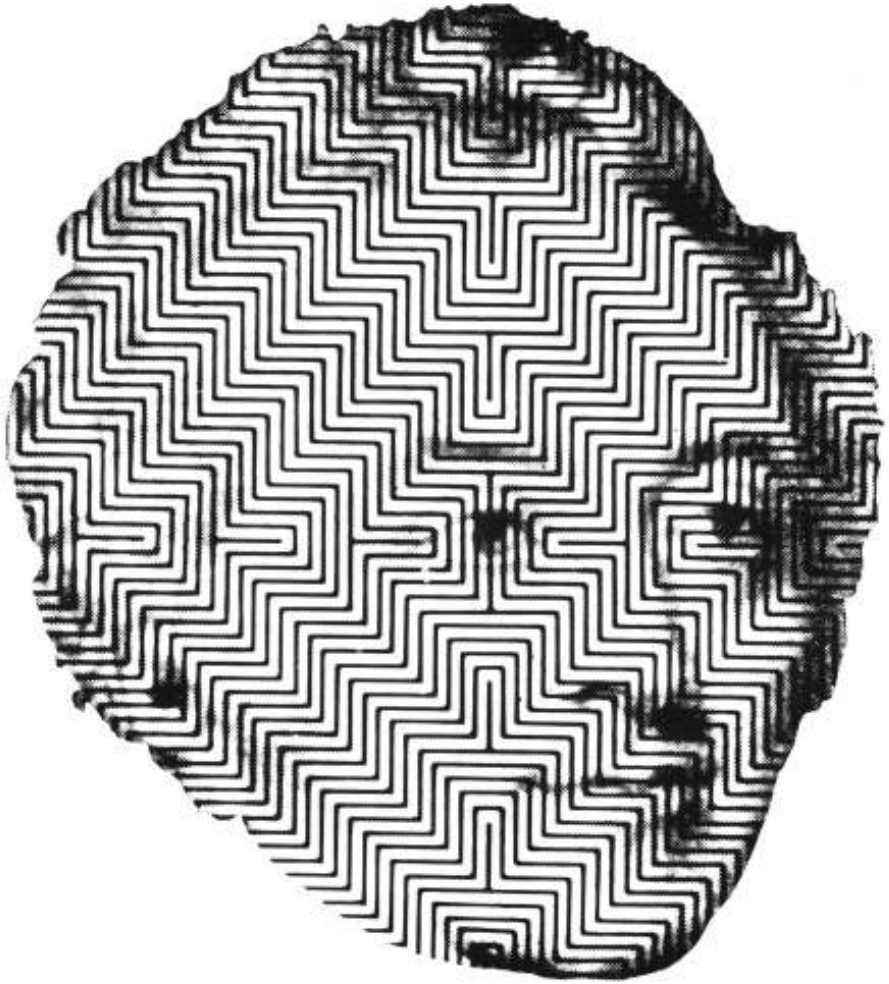


“Towards plastic unity”

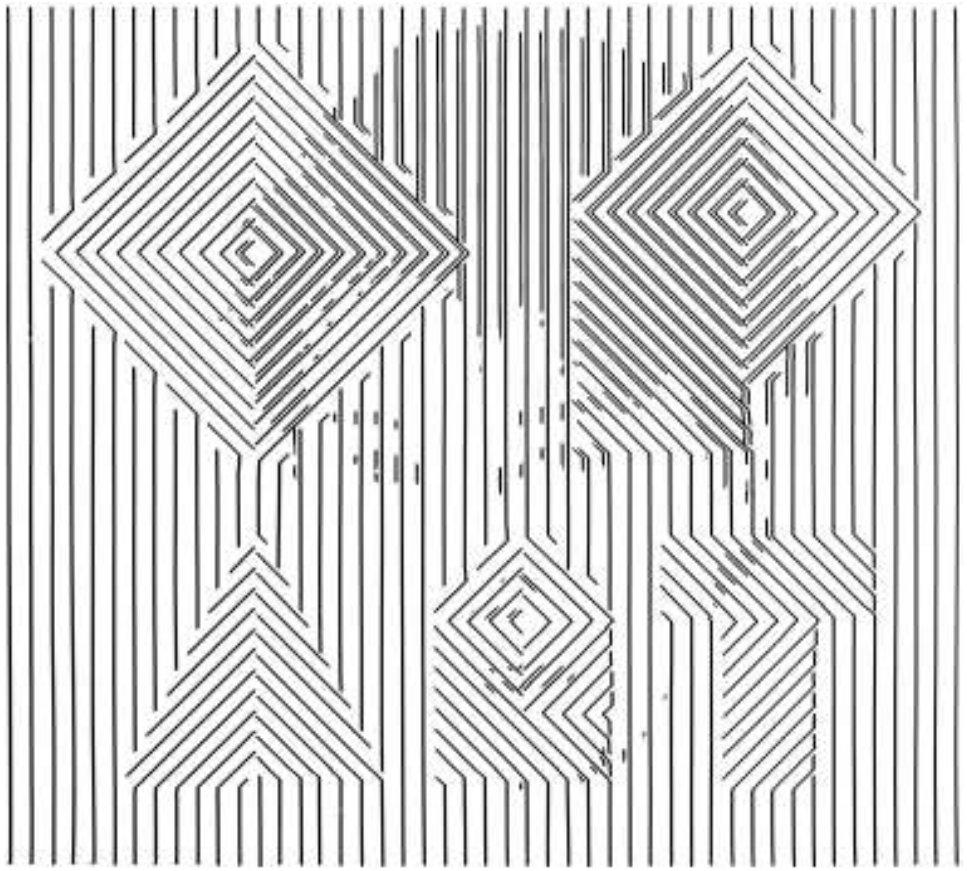
Hermann and Hering grids have been manipulated with great skill by Victor Vasarely.

They have played a major part in Op Art – the genre that closely binds the art and science of vision.

“Astigmat”

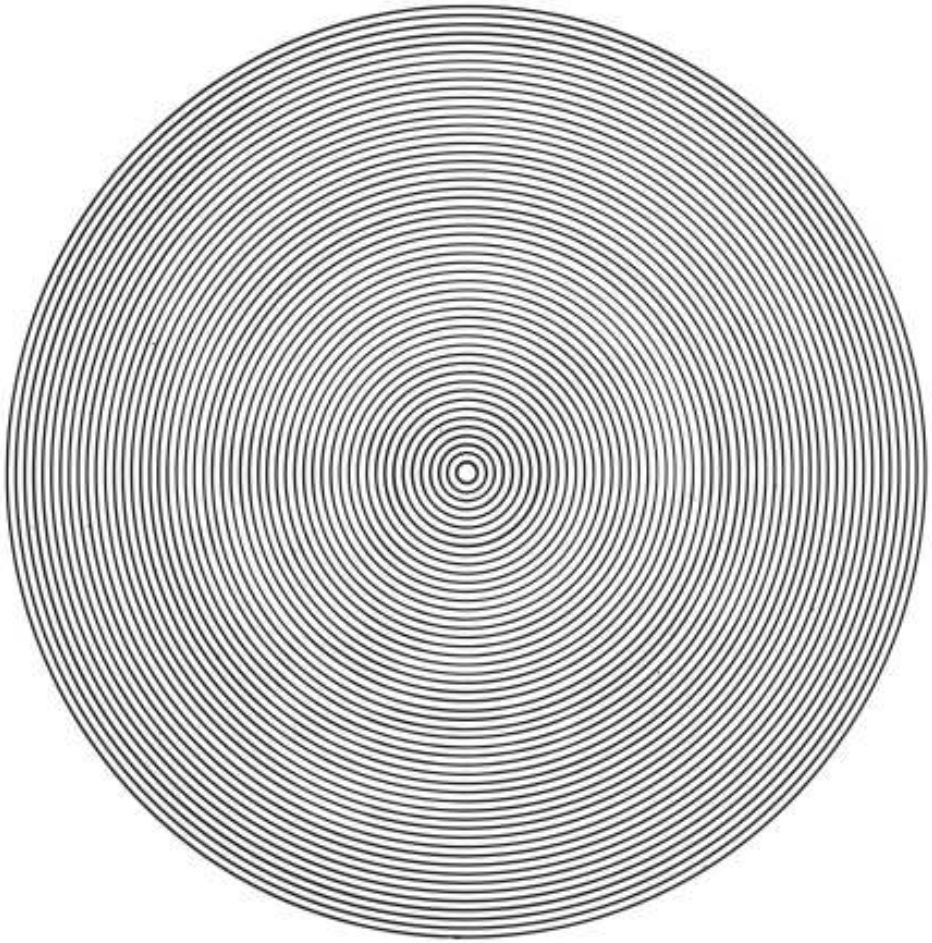


“Abstract Geometer”

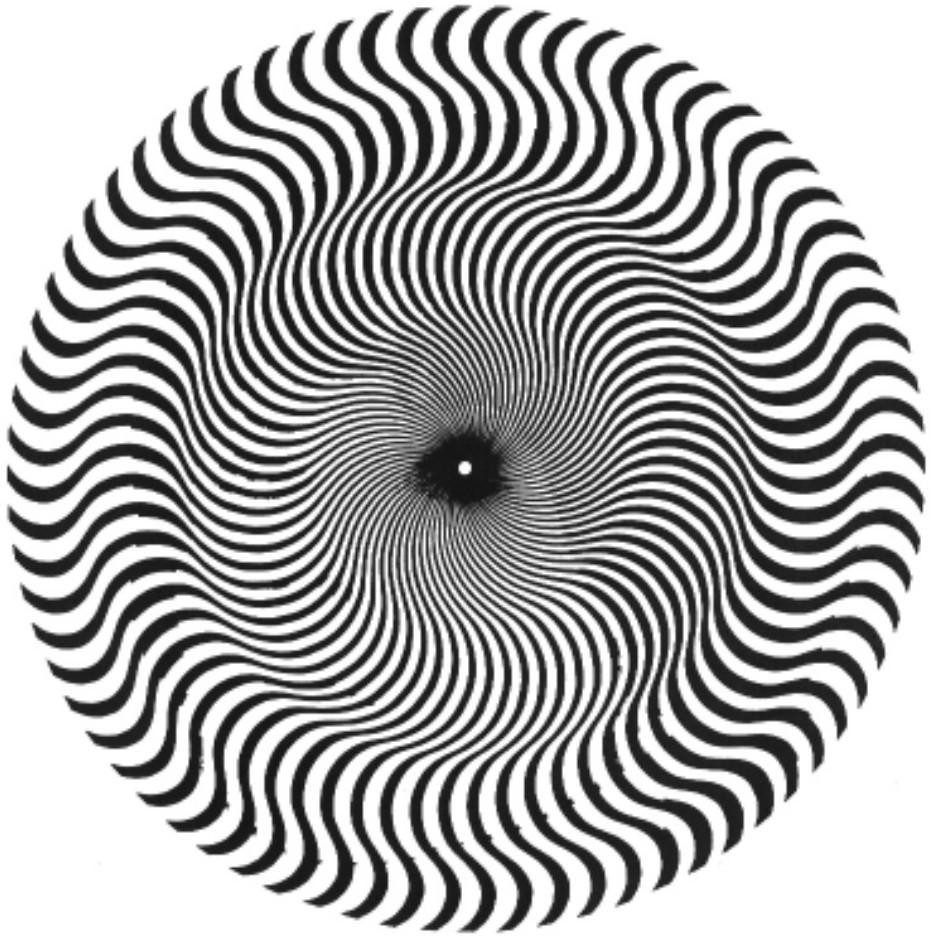


Thomas Young described his own regular astigmatism in 1801, and transient astigmatism has been amplified extensively in the art of Bridget Riley and other Op artists.

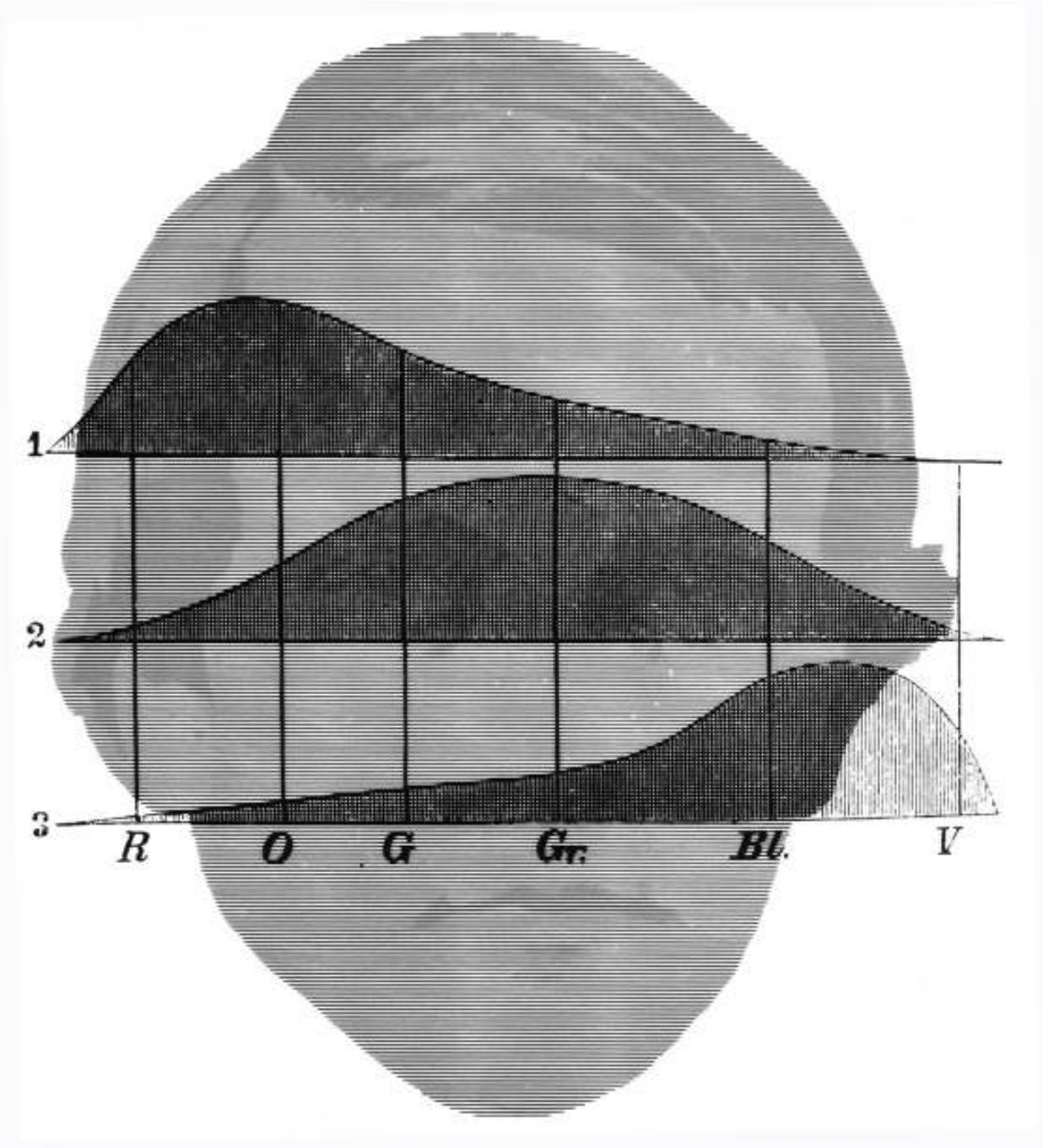
“Sehen in subjektiver Hinsicht”



“The Responsive Eye”

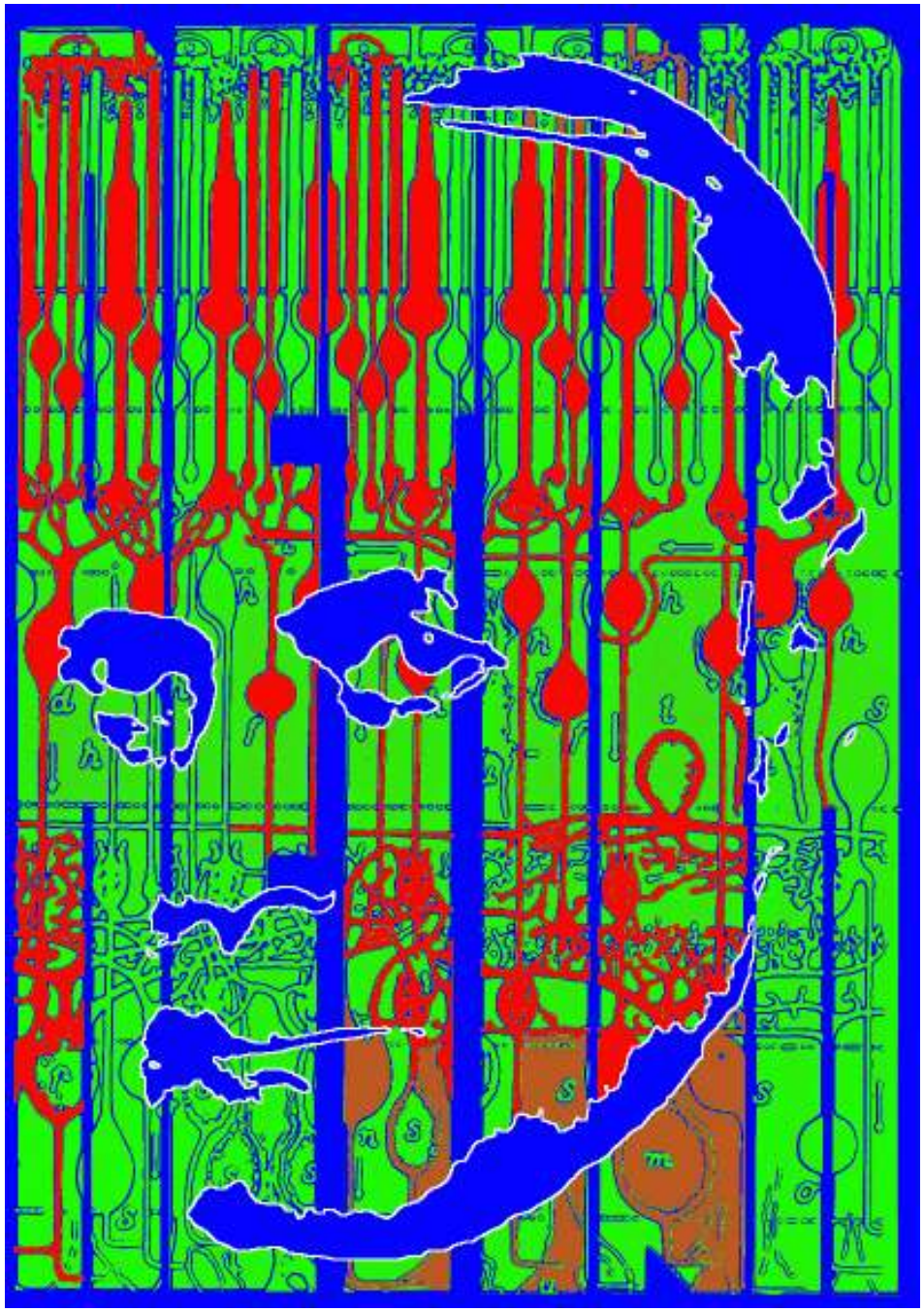


Purkinje described the distortions that are seen with regular geometrical patterns, like circles and radiations. Bridget Riley uses these effects in her op art. Patterns like these often produce subjective colours.



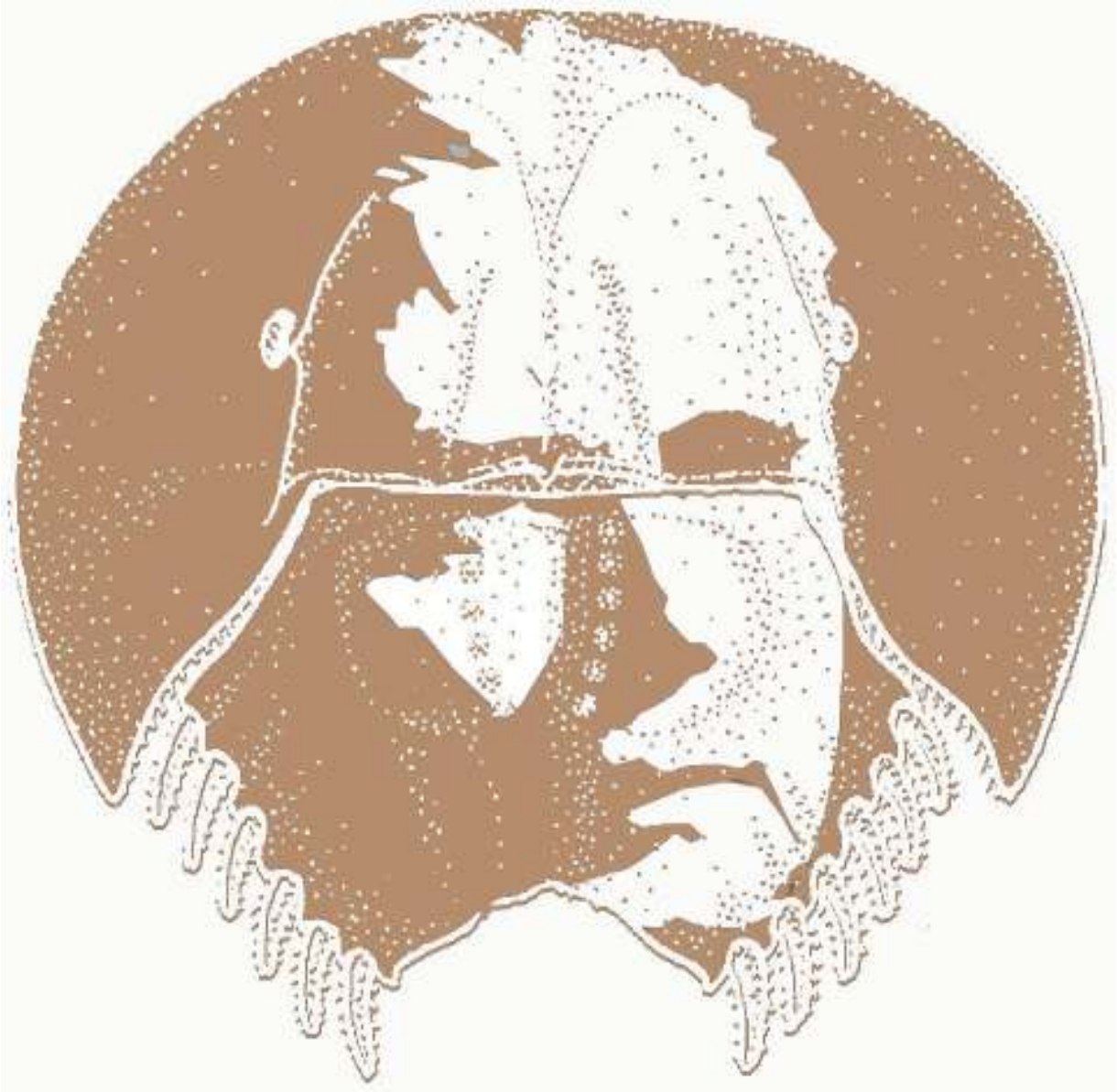
"Young Helmholtz"

Hermann Helmholtz (1821-1894) devoted one of his Popular Lectures to the relation of optics to painting – particularly colour.



“Nobel colours”

Ragnar Granit
(1900-1991)

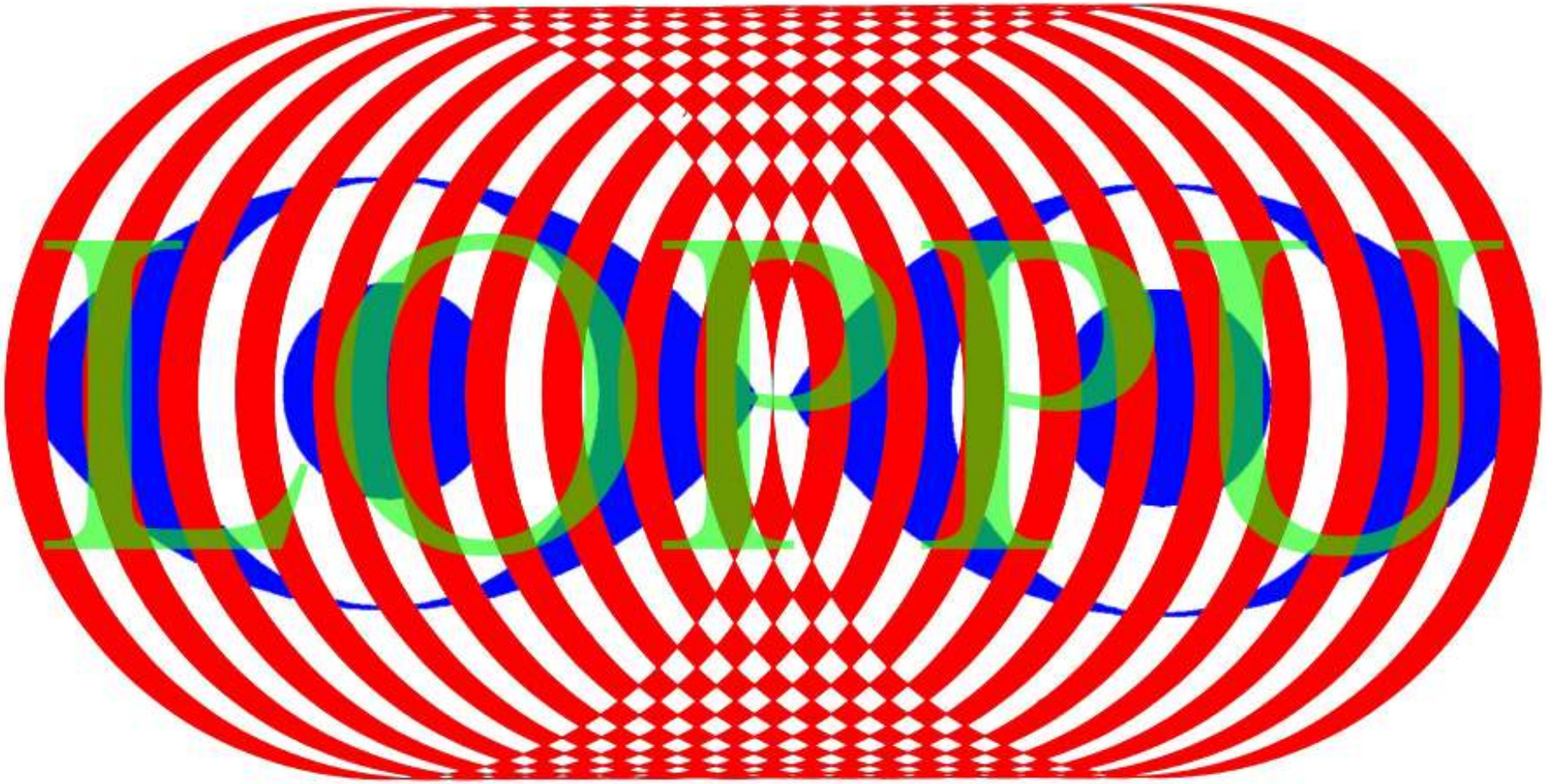


"Limulus"

Haldan Keffer
Hartline
(1903-1983)

"Visual purple"

George Wald (1906-1997)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