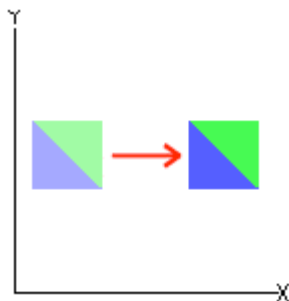


SYMMETRY

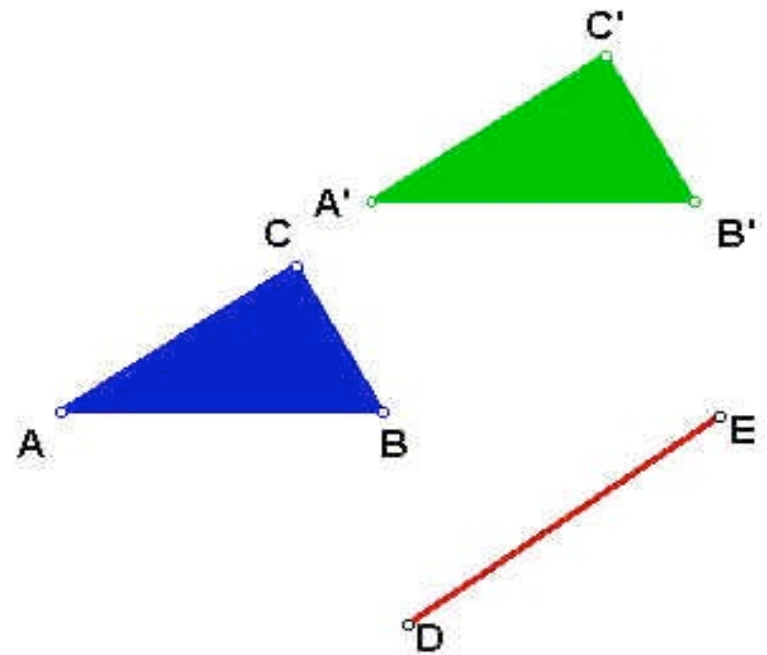
1. Translation
2. Rotation
3. Reflection
4. Glide reflection

Translation

- All points in a figure are moved the same distance in the same direction.

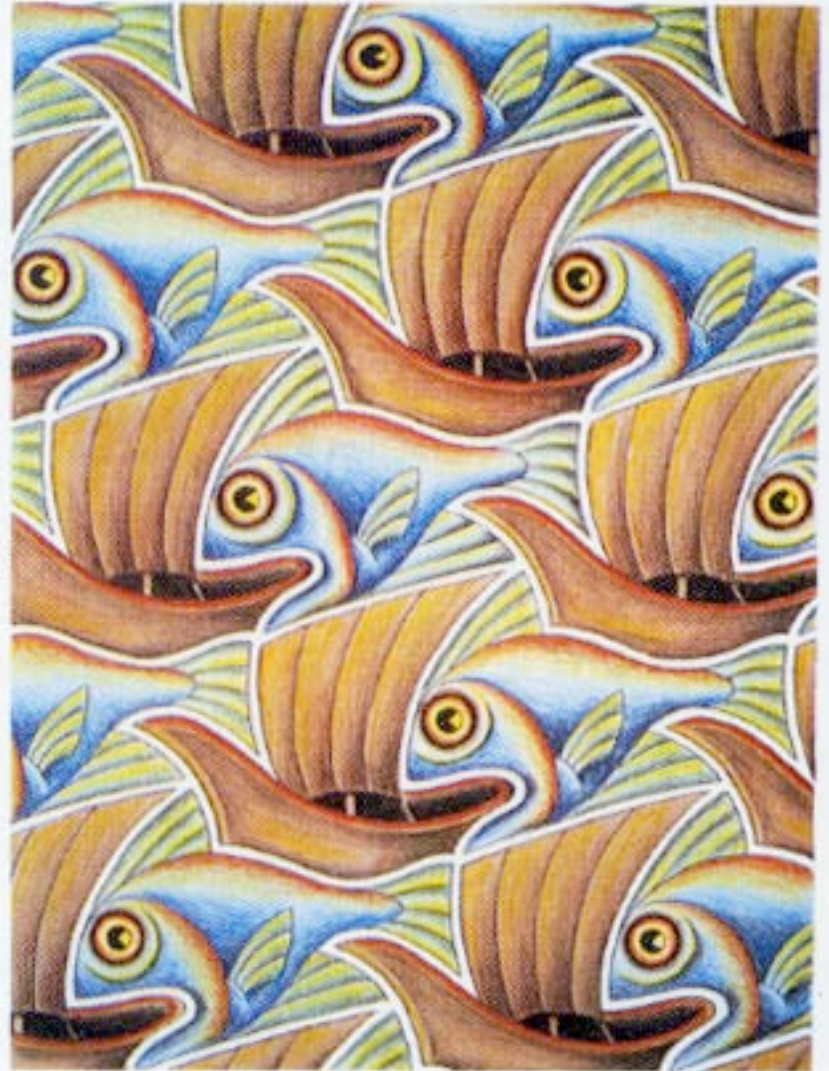


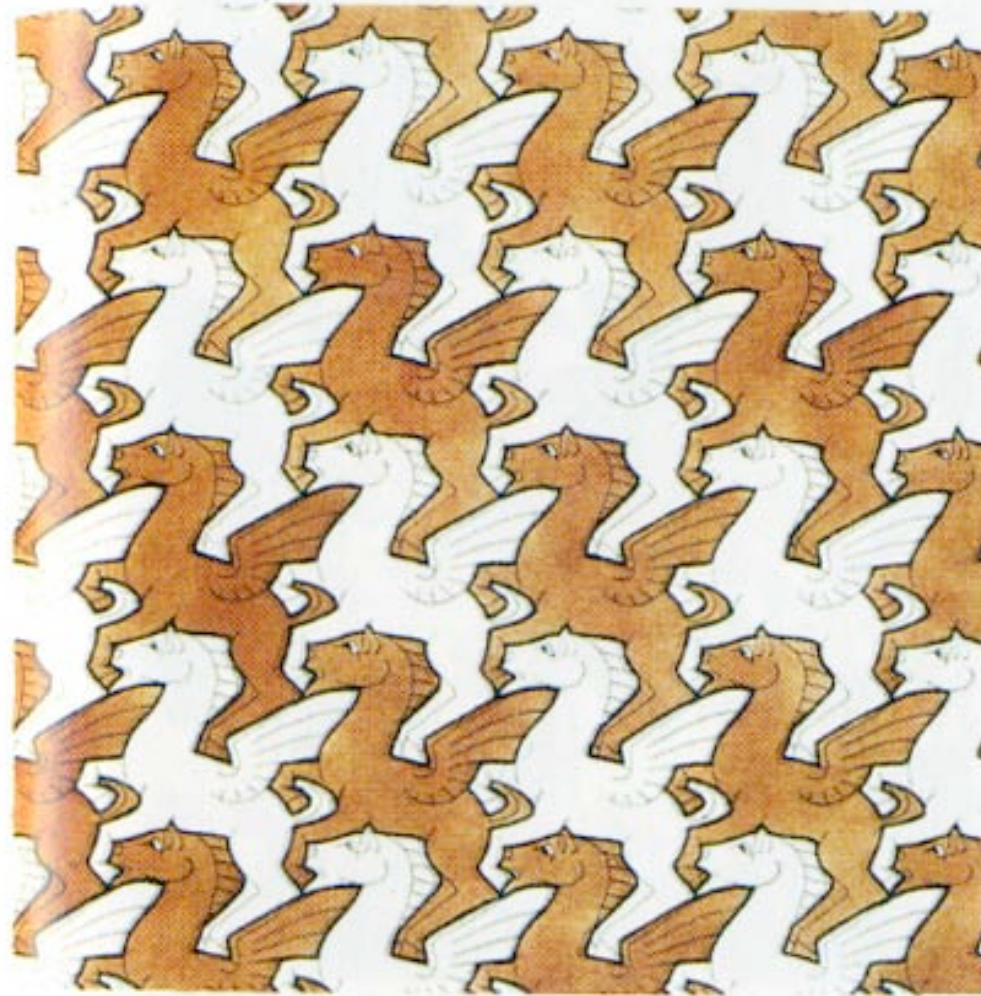
Triangle A'B'C' is a translation of Triangle ABC in the direction of D to E and distance DE.



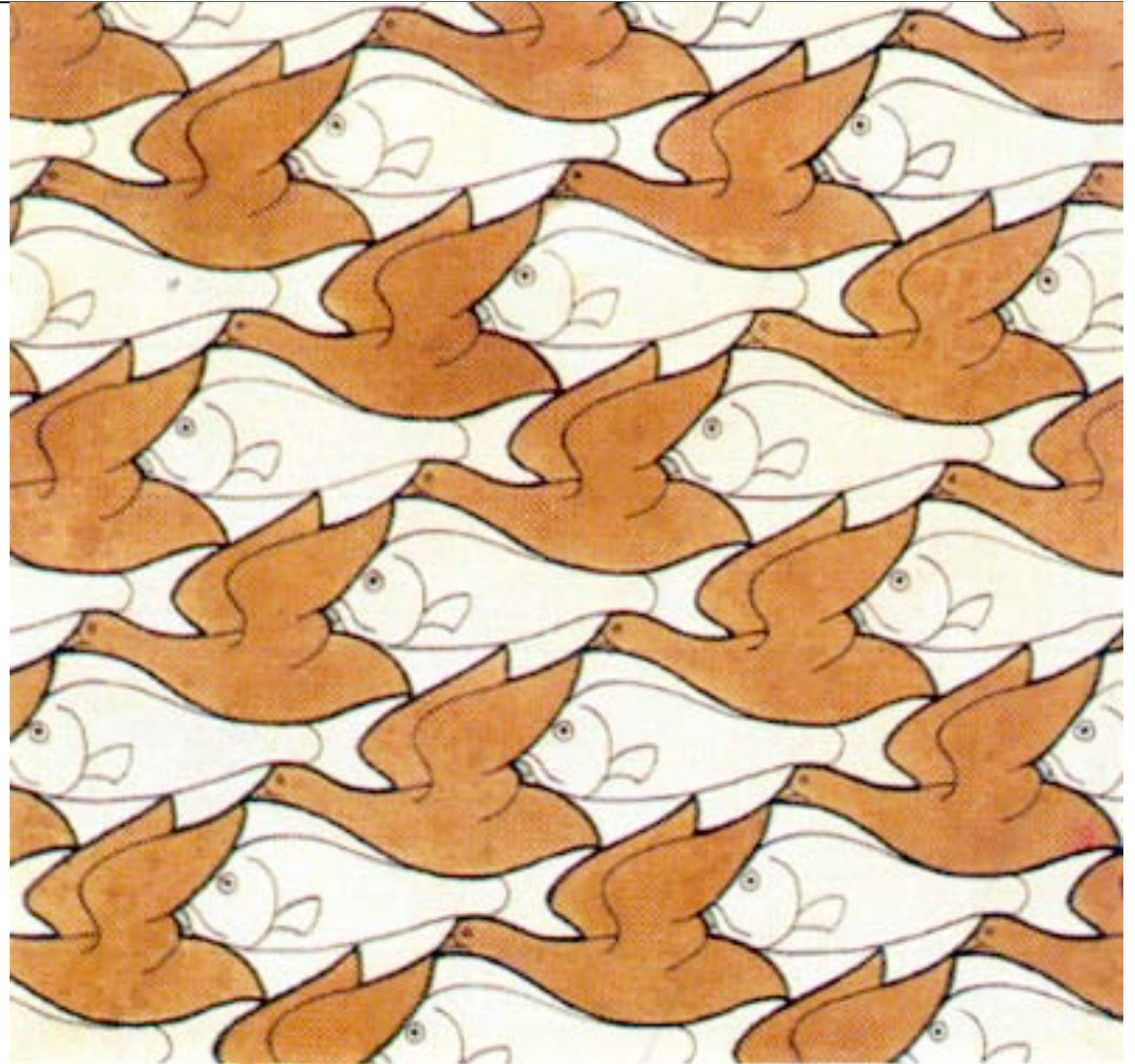


-
- M. C. Escher used translations (and other transformations) to achieve a **tessellation** (also known as tiling, mosaic, or paving) **of the plane**
 - A tessellation is a set of polygonal regions that cover the plane without gaps and without overlap.
 - In art, tessellation is sometimes also known as a regular **division of the plane**.





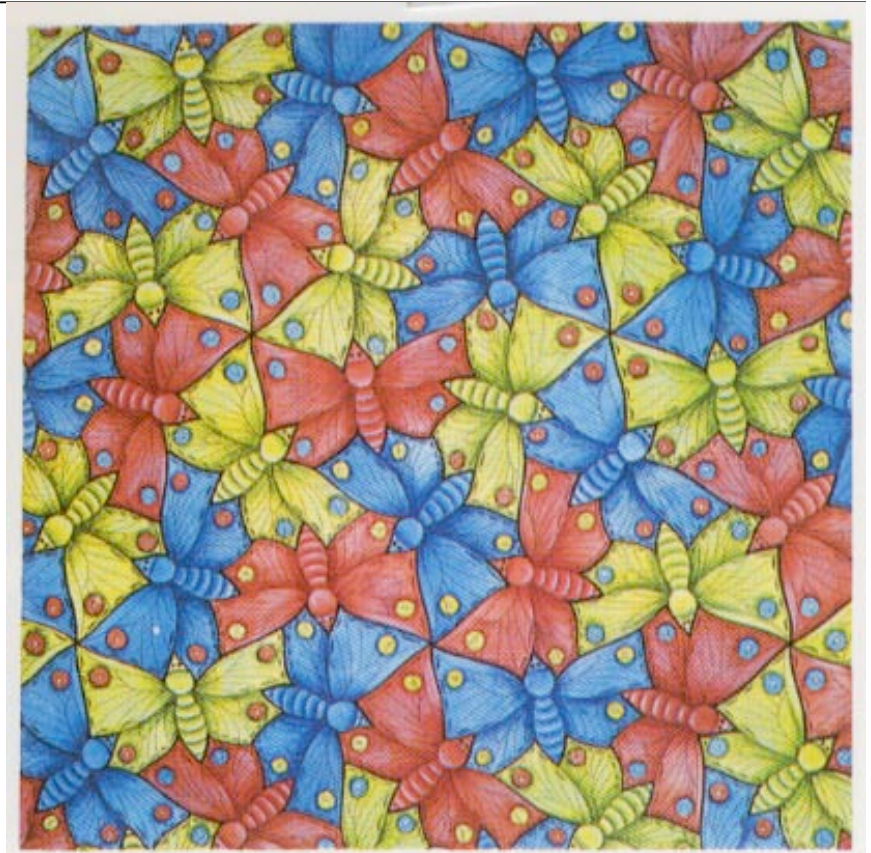
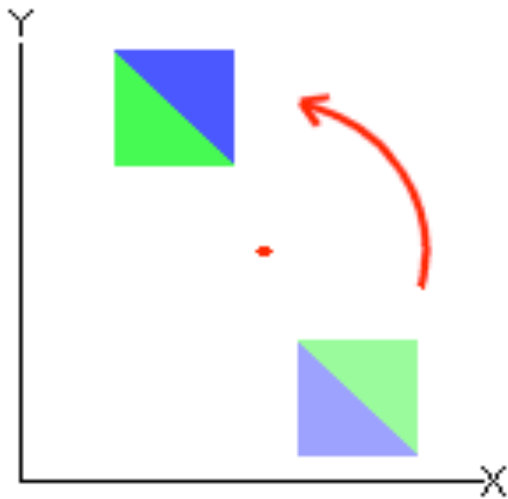
-
- Tessellation is based on the principle of the **double function of contour lines**.
 - A contour line is the outline or edge of a figure.
 - Each contour line defines the shapes of two figures, on either side of it.

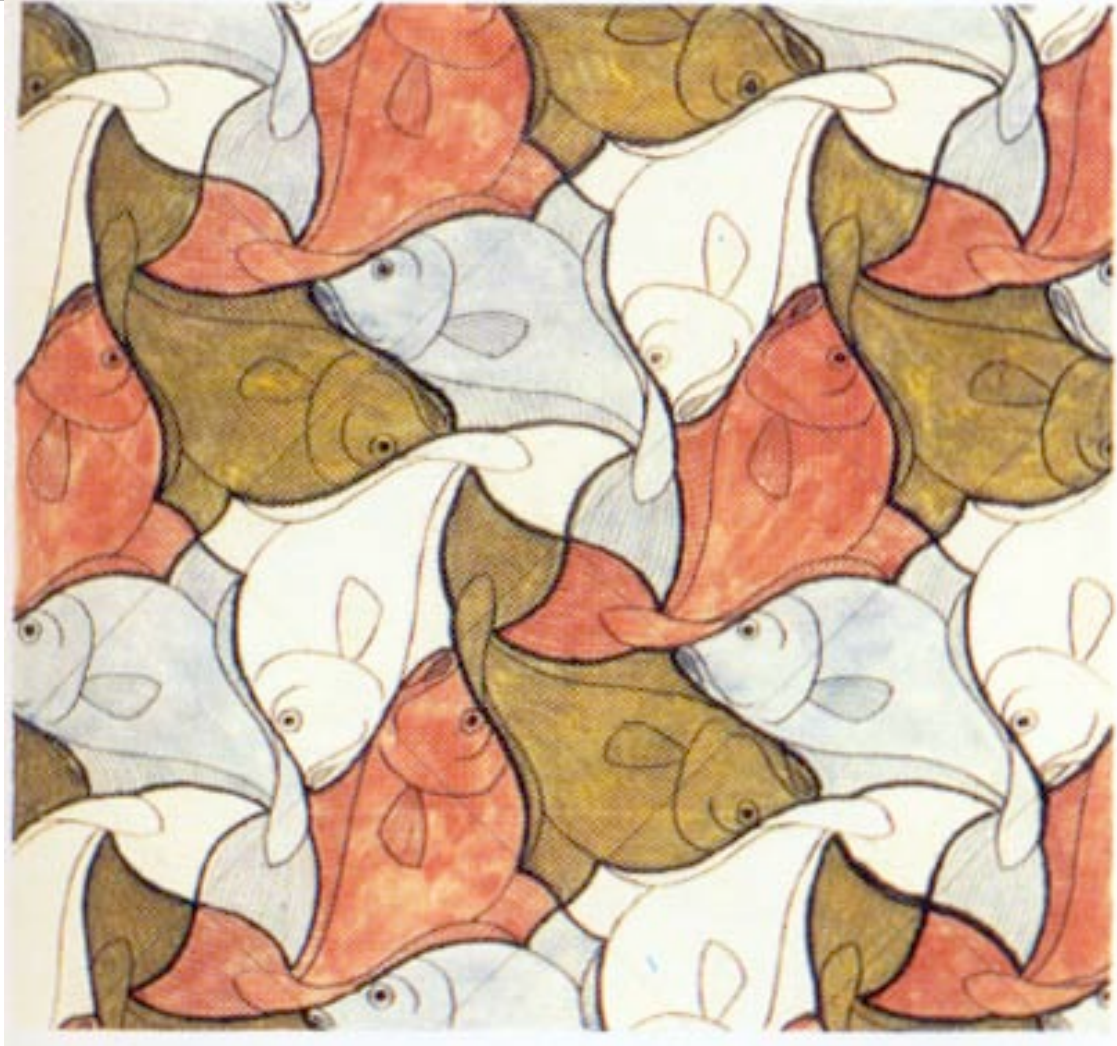


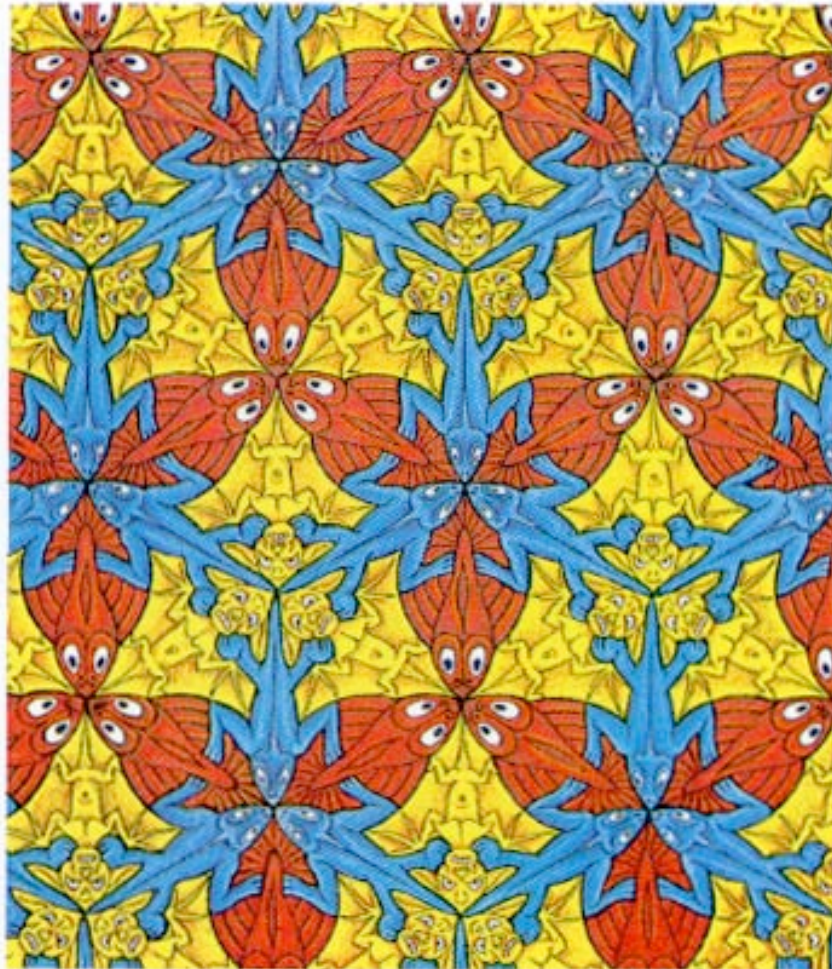


Rotation

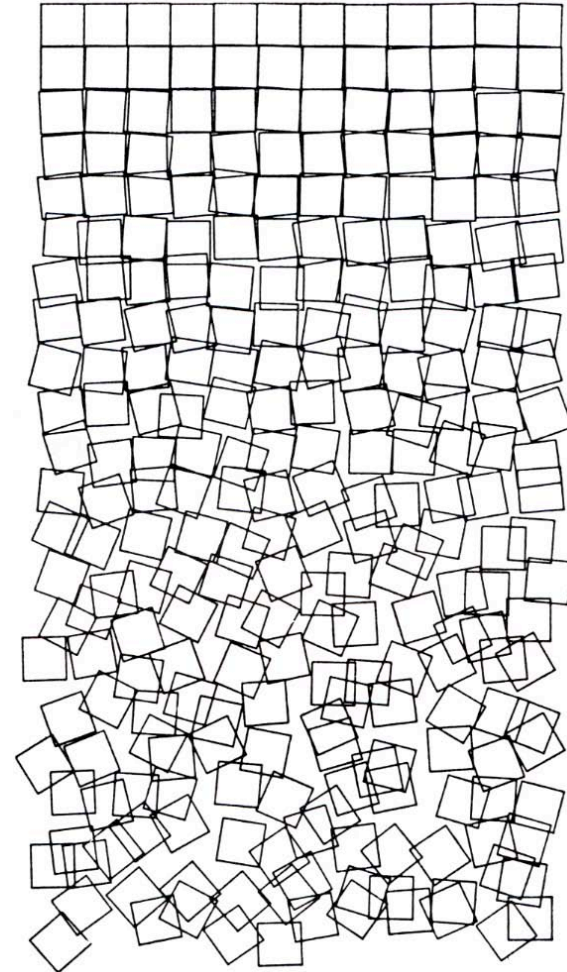
- A figure is turned on an angle.
- This angle is the **fixed point** of the rotation.







-
- Translations and rotations may be used to generate a sense of rhythm and development

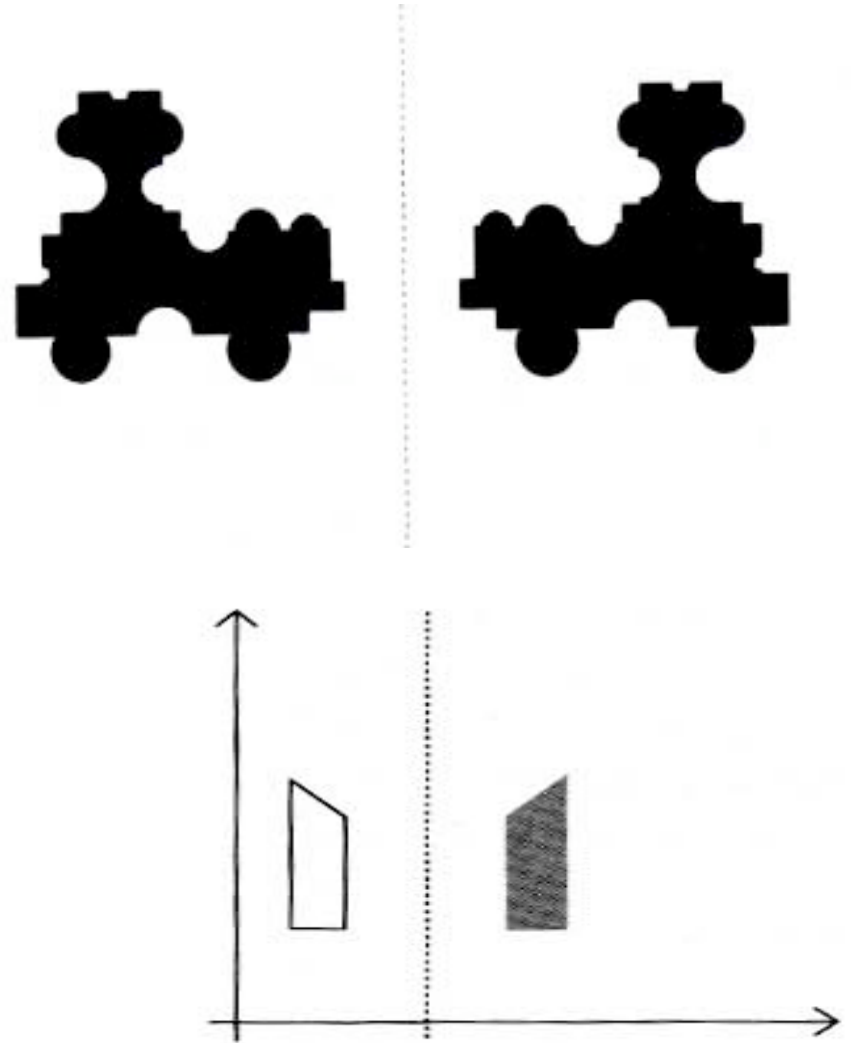




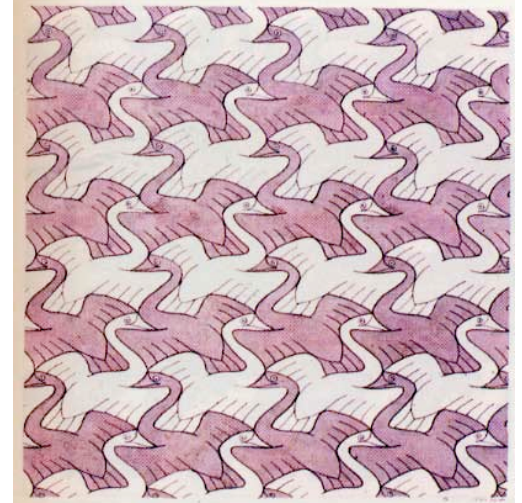
Reflection

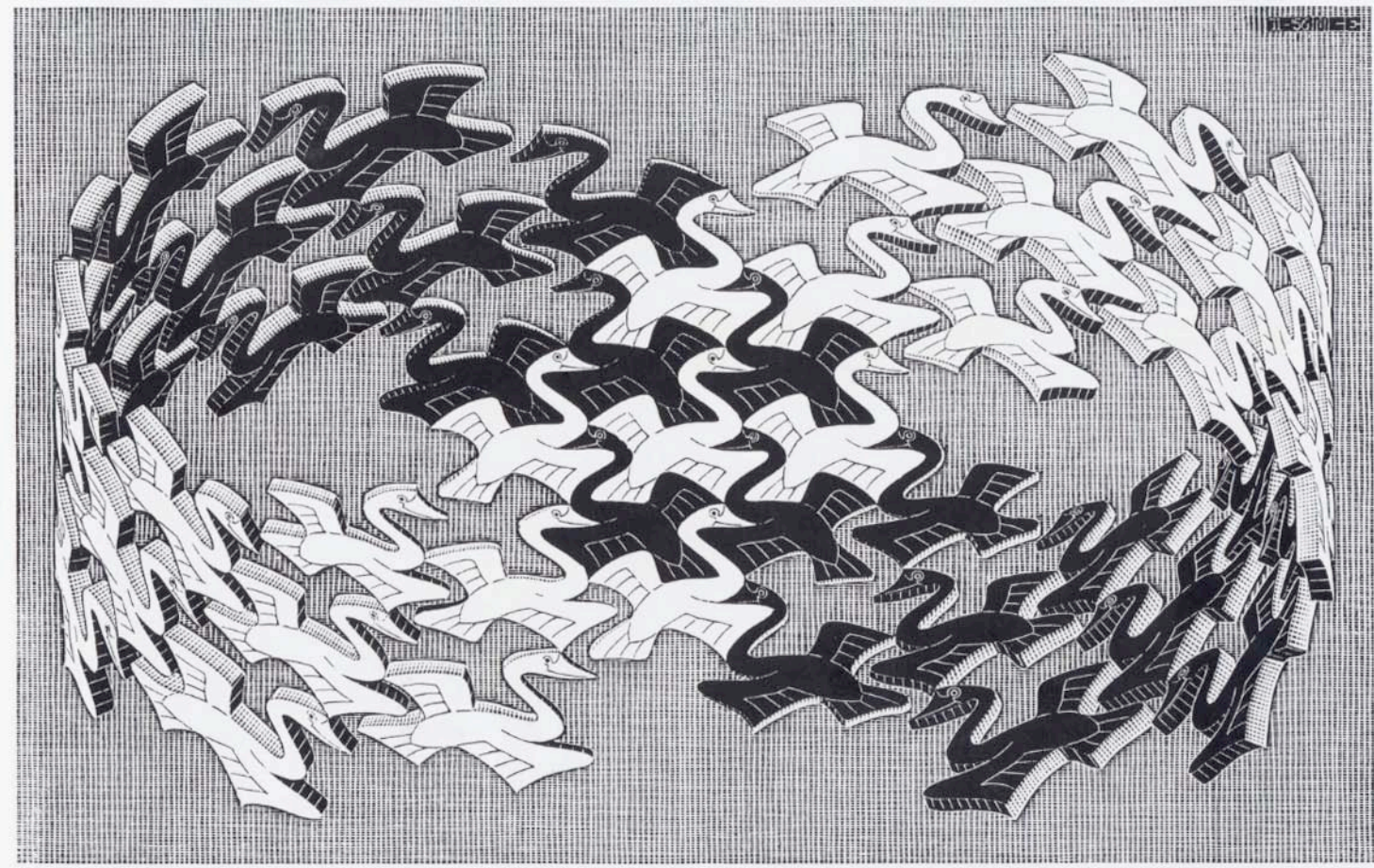
Preserves shape (distances) but alters “handedness”.

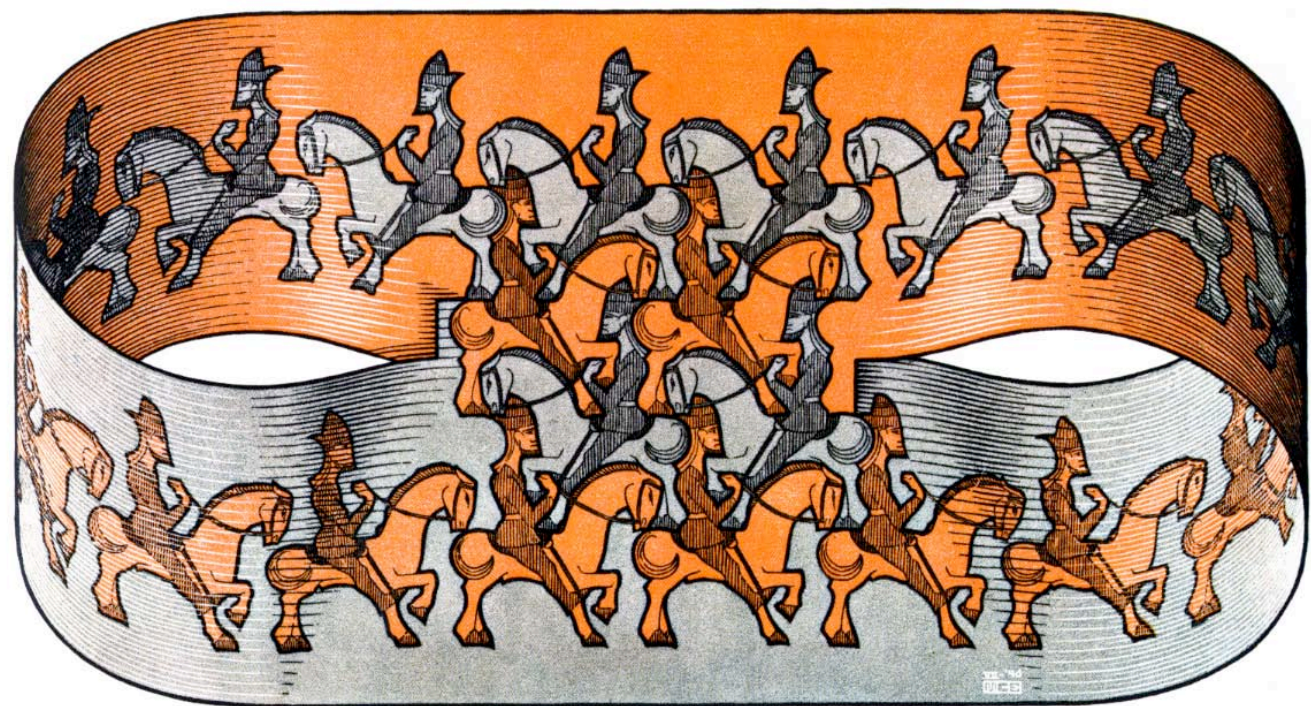
- The figure is “flipped”.
- Its right-hand side and left-hand side are exchanged.



-
- Reflection is not order preserving.
 - The points in the image do not have the same order as the points in the original.
 - Reflection is an order reversing transformation.
 - One cannot move one figure and fit on top of the other figure without taking it off the flat plane and reversing it in 3D space.
 - Rotations and translations, on the other hand, are order preserving.
 - We can move one image onto the other without taking it off the flat plane and onto space.

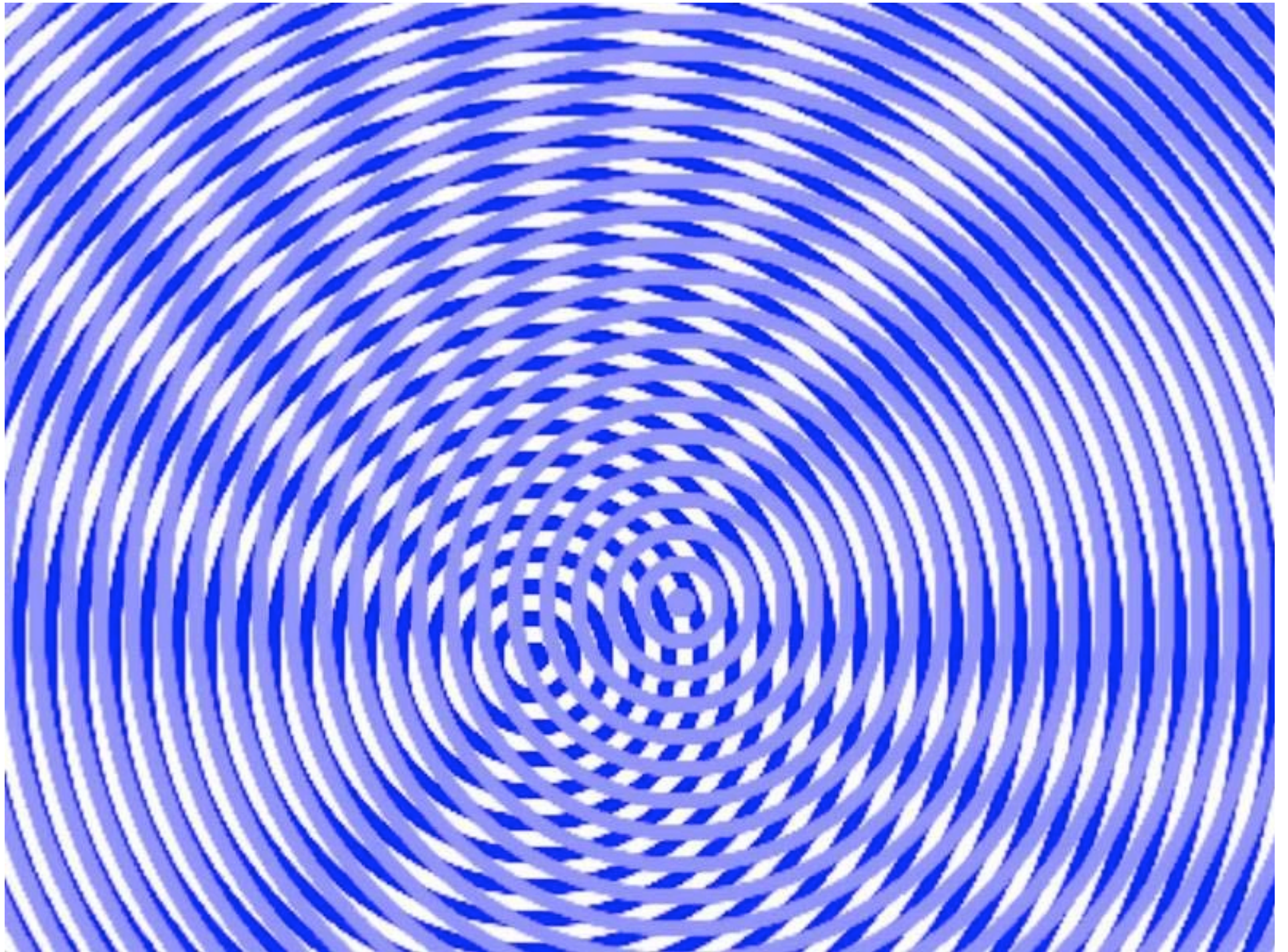


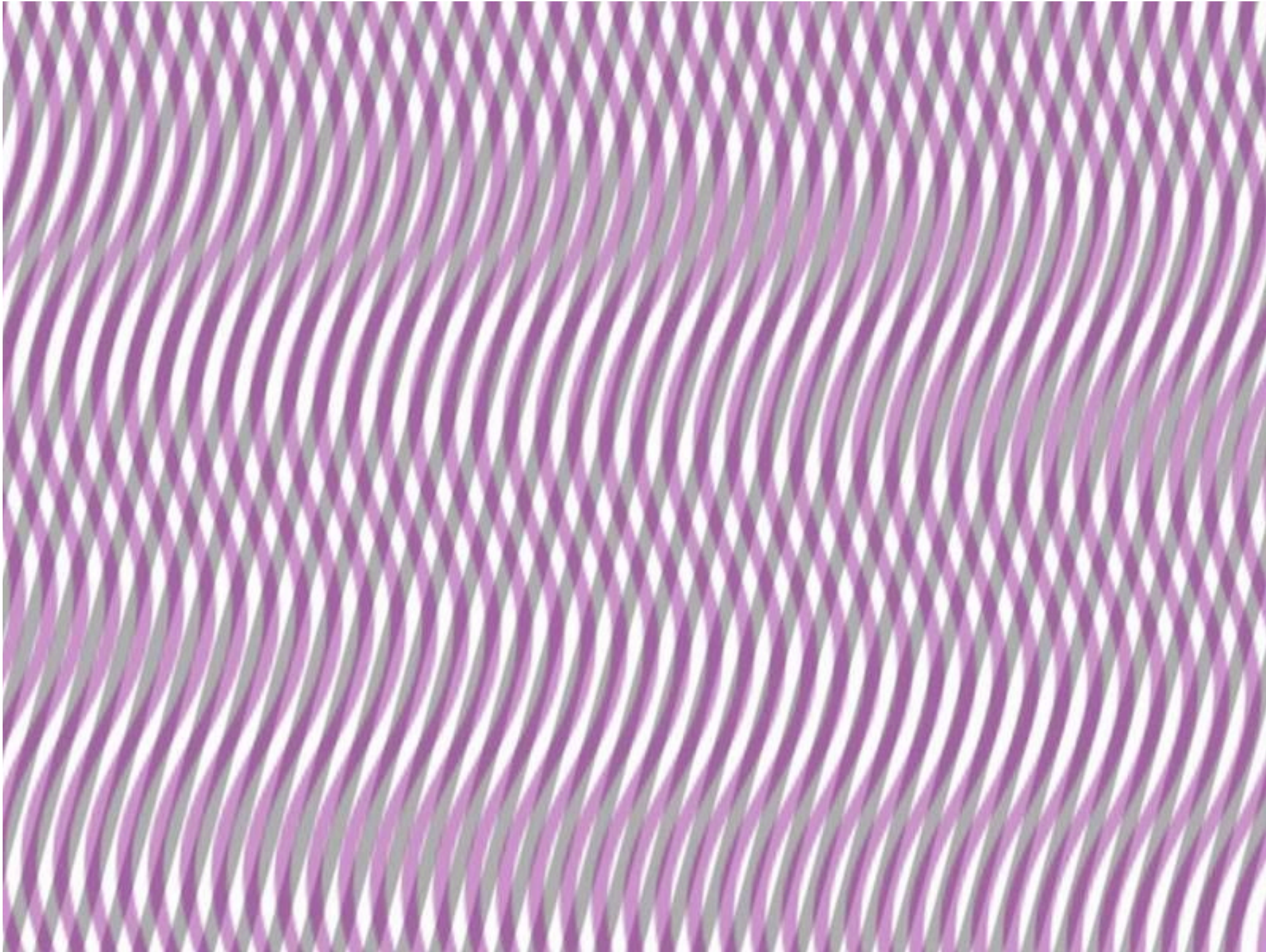


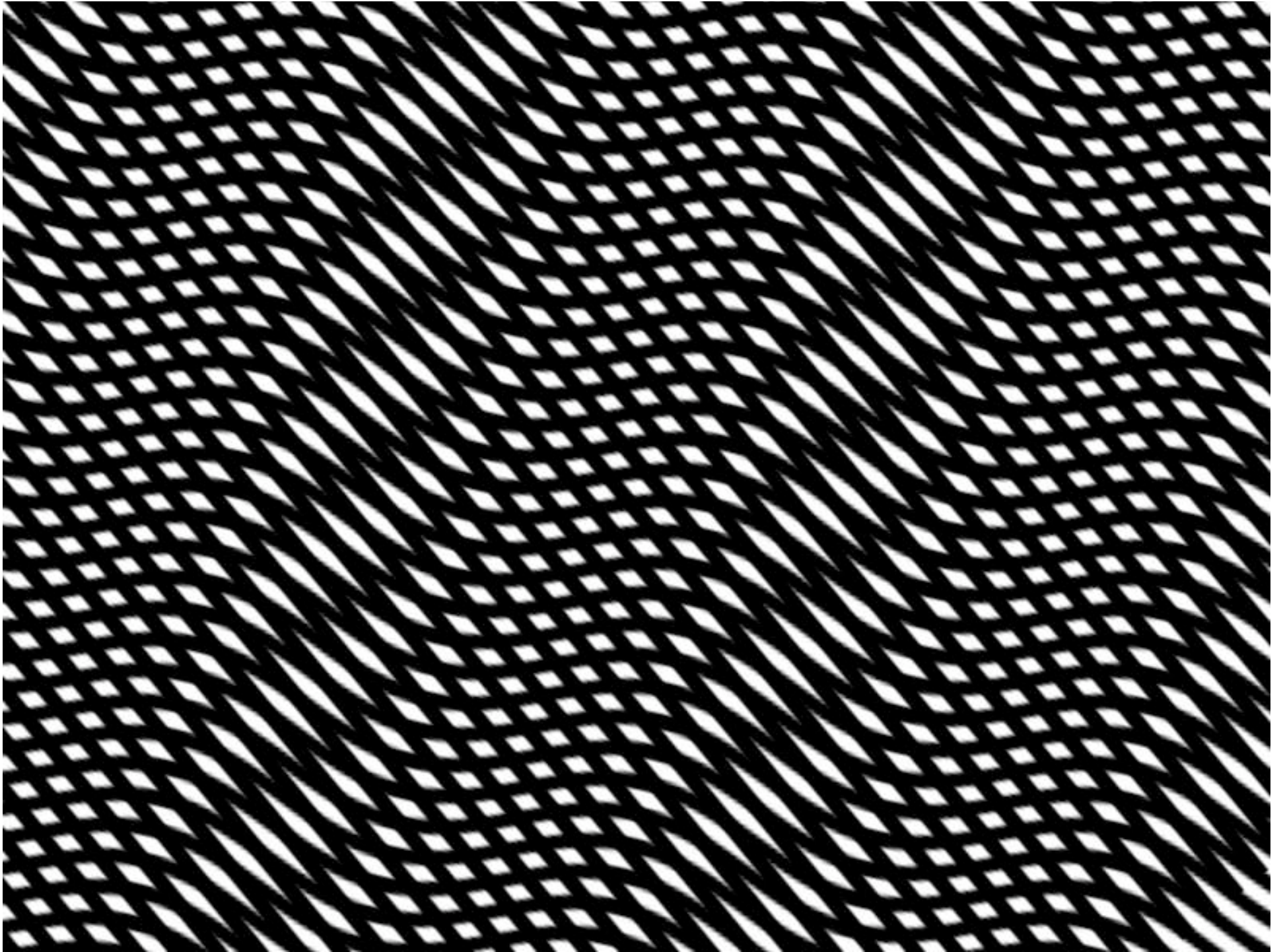


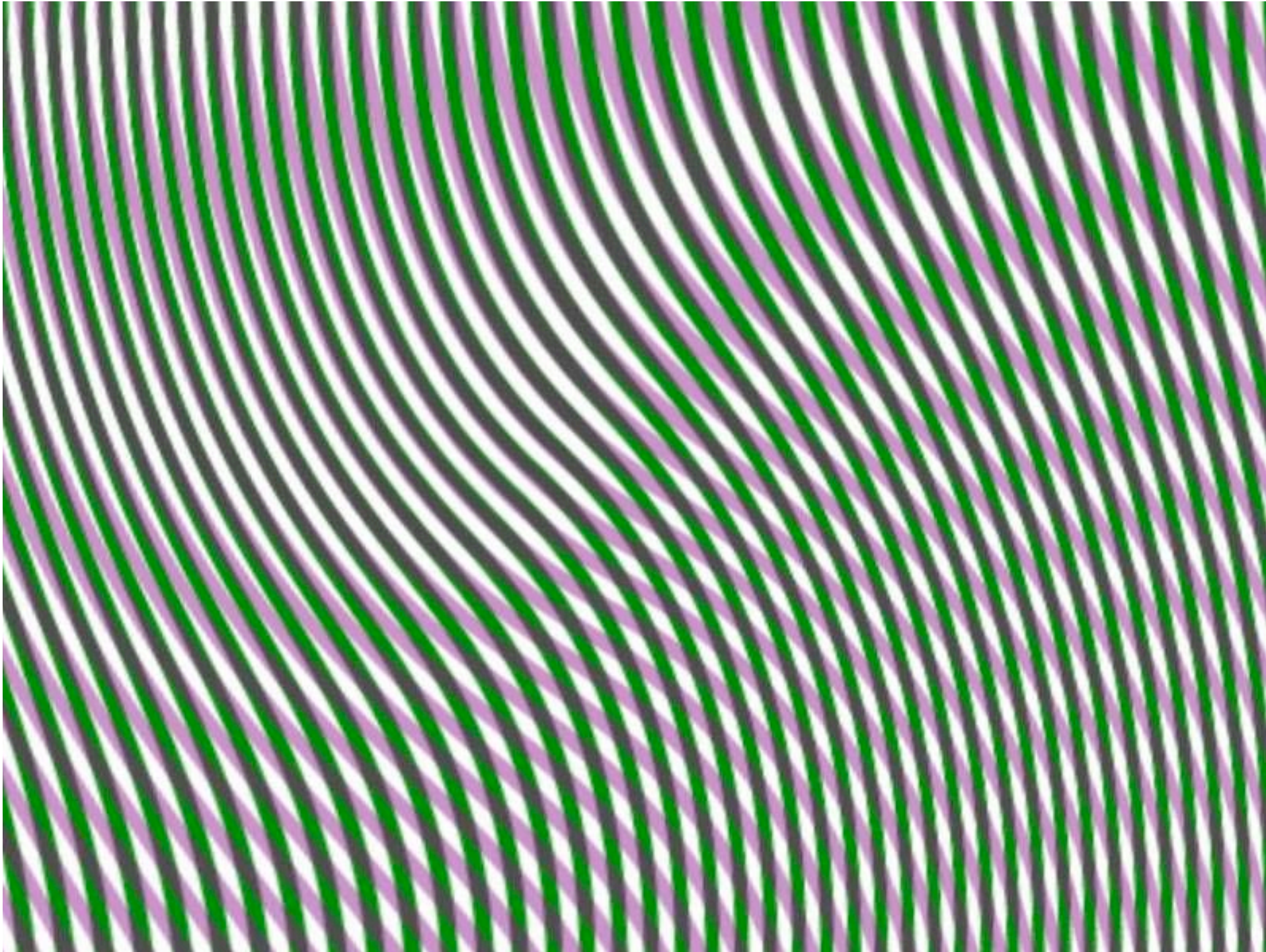
Moiré patterns

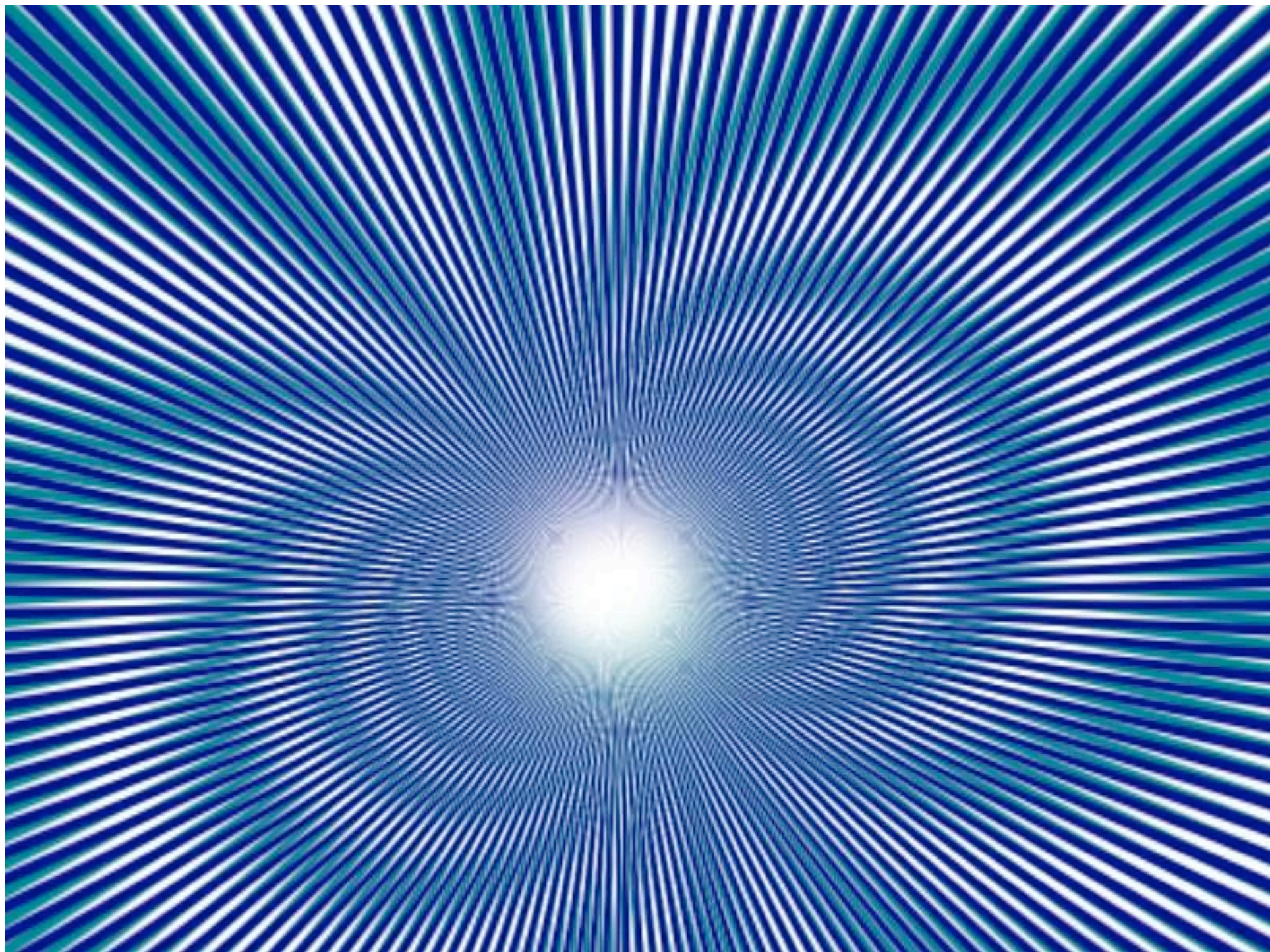
- Moiré is interference that can be seen when overlaying similar patterns.
- It is a special case of counterpoint.
- The result is strongly dynamic and unstable.



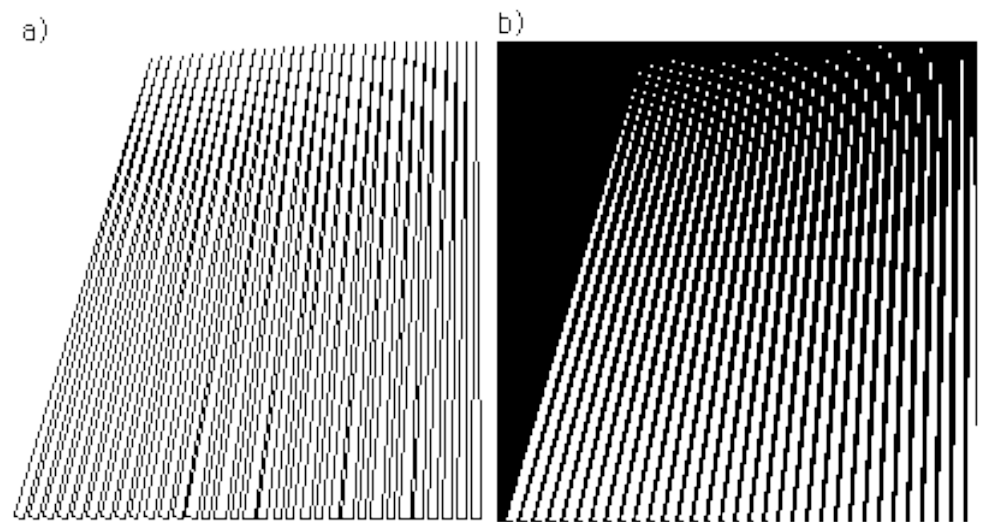


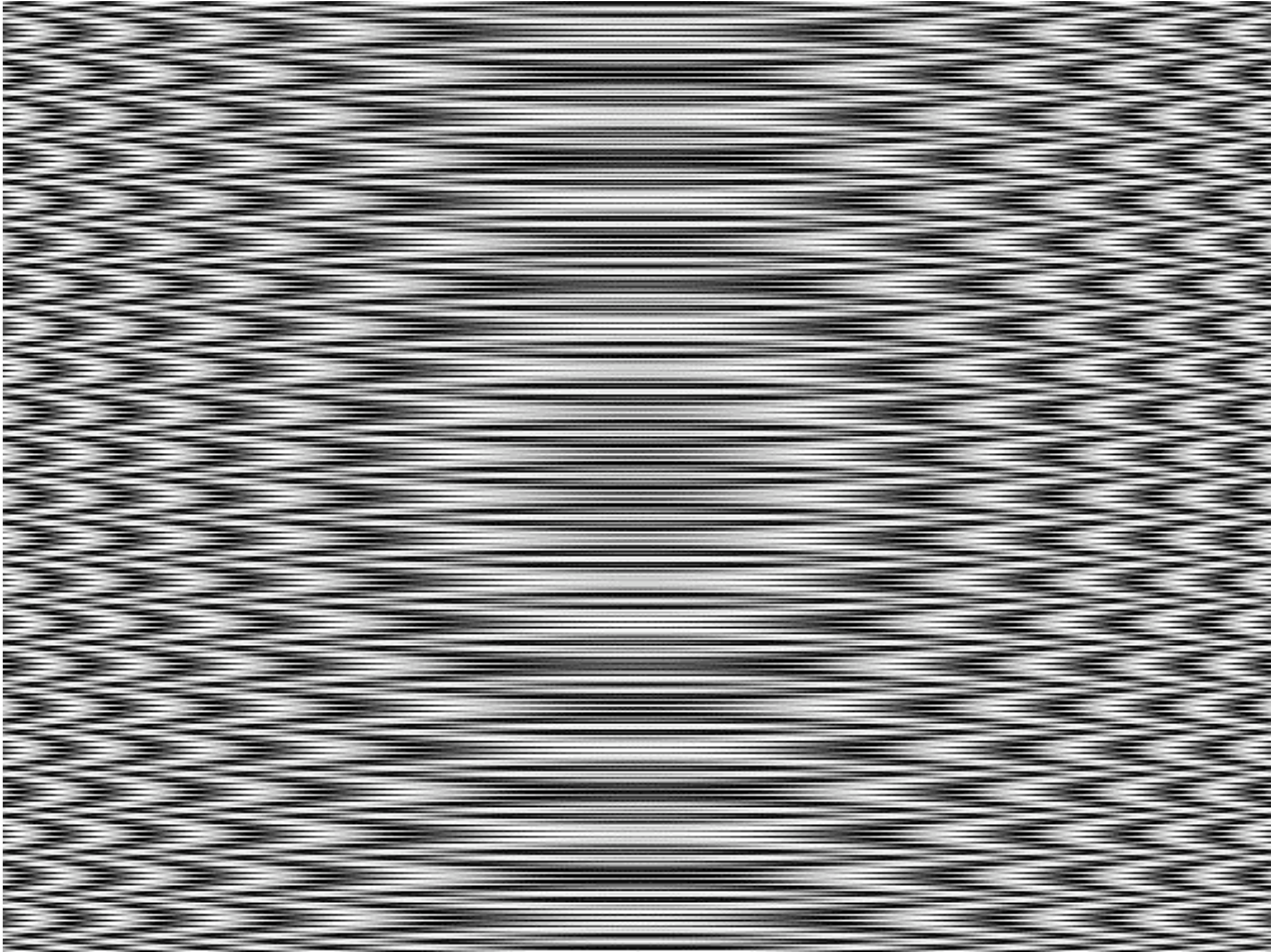




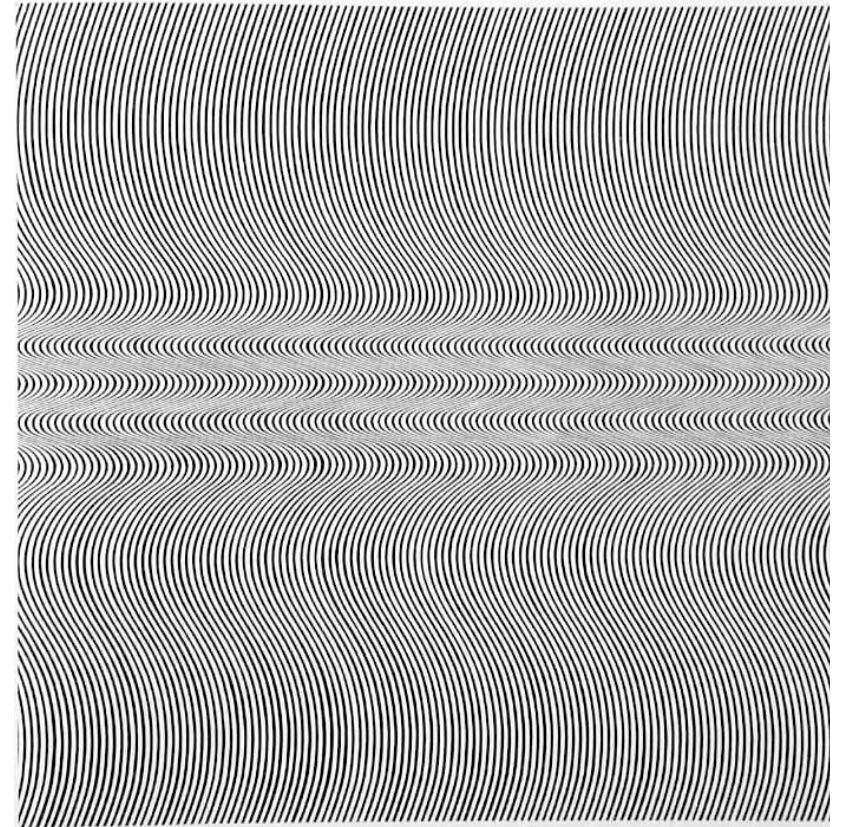


-
- Moiré patterns may sometimes produce an alias pattern.
 - **Aliasing** occurs when a new pattern is visually apparent – but was not present in the source patterns.

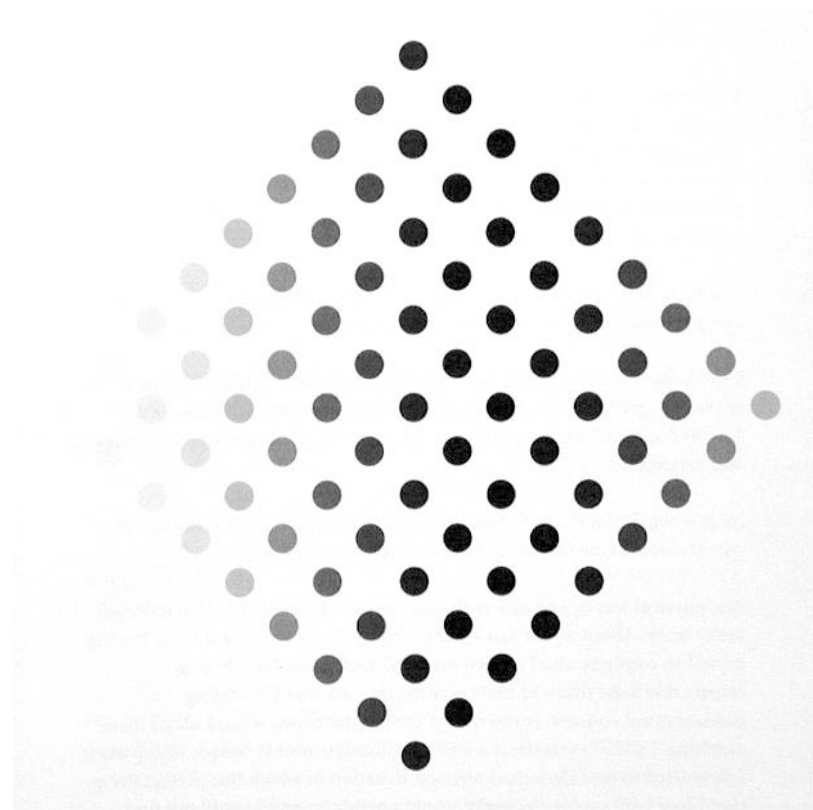




-
- A similar instability can also be produced without any moiré patterns.
 - Bridget Riley often created such effects by means of thin curved lines packed close together.
 - The effect is of intense flowing movement across the image.



Bridget Riley



-
- Similarity combined with gradual change can give an impression of motion.

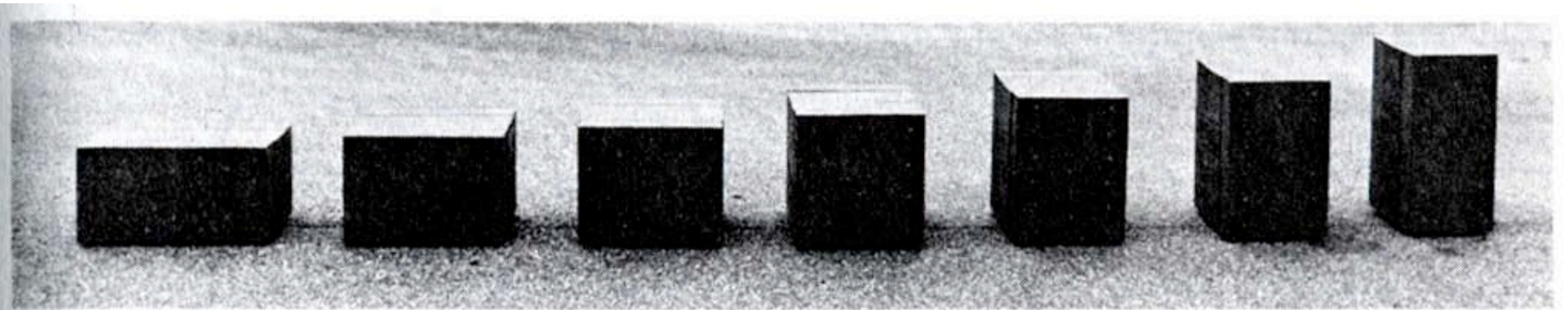
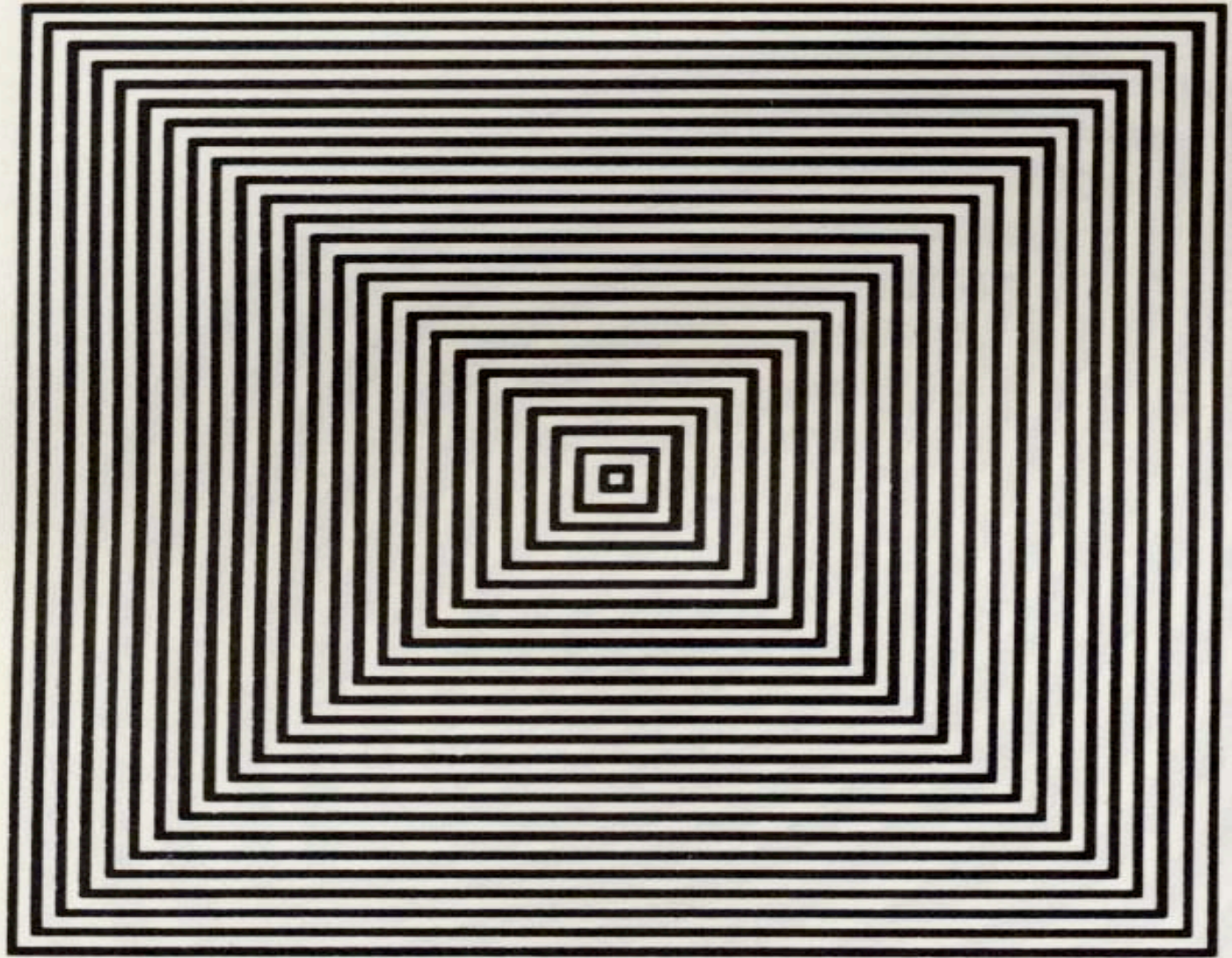
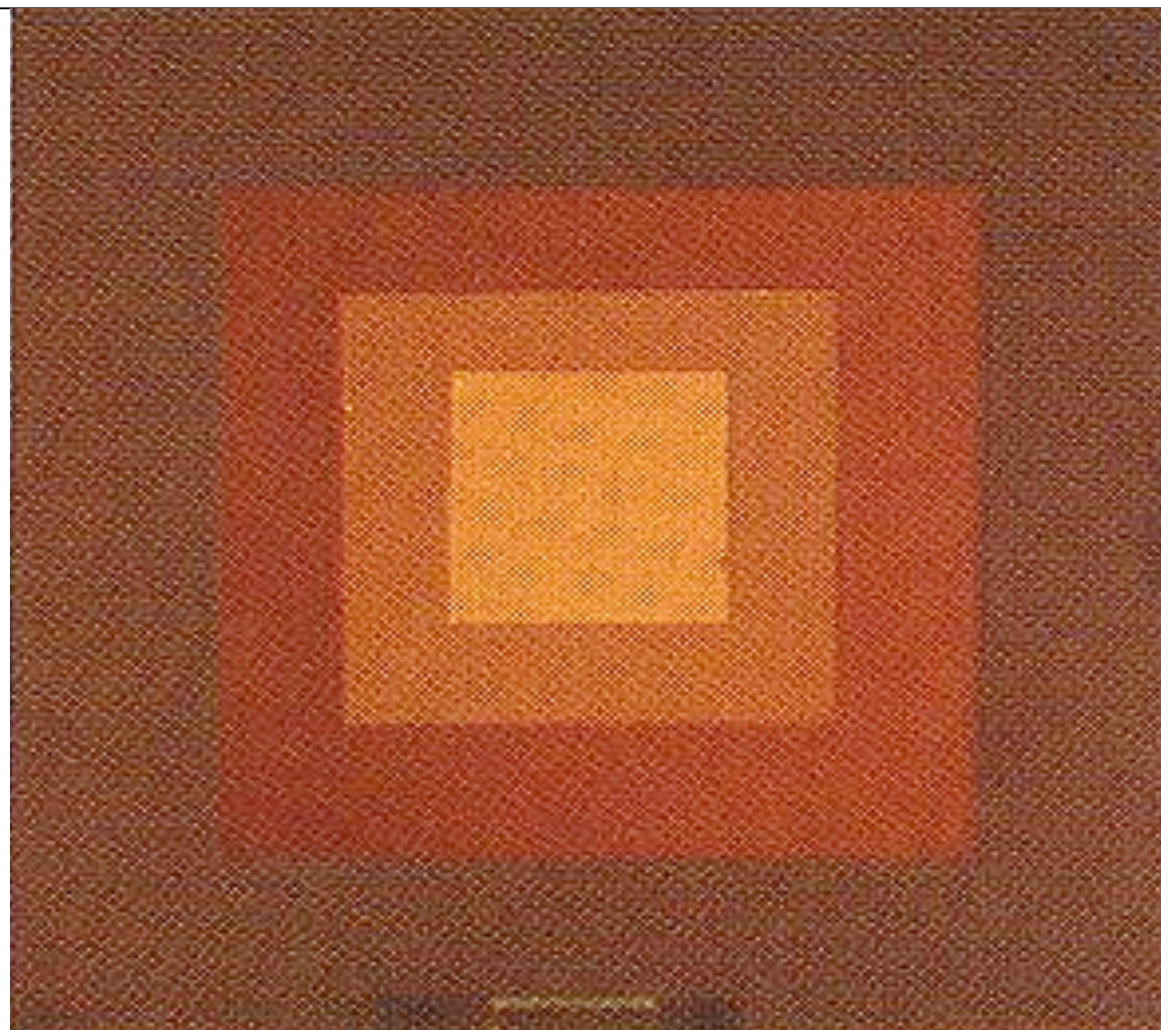


Figure 272





Victor Vasarely

Irregular progression can also create a sense of depth.

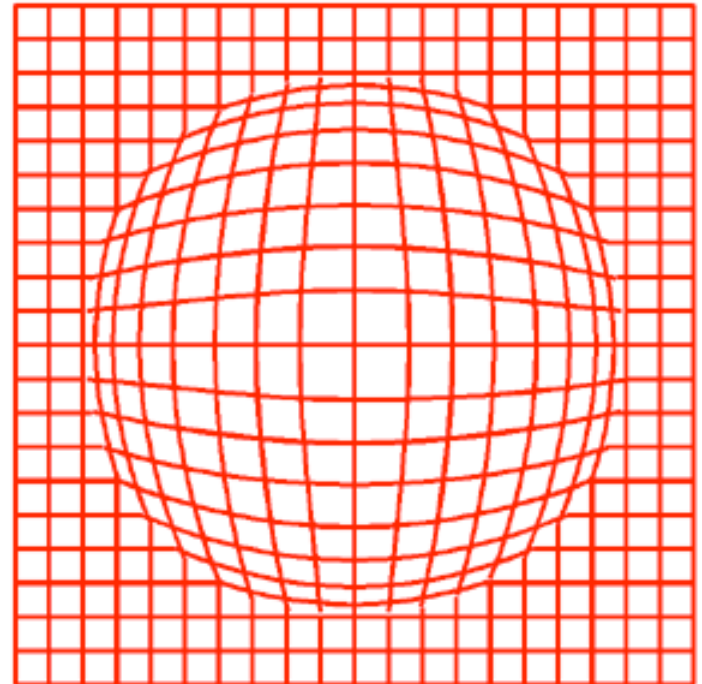
Especially when there is a contrast between cool and warm colors.

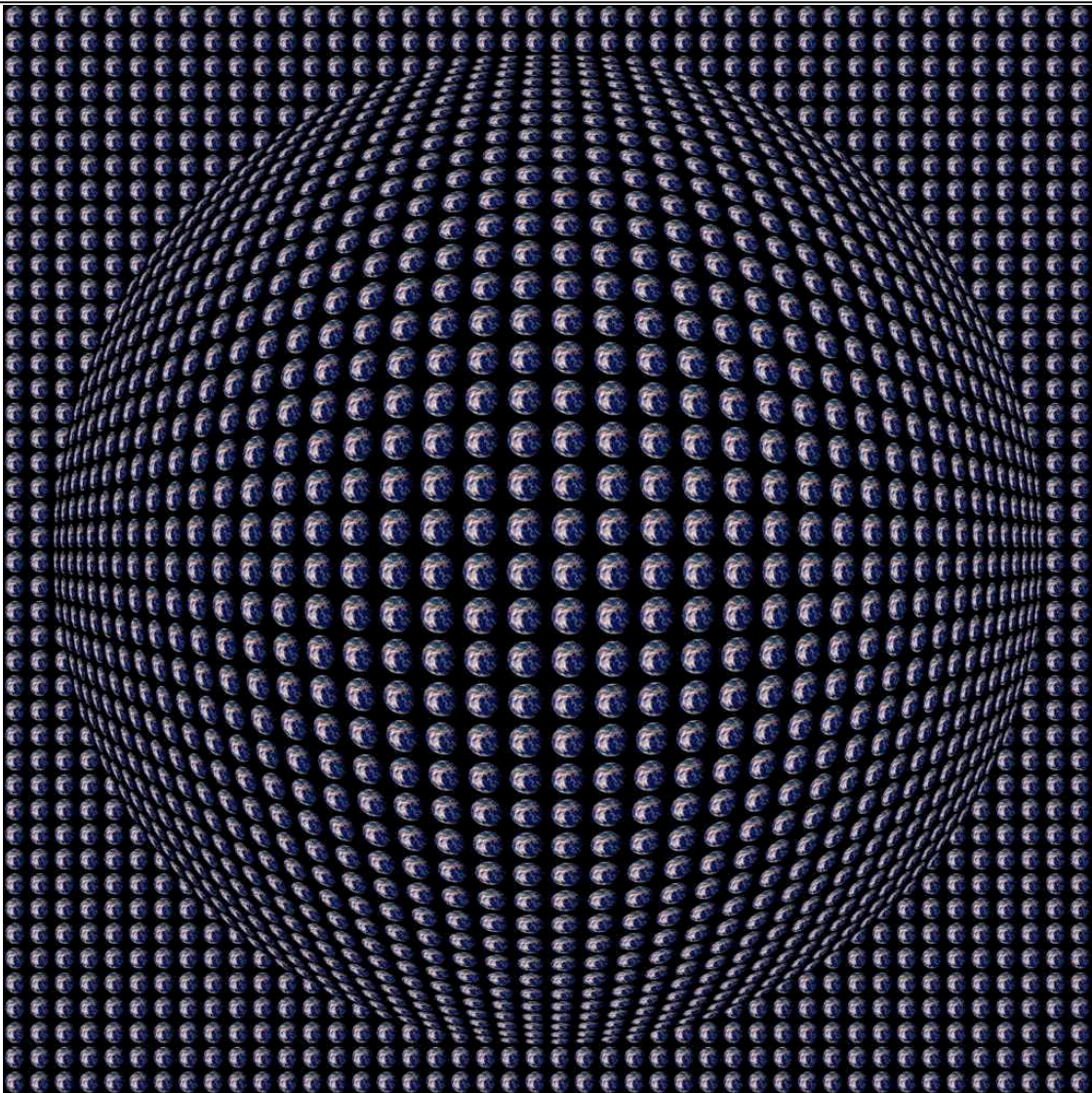


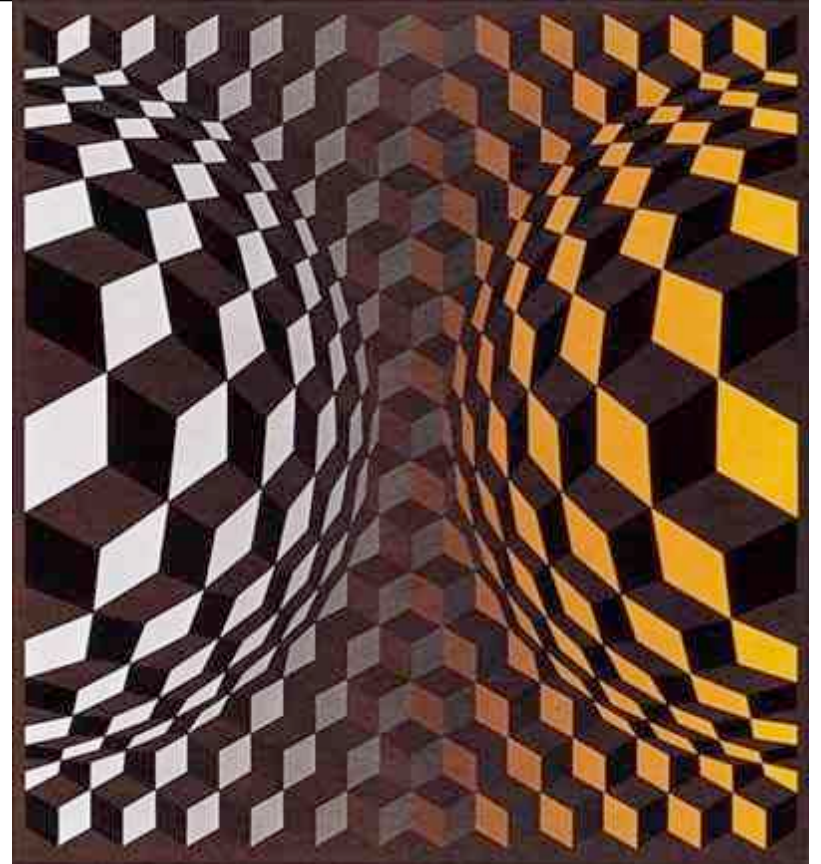
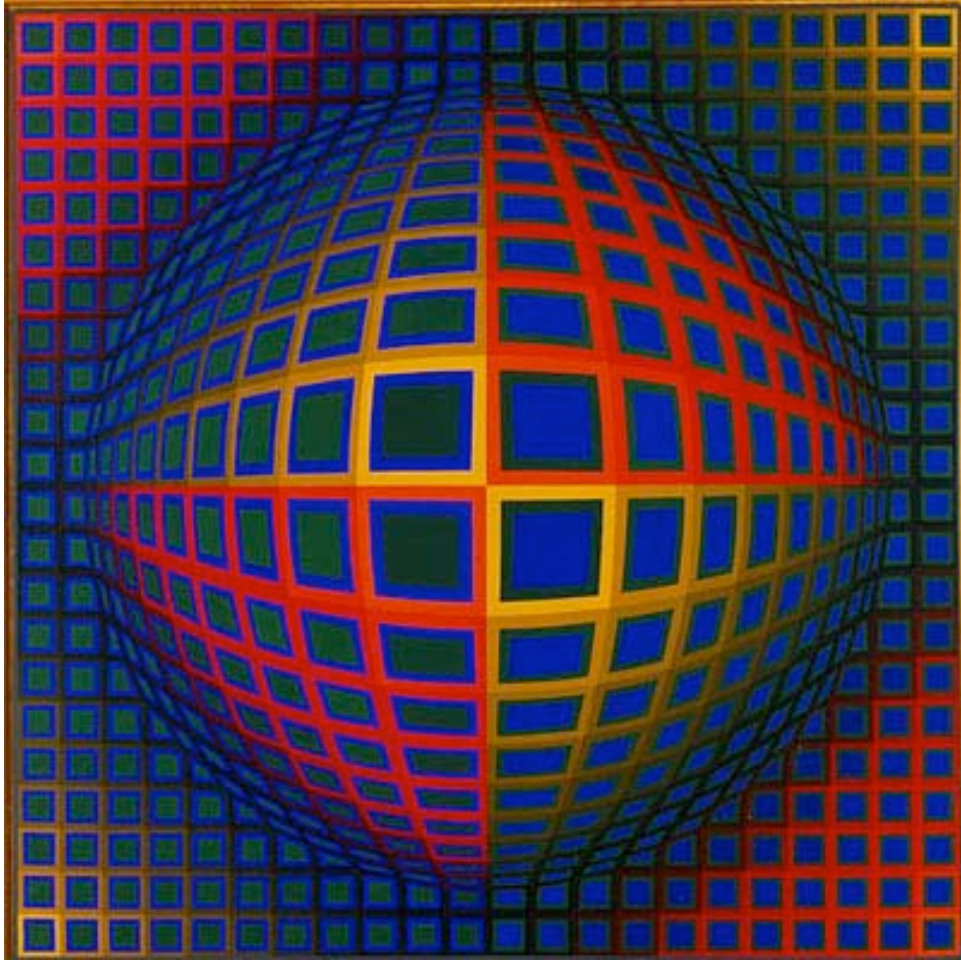


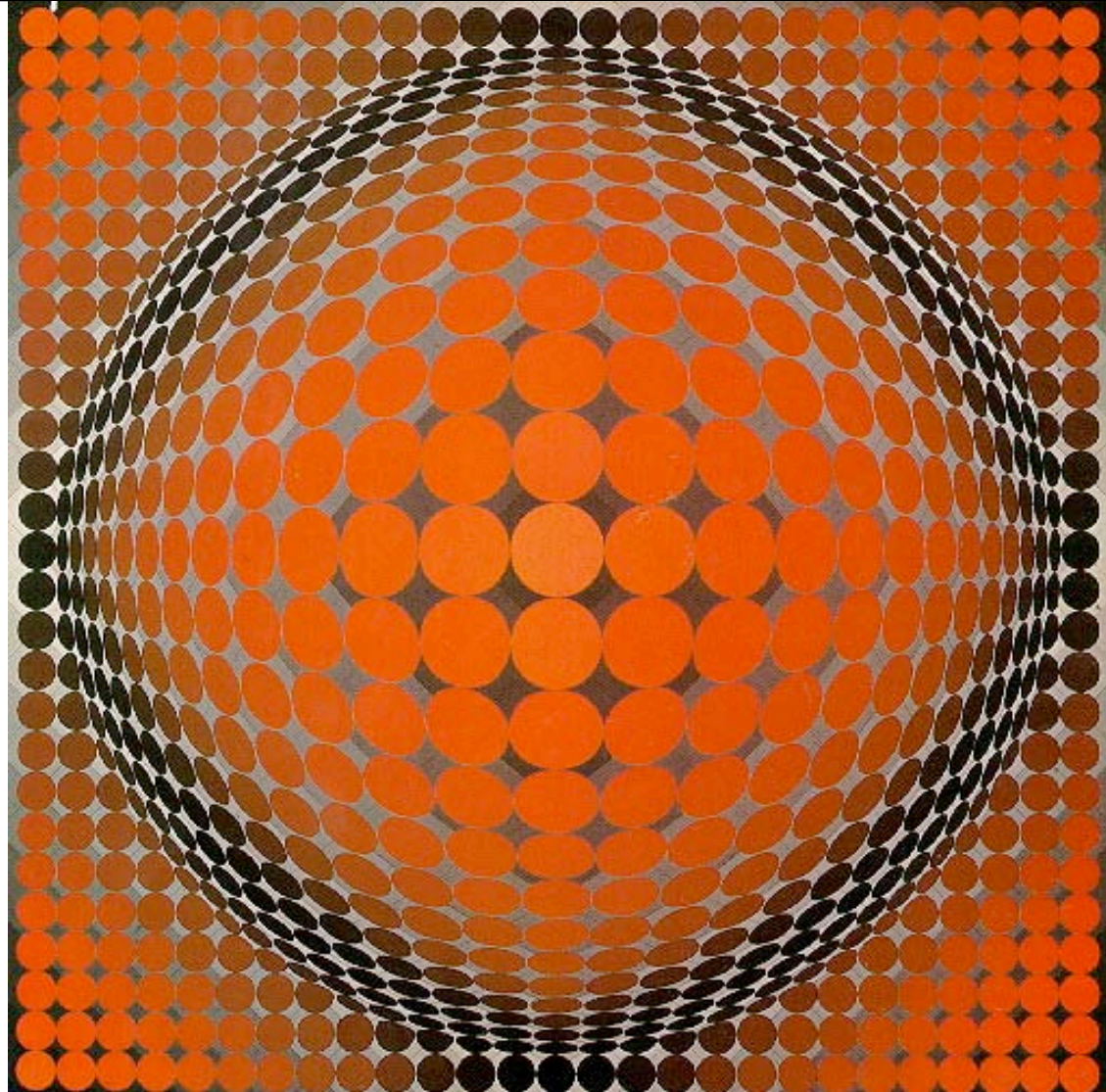
DAVID H. 1979
ARTIST

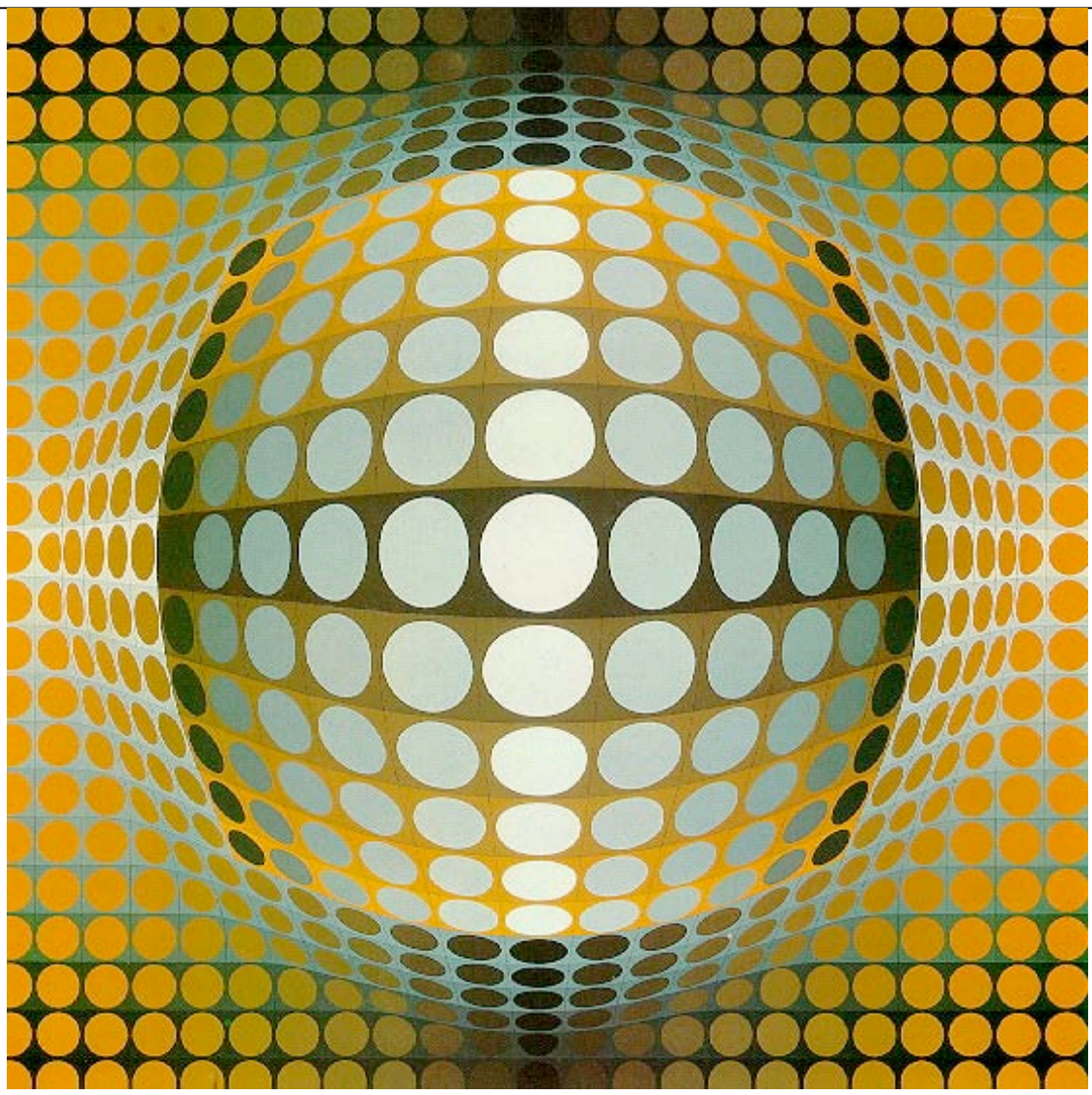
-
- Vasarely has made many designs where the progression bulges out from a center.
 - This gives an impression of volume.
 - The two-dimensional design appears three-dimensional.





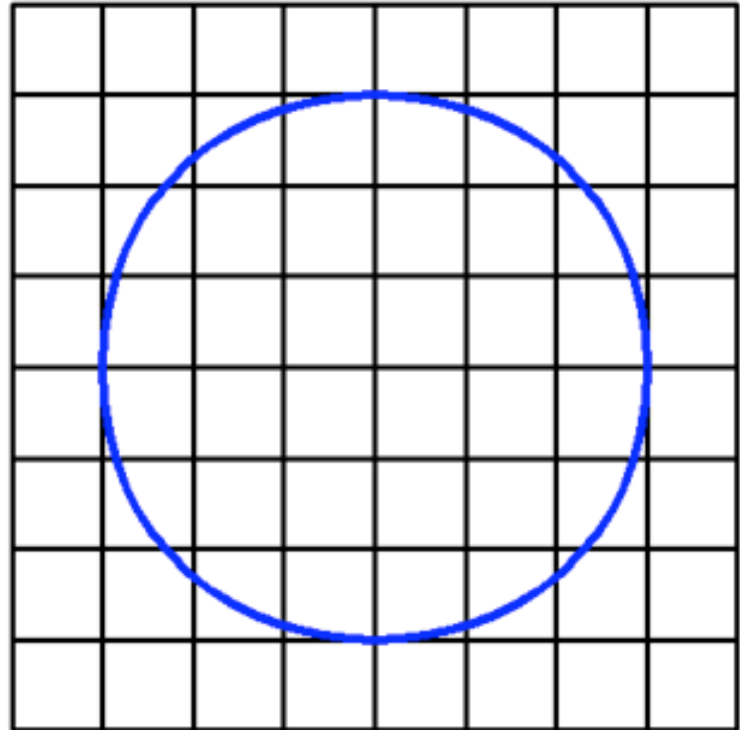






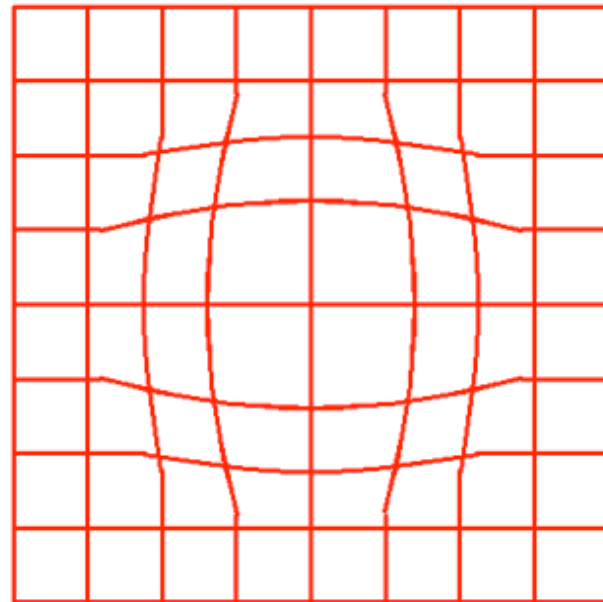
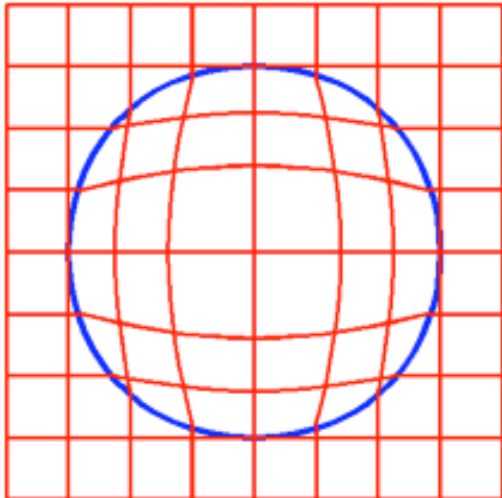
-
- Here is one way of organizing such a pattern:

1. Draw a square grid.
2. Draw a circle within the grid.

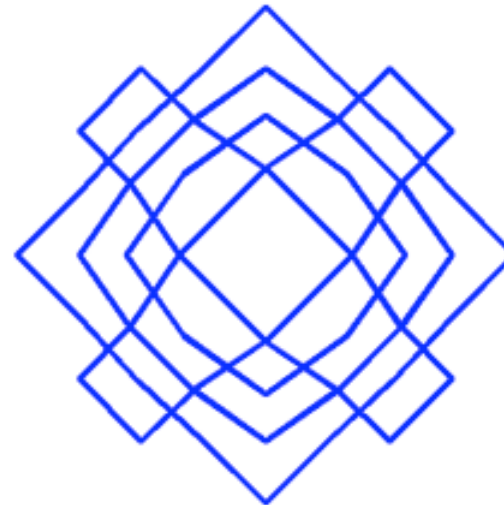
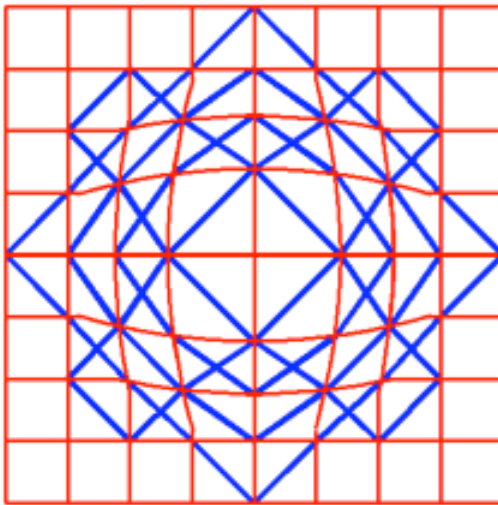


3. Change the lines inside the circle into arcs.

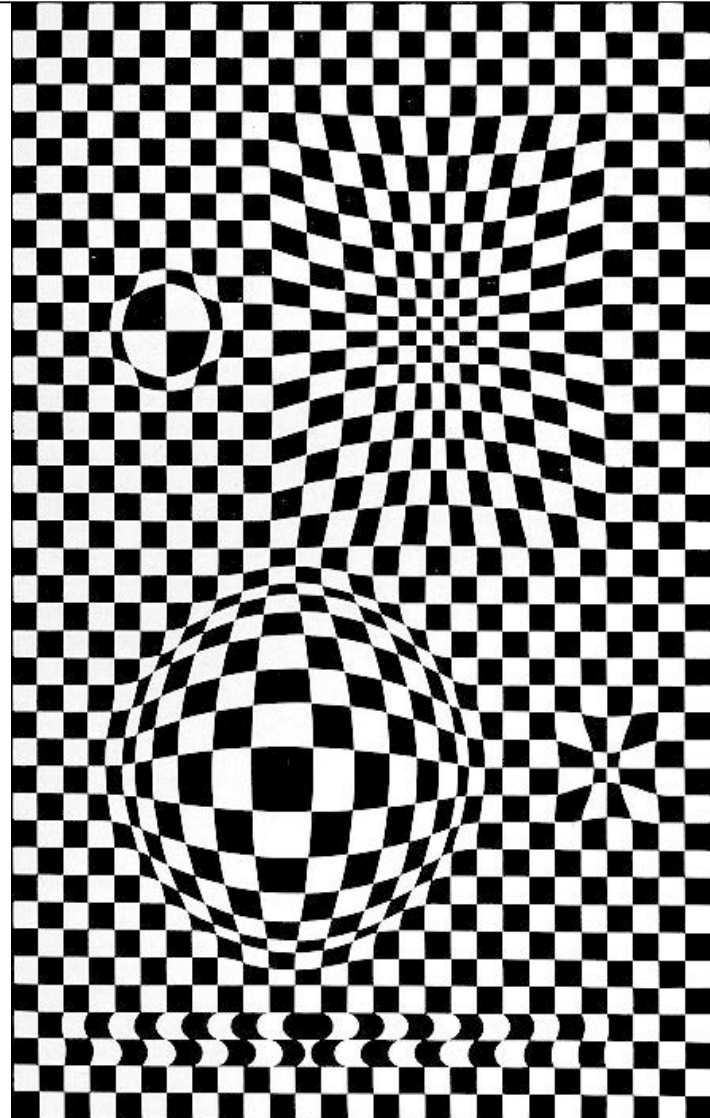
4. Delete the circle to obtain the pattern.

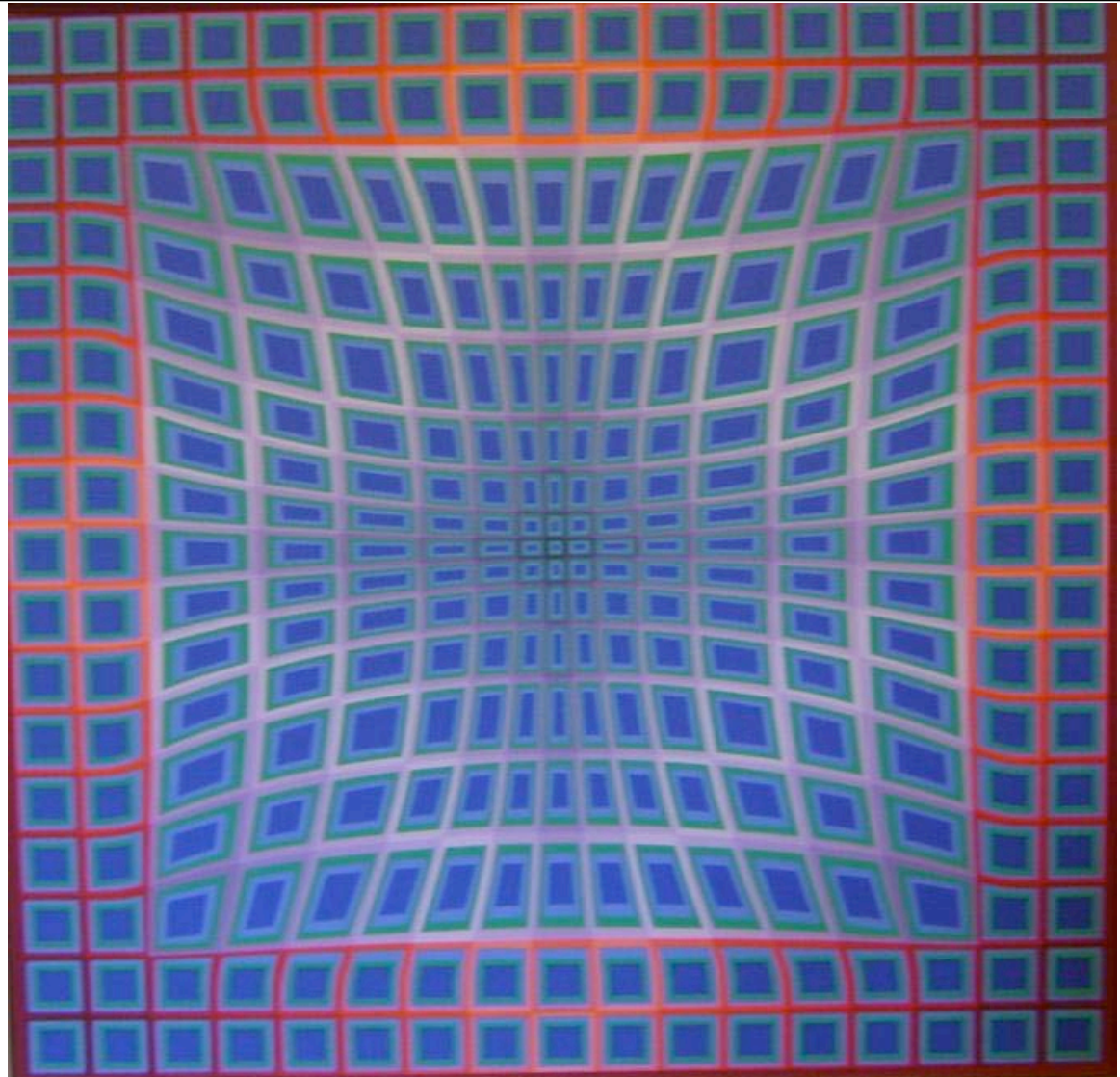


You can also draw a symmetric motif inside the deformed grid.

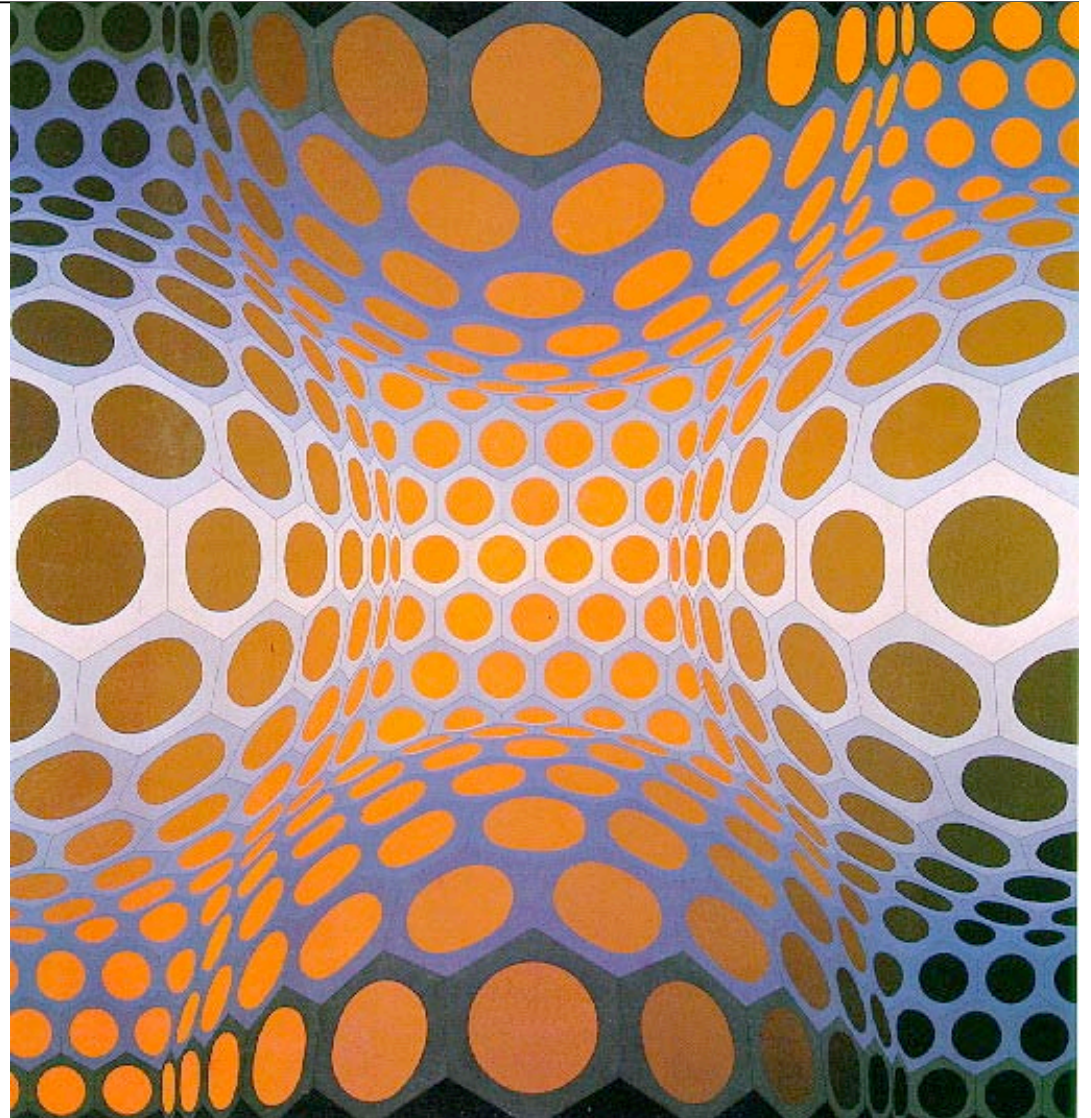


-
- There are different ways to organize a progression around the center.

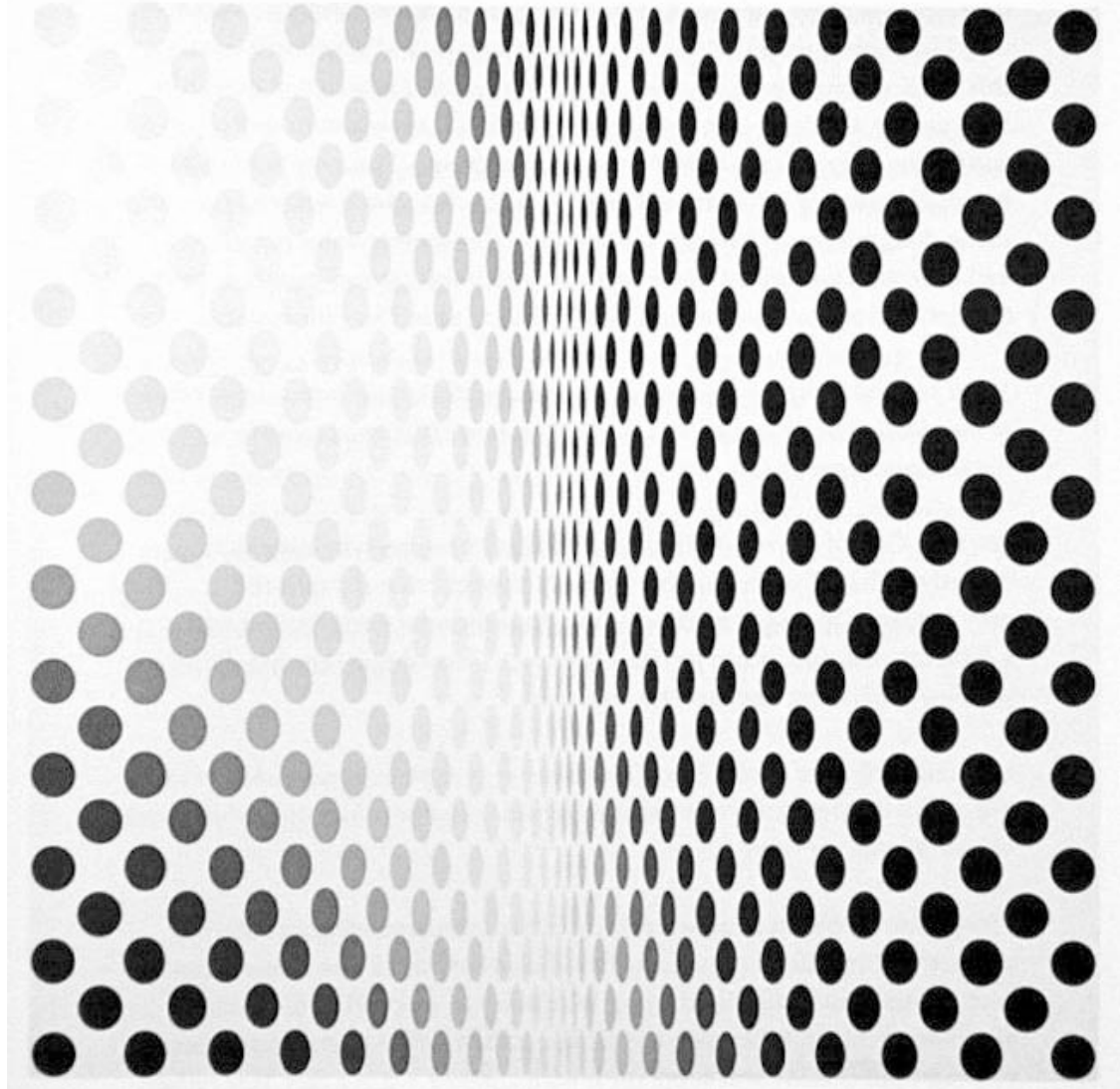




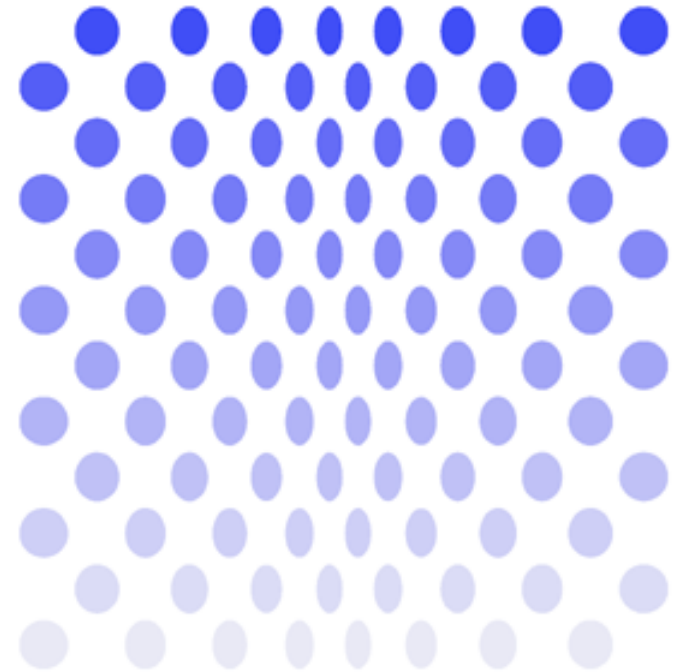
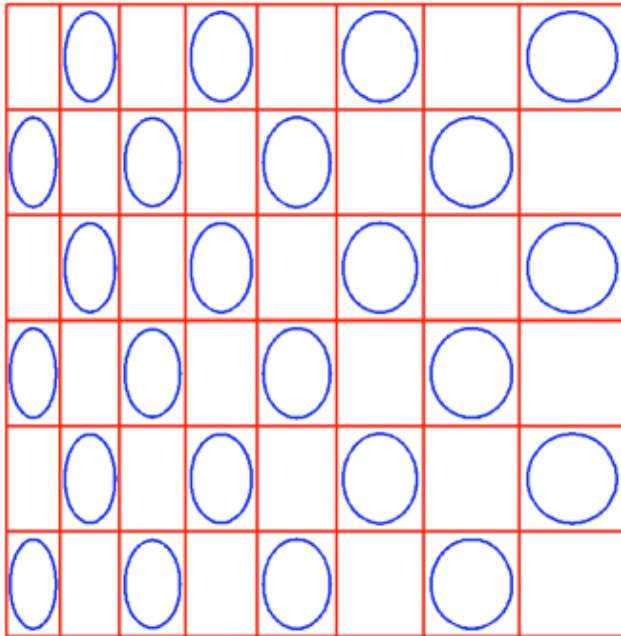
-
- Different kinds of progression can be combined into one image.

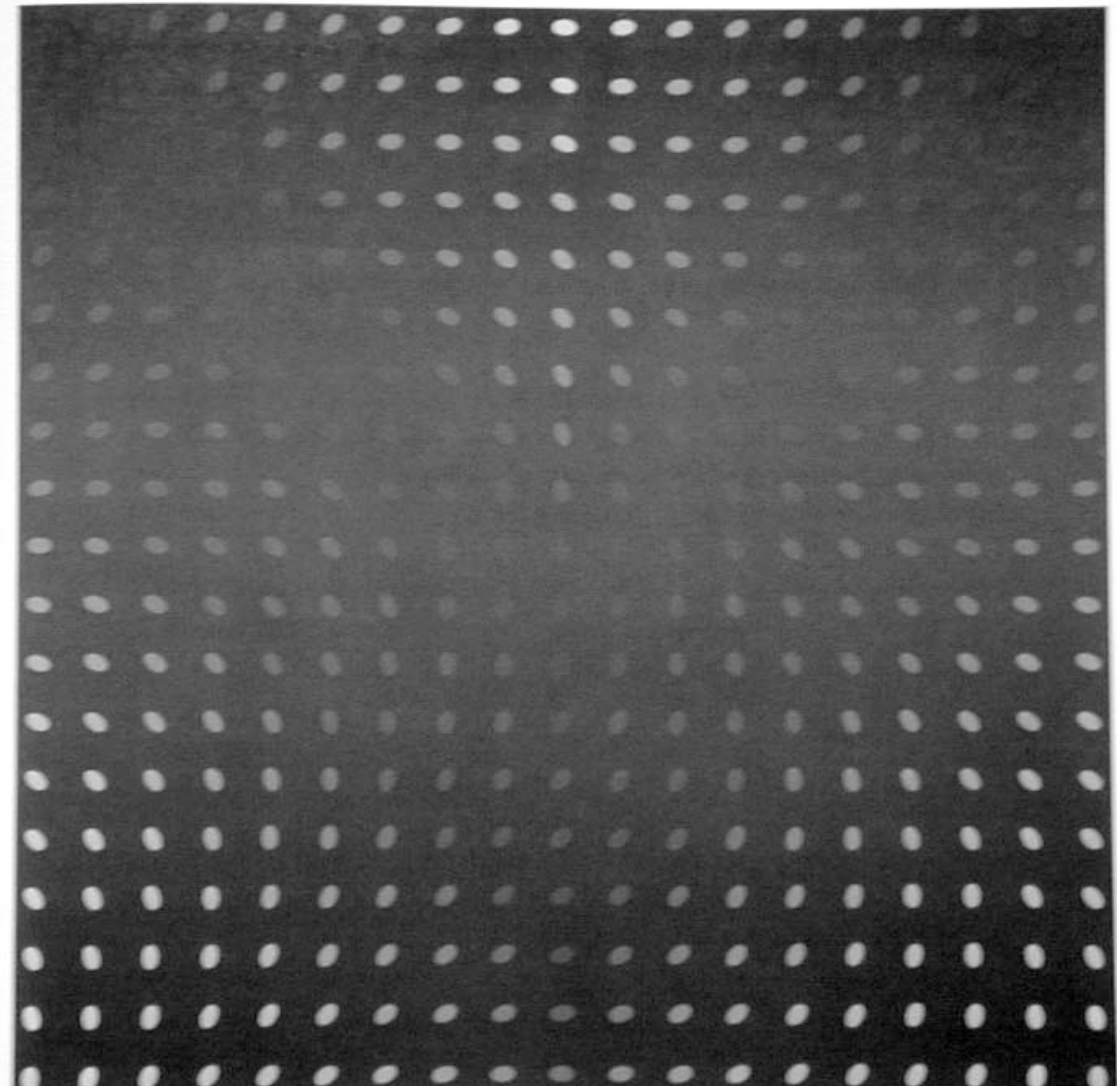


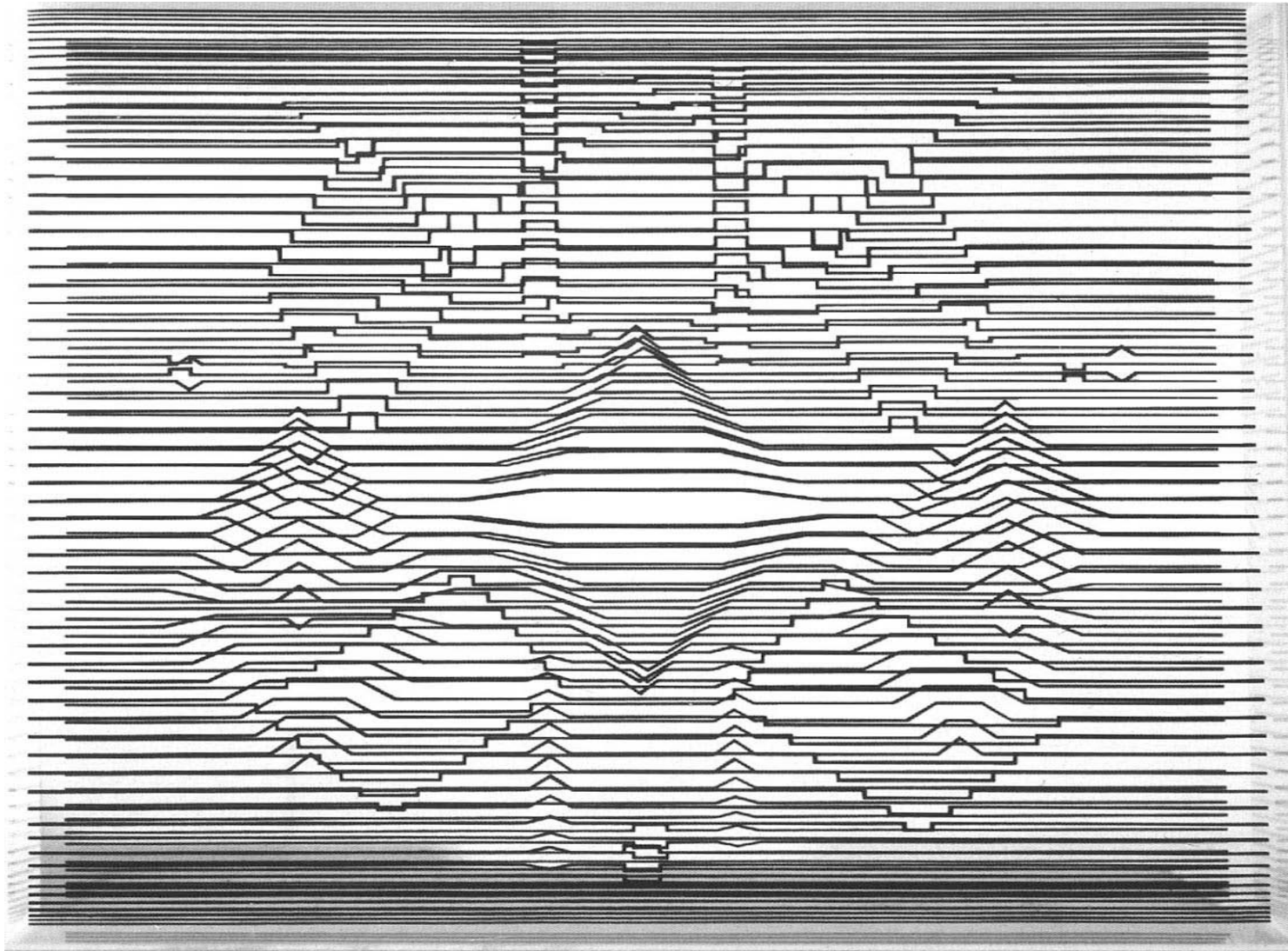
-
- Bridget Riley



-
- The previous painting uses a definite geometric progression from the center to the outer edges.
 - The gradual change can be seen by making a grid.







-
- In the previous image, the effect of space is achieved by changing the distance between lines.
 - Another important technique is the use of angles.
 - Acute and obtuse angles are often viewed as representatives of three-dimensional objects.