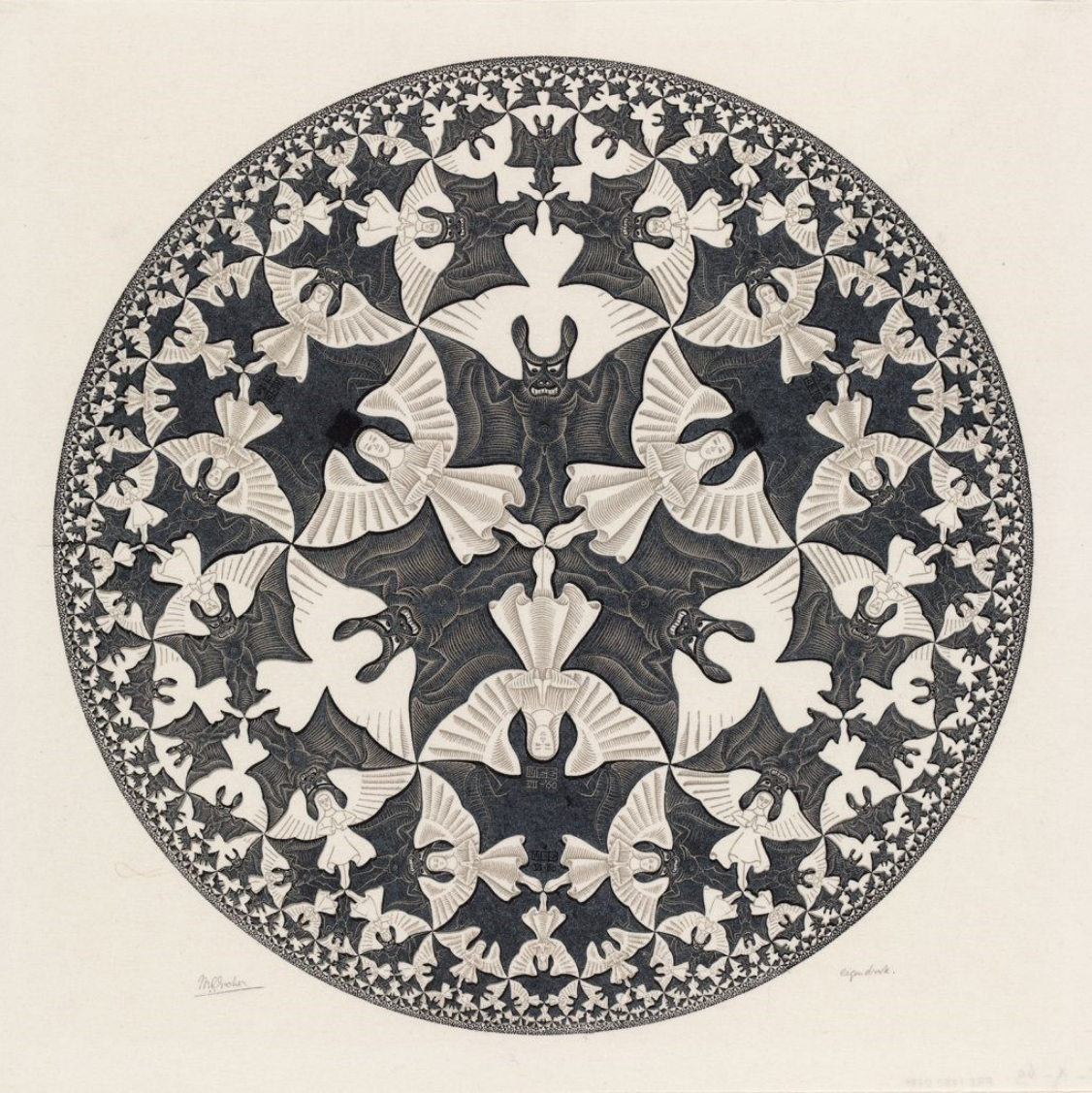

Maurits Cornelis Escher
Circle Limit IV (Heaven and Hell)
Escher in The Palace
https://www.escherinhetpaleis.nl/escher-today/circle-limit-iv-heaven-and-hell/?lang=en

Vincent van Gogh
The Starry Night
Museum of Modern Art - MOMA
https://www.moma.org/collection/works/79802

- As difficult as turbulence is to understand from a statistical, numerical, experimental, or theoretical point of view, we can use art to depict the way it looks.

Katsushika Hokusai. The Great Wave at Kanagawa. 1831.

Vincent van Gogh. Road with Cypress and Star. 1890.

Leonardo da Vinci. Codex Leicester. Studies of water. Circa 1510.

Edvard Munch. The Scream. 1910.

- Vincent van Gogh and other impressionists represented light in a different way than other artists. Their strokes seem to capture light motion.
- The effect is caused by luminance, which is the intensity of the light in the colors on the canvas.
- Some of van Gogh's painting, in particular those paintings related to his psychotic agitation period, transmit the essence of turbulence with high realism.
- By studying the luminance of van Gogh's painting, a group of researchers [1], have shown that there is a distinct pattern of turbulent fluid structures that have similarities to the turbulent energy cascade as predicted by Kolmogorov.

[1] J. L. Aragón, G. G. Naumis, M. Bai, M. Torres, P. K. Maini. Turbulent luminance in impassioned van Gogh paintings. arXiv:physics/0606246v2 [physics.flu-dyn]. 2006.

- This was observed by taking measurements of how brightness (or luminance) varies between any two pixels in high resolution digital images of the paintings, and it was concluded that some of van Gogh's paintings behave remarkably similar to fluid turbulence [1].
- In starry night, van Gogh's circular brushstrokes create a night sky filled with swirling clouds and eddies of stars, that convey the quintessence of turbulence.
- By a brilliant use of the strokes, the light seems to pulse, flicker, and radiate.
- Paintings from a calmer period of van Gogh, showed no sign of this correspondence and neither did other artists' work that seemed equally turbulent at first glance like Munch's the scream.

[1] J. L. Aragón, G. G. Naumis, M. Bai, M. Torres, P. K. Maini. Turbulent luminance in impassioned van Gogh paintings. arXiv:physics/0606246v2 [physics.flu-dyn]. 2006.

References

- **Van Gogh painted perfect turbulence**
  https://www.nature.com/news/2006/060703/full/news060703-17.html#B1

- **Turbulent luminance in impassioned van Gogh paintings**
  https://arxiv.org/abs/physics/0606246

- **Van Gogh's Turbulent Mind Captured Turbulence**
  https://www.npr.org/sections/13.7/2015/04/01/396637276/van-goghs-turbulent-mind-captured-turbulence?t=1591770310648

- **How Did Van Gogh's Turbulent Mind Depict One of the Most Complex Concepts in Physics?**
  https://medium.com/the-omnivore/how-did-van-goghs-turbulent-mind-depict-one-of-the-most-complex-concepts-in-physics-a10d0faacdbc

- **The Fluid Dynamics of "The Starry Night": How Vincent Van Gogh's Masterpiece Explains the Scientific Mysteries of Movement and Light**
  https://www.brainpickings.org/2014/11/13/van-gogh-starry-night-fluid-dynamics-animation/

- **The Unexpected Math Behind Van Gogh's "Starry Night"**
  https://ed.ted.com/lessons/the-unexpected-math-behind-van-gogh-s-starry-night-natalya-st-clair