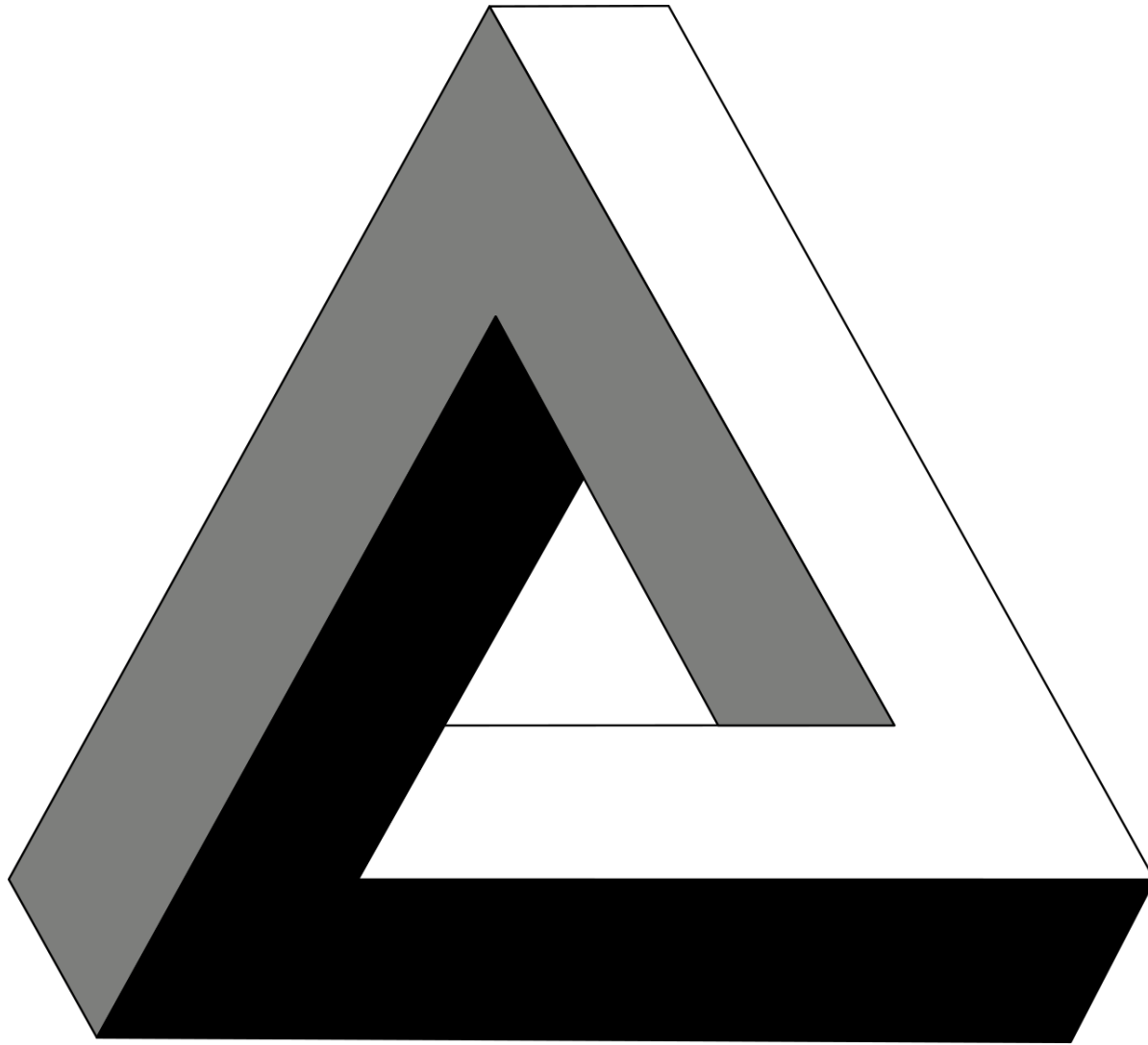


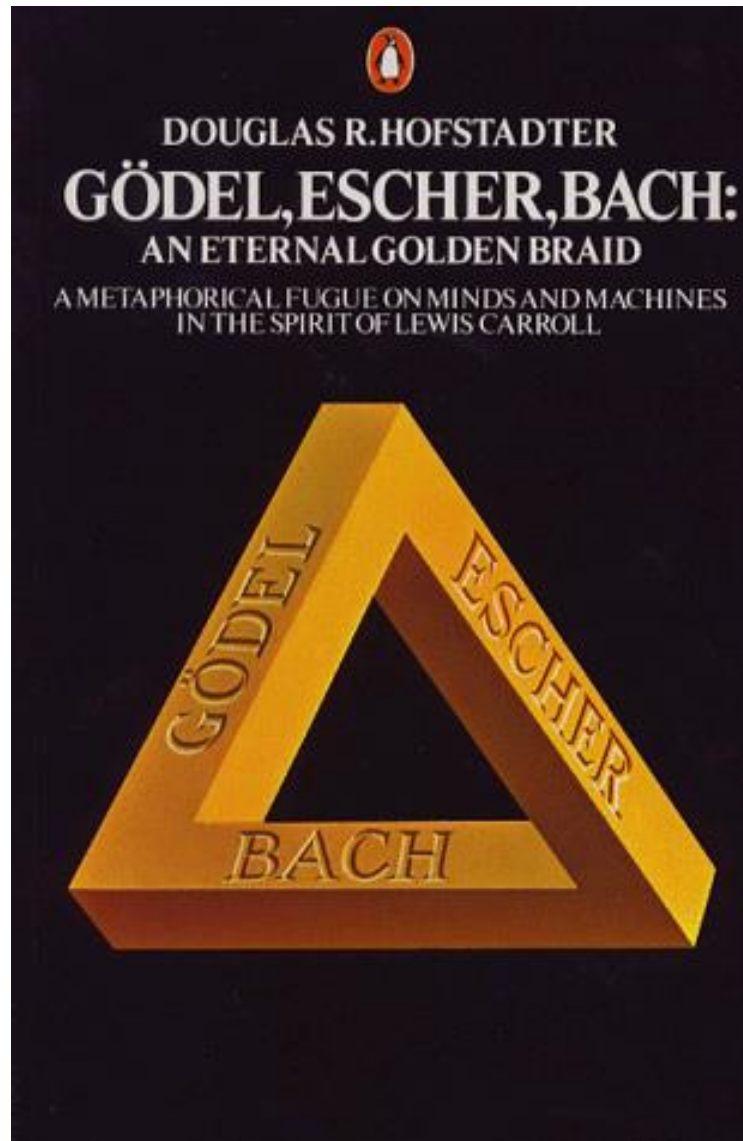
The Impossible Diagram: AI meets the Penrose Triangle

Image and Object Symposium
Schwartzman Theatre. 2026.05.15

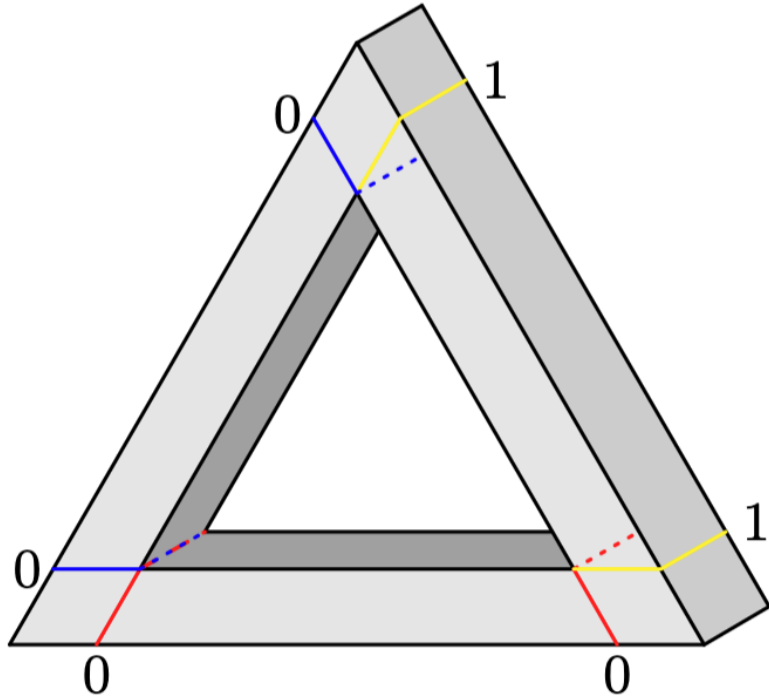
Bernie Hogan
Associate Professor and Senior Research Fellow



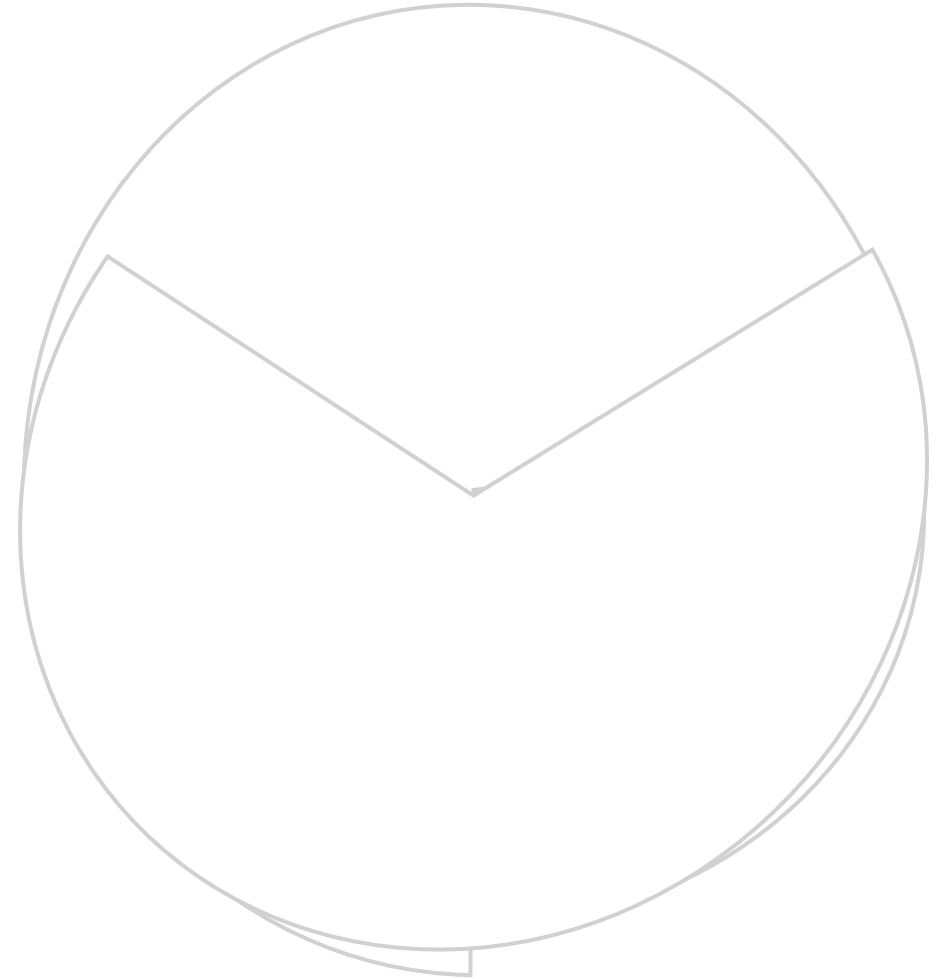




(a)



(b)

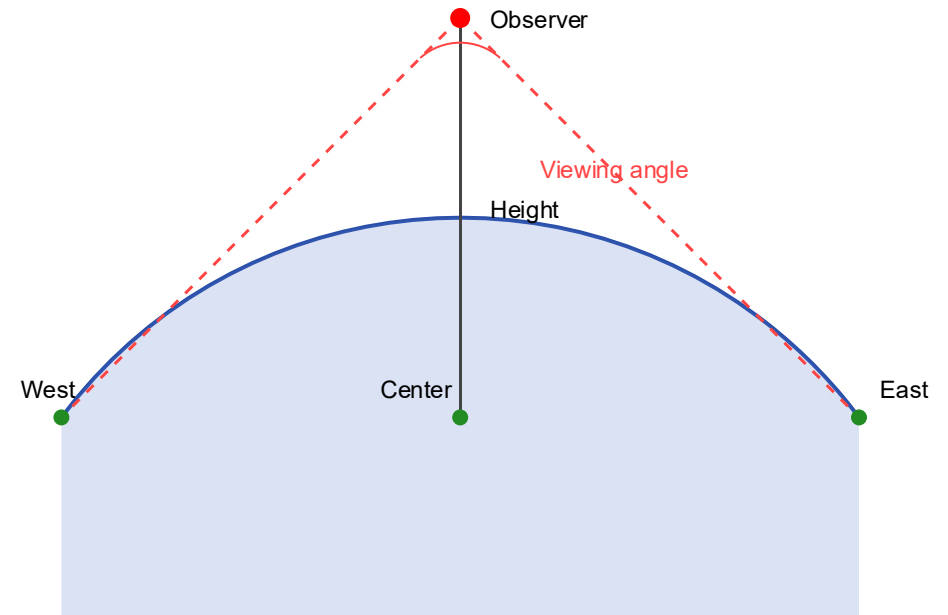
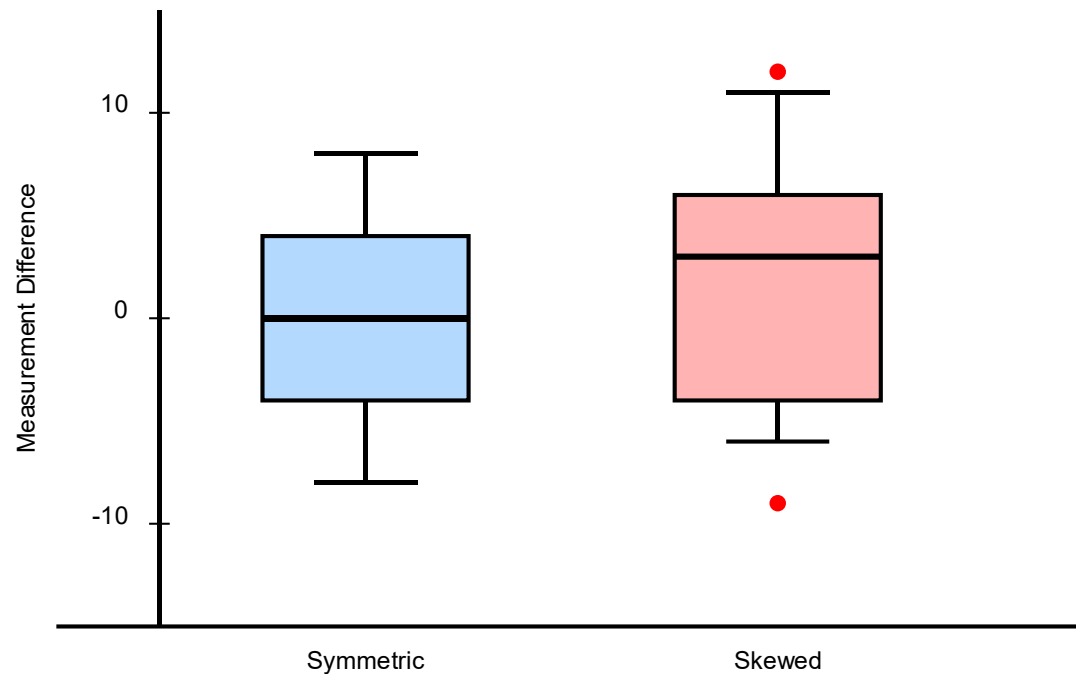


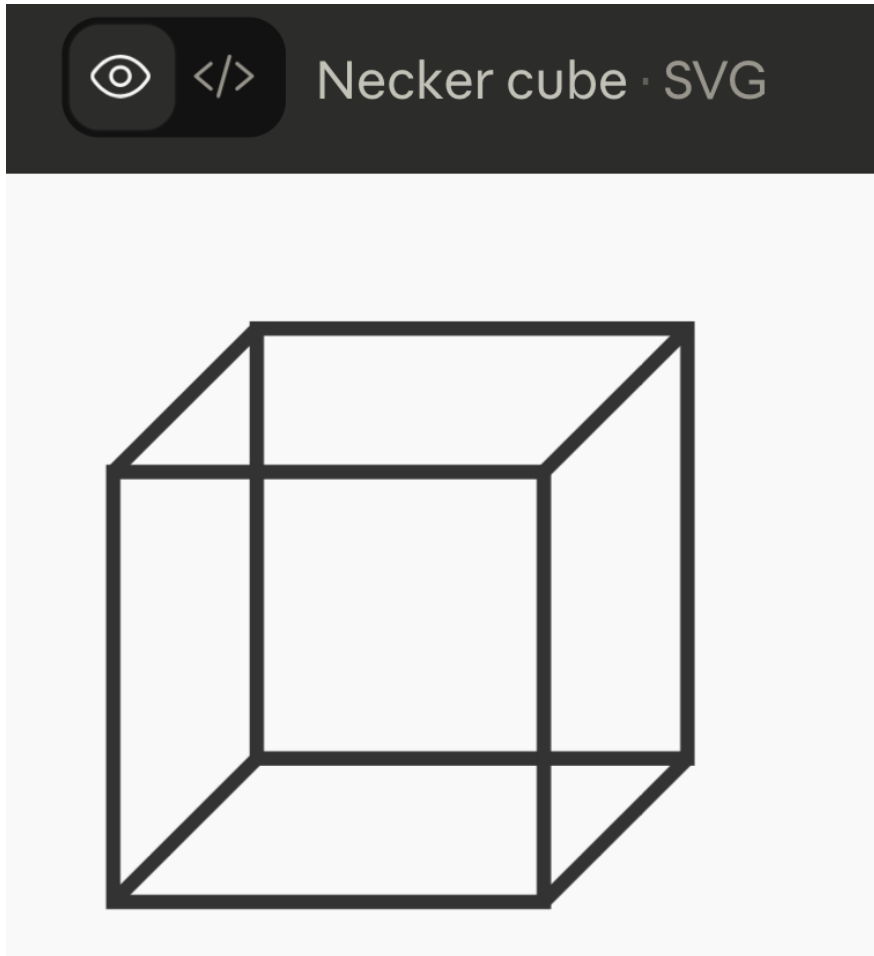
Source: Cervantes, V. H., & Dzhafarov, E. N. (2020). Contextuality analysis of impossible figures. *Entropy*, 22(9), 981.

2024: Claude can make SVG?

Structured Vector Graphics create sharp diagrams as images

Comparing Different Measurement Distributions





```
Necker cube · SVG Copy ↻ ✕
1 <svg xmlns="http://www.w3.org/2000/svg" viewBox="0 0 200 200" width="200" height="200">
2   <!-- Back face -->
3   <polygon points="70,50 130,50 130,110 70,110"
4     fill="none" stroke="#333" stroke-width="2"/>
5
6   <!-- Front face -->
7   <polygon points="50,70 110,70 110,130 50,130"
8     fill="none" stroke="#333" stroke-width="2"/>
9
10  <!-- Connecting edges -->
11  <line x1="70" y1="50" x2="50" y2="70" stroke="#333" s
12    stroke-width="2"/>
13  <line x1="130" y1="50" x2="110" y2="70" stroke="#333"
14    stroke-width="2"/>
15  <line x1="130" y1="110" x2="110" y2="130" stroke="#33
16    3" stroke-width="2"/>
17  <line x1="70" y1="110" x2="50" y2="130" stroke="#333"
18    stroke-width="2"/>
19 </svg>
```

Excellent. Very clear. Please render a simple Penrose triangle in SVG

Refined geometric approach to render impossible triangle correctly >

[View your Penrose triangle](#)

This is the Penrose triangle (also called the impossible triangle or tribar). Each of the three bars appears to connect normally at each corner, yet following the structure around reveals it's geometrically impossible—each bar seems to be simultaneously in front of and behind the others. The illusion works through clever use of shading and the way the corners overlap, creating a paradox that couldn't exist in three-dimensional space.

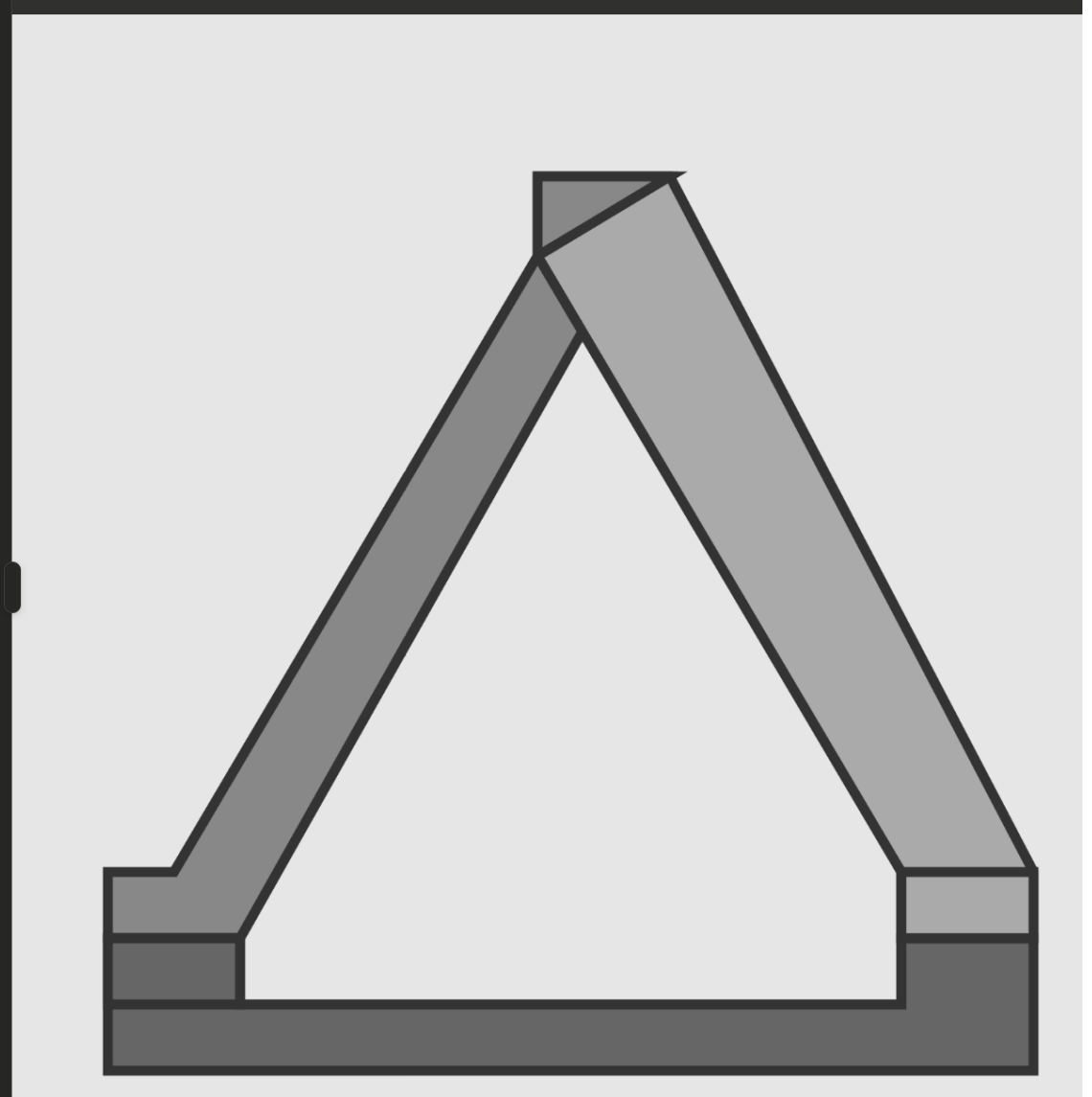
Penrose triangle
Image · SVG

Download

Reply...

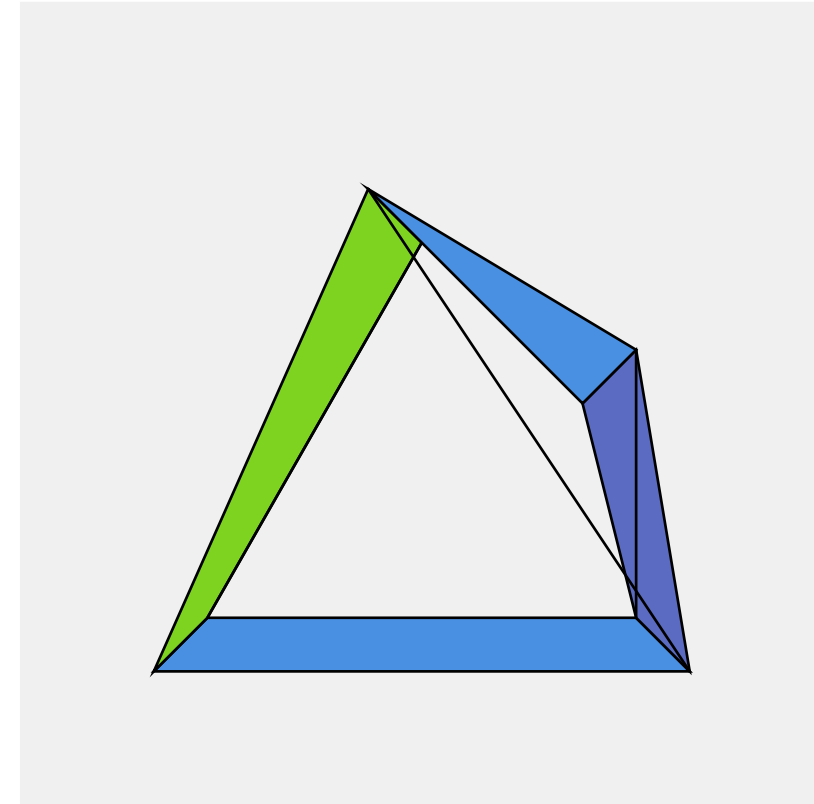
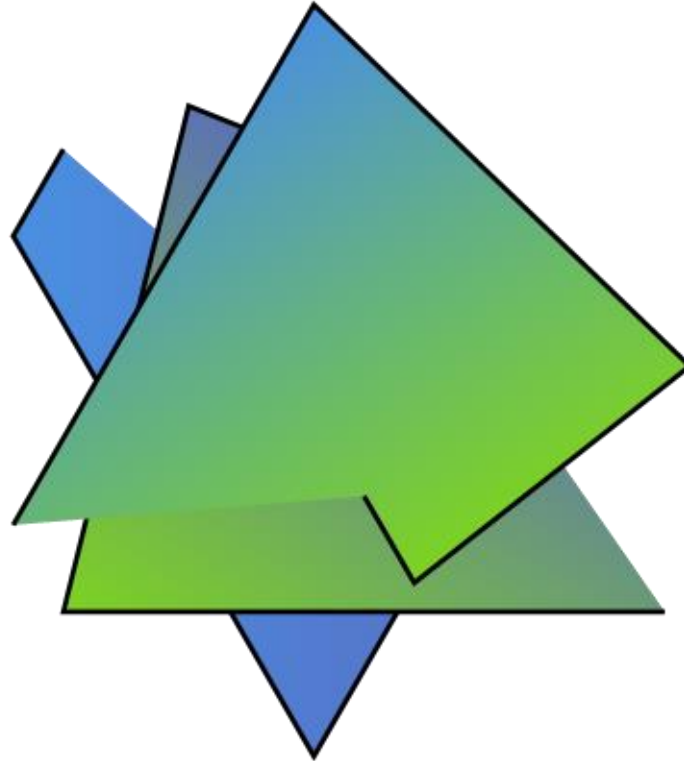
+

Opus 4.5 Extended



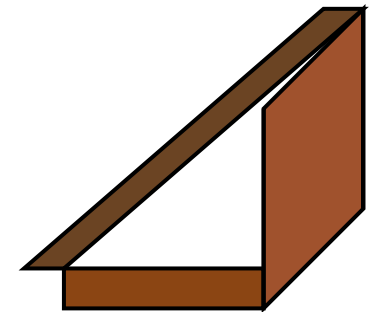
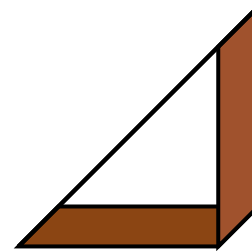
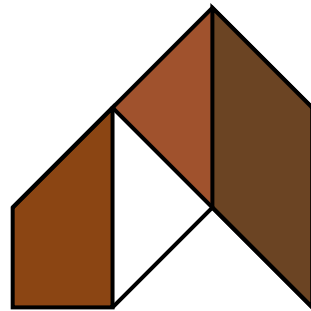
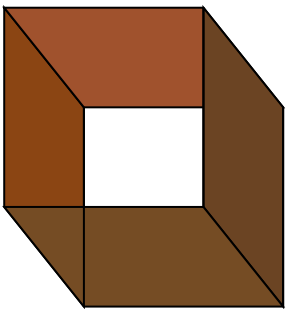
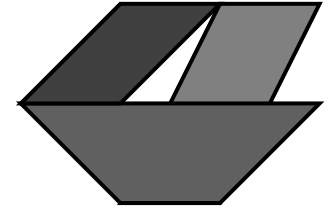
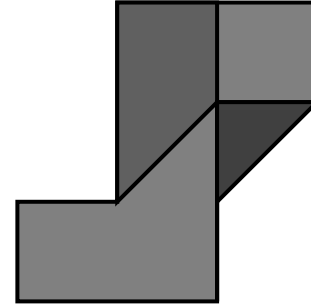
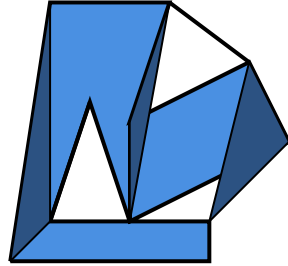
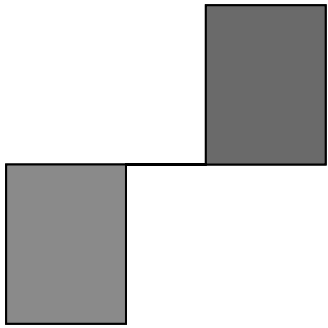
Undeterred I tried a few... more times

All failures. And still to this day

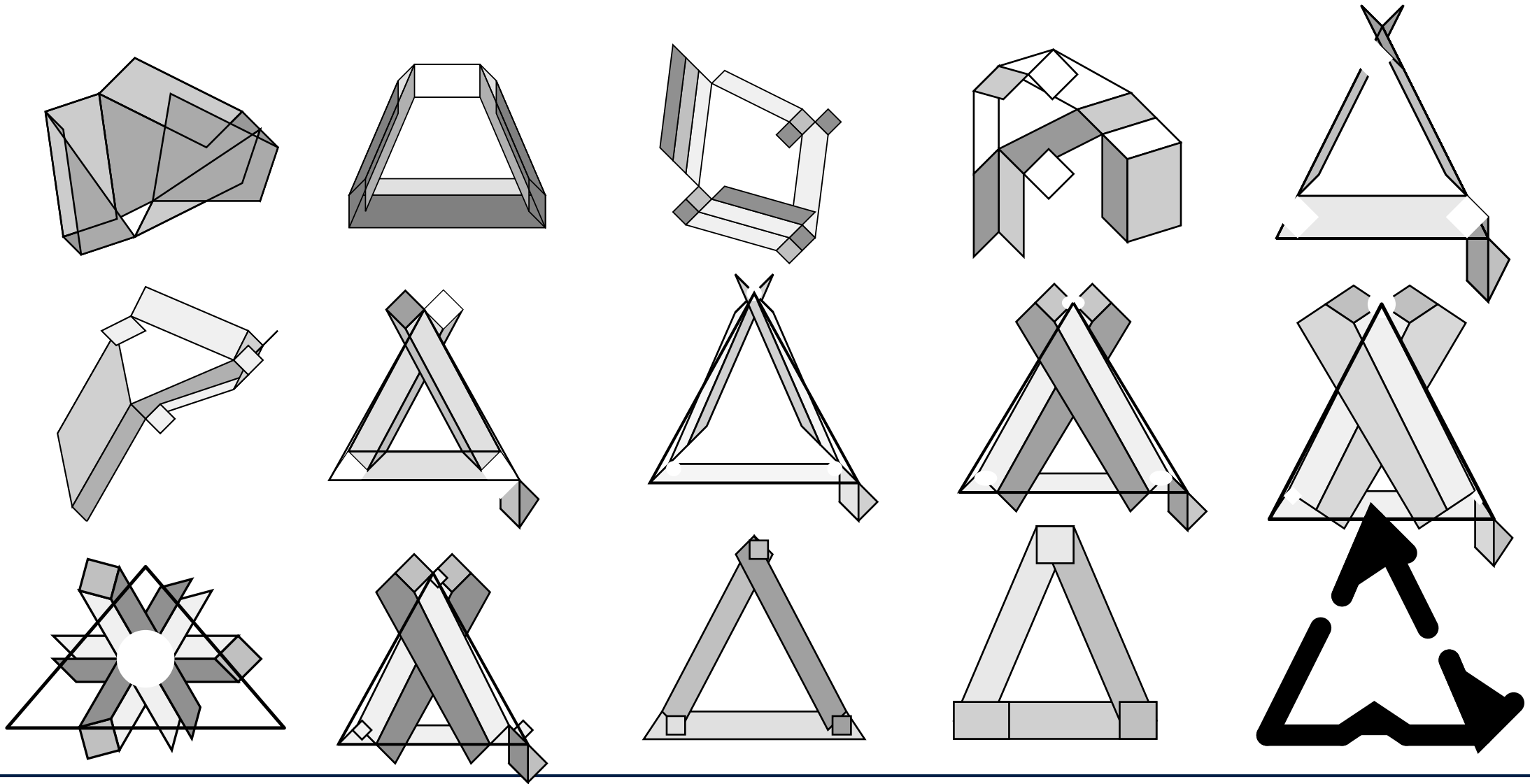


Some of Claude's other attempts

Primarily from Sonnet 3.7 and Opus 4.1



And more...failure from Claude



I even made an app to help it along, to no avail.

The geometry of impossible figures

Alasdair McAndrew

`Alasdair.McAndrew@vu.edu.au`

College of Engineering and Science
Victoria University
PO Box 14428, Melbourne 8001
Australia

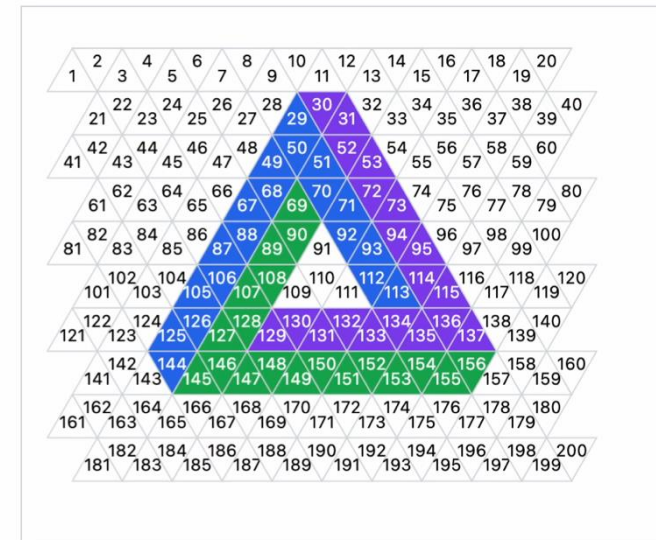
Jacob A. C. Baker

`jbaker@alexandrapark.school`

Mathematics Department
Alexandra Park School
Bidwell Gardens, London N11 2AZ
United Kingdom

Abstract

“Impossible figures” are those that can be drawn with perspective in two dimensions, but cannot exist in the physical world. Well known examples are the Penrose triangle, the Penrose staircase, and the “impossible trident”. The Dutch artist Maurits Escher (1898–1972) took great delight in such figures and incorporated them into many of his works. Less well known is the Swedish artist and graphics designer Oscar Reutersvärd (1916–2002), who drew and developed hundreds of such figures, and who has been honoured by some Swedish postage stamps showing his designs. Some art installations now include such figures, but which only seem impossible from one particular perspective. In this article, we explore the geometry of such figures, and discuss how such figures can be drawn using standard programming tools. The mathematics required is elementary, but not without subtlety, and with the delight of producing some lovely diagrams.



Penrose Triangle

Clear

Enter numbers (e.g., 1,2,3)

Add

What about turning on “thinking mode”

Claude Opus 4.7 Thinking mode ran out the context...twice. And no image. (This video is over a minute long...of scrolling).



I have also provided a penrose triangle on an isometric grid which might help you to consider how to project this into a different space first.

Constructing isometric Penrose triangle parallelograms systematically ▾

🕒 I see the approach now — building the Penrose triangle on an isometric grid where each of the three colored beams is constructed from a sequence of triangles alternating between up-pointing and down-pointing orientations. Let me trace through how this grid structure works to recreate it. I'm identifying which colored regions correspond to each beam—blue on the left, green at the bottom, purple on the right—then switching to a coordinate-based approach using isometric projection axes to construct the impossible triangle systematically. y-down)

- Axis B points up-left: direction $(-\cos(30^\circ), -\sin(30^\circ)) = (-\sqrt{3}/2, -1/2)$
- Axis C points down (vertical): $(0, 1)$

Hmm, but the reference image shows a Penrose triangle with the apex at top, so let me orient differently:

- Up-apex: top of triangle
- Two bottom corners: bottom-left and bottom-right
- This is rotated 60° from "standard" isometric

Has any model succeeded?

What about newer image models like
OpenAI's Image 2.0 and Google's Nano Banana?

Yes and no.

Open AI's Image 2.0 via ChatGPT: Yes...!

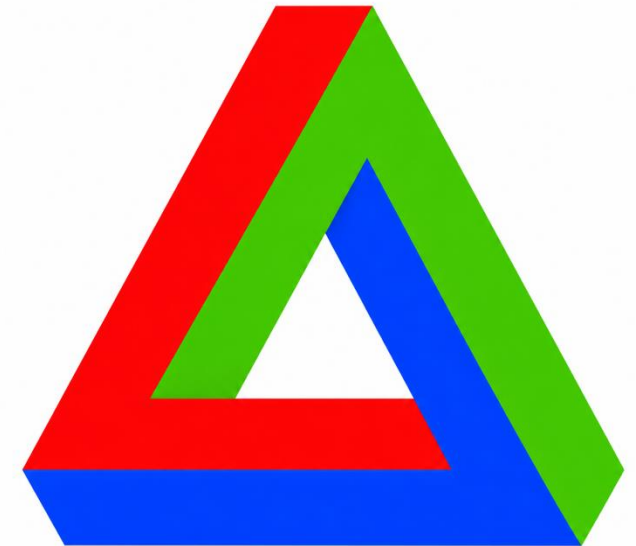
Hi ChatGPT, please use Image 2.0 to render me an image of a tribar aka a Penrose triangle.



Please render this in full colour

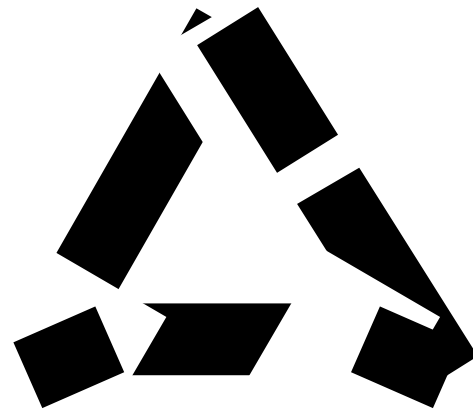


How about making it in full colour? Thus each of the sides is one of three colours (RGB)



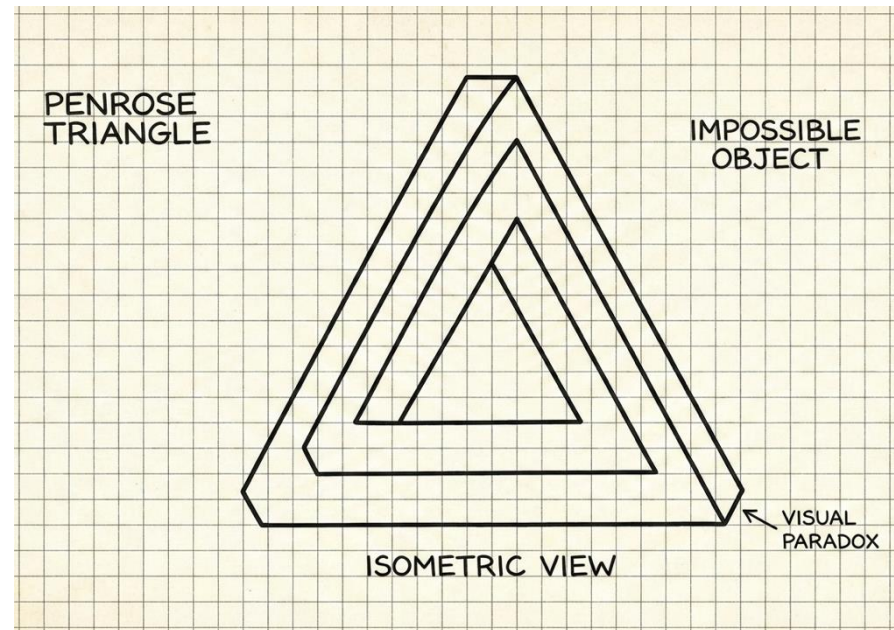
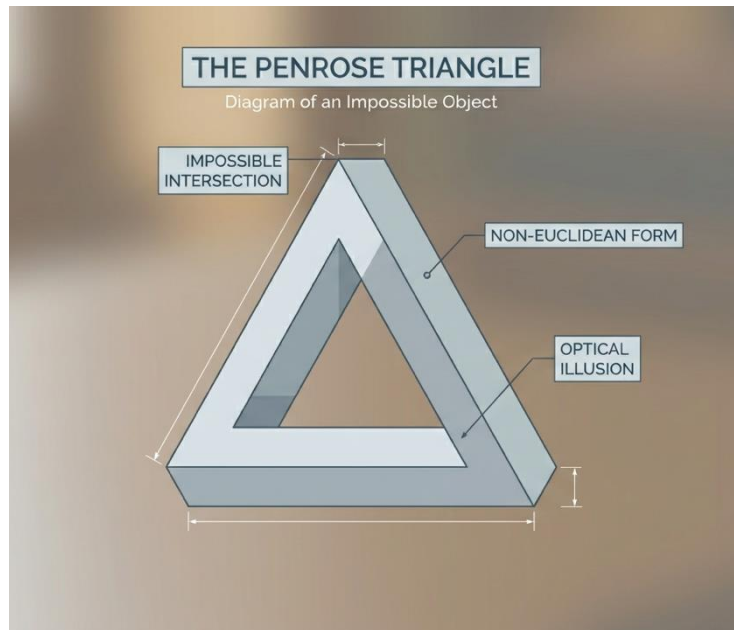
Open AI's ChatGPT: ...and no.

Could you render a Penrose triangle in SVG?



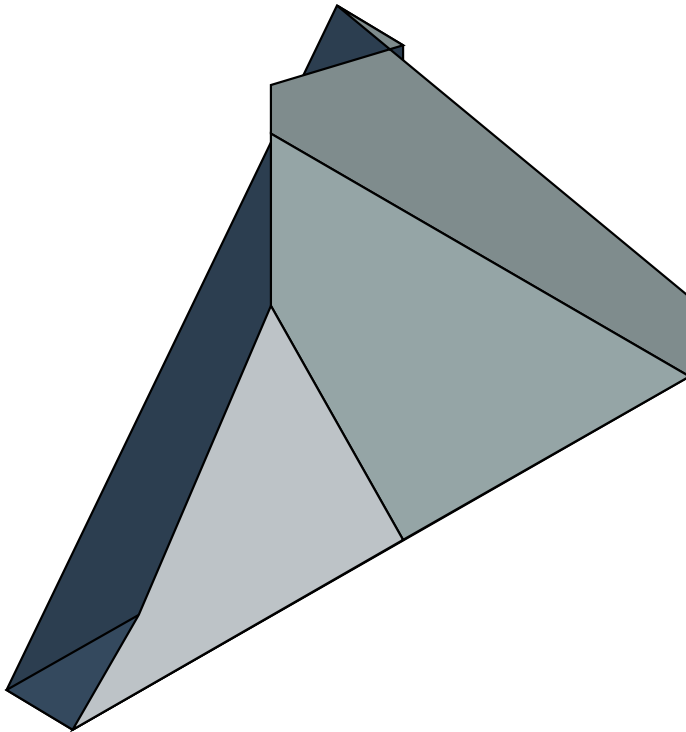
Same story for Google

Nano Banana does an inconsistent job. So, sort of yes.



SVG: You guessed it.

Can you render a Penrose triangle as SVG?



Hi Gemini, I'm looking for an SVG file of a Penrose Triangle. Could you generate one?

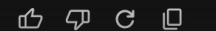
✦ Show thinking ▾

Sorry, something went wrong. Please try your request again.

Try again (SVG of Penrose Triangle Figure)

✦ Show thinking ▾

Sorry, something went wrong. Please try your request again.



Ask Gemini

+ Tools

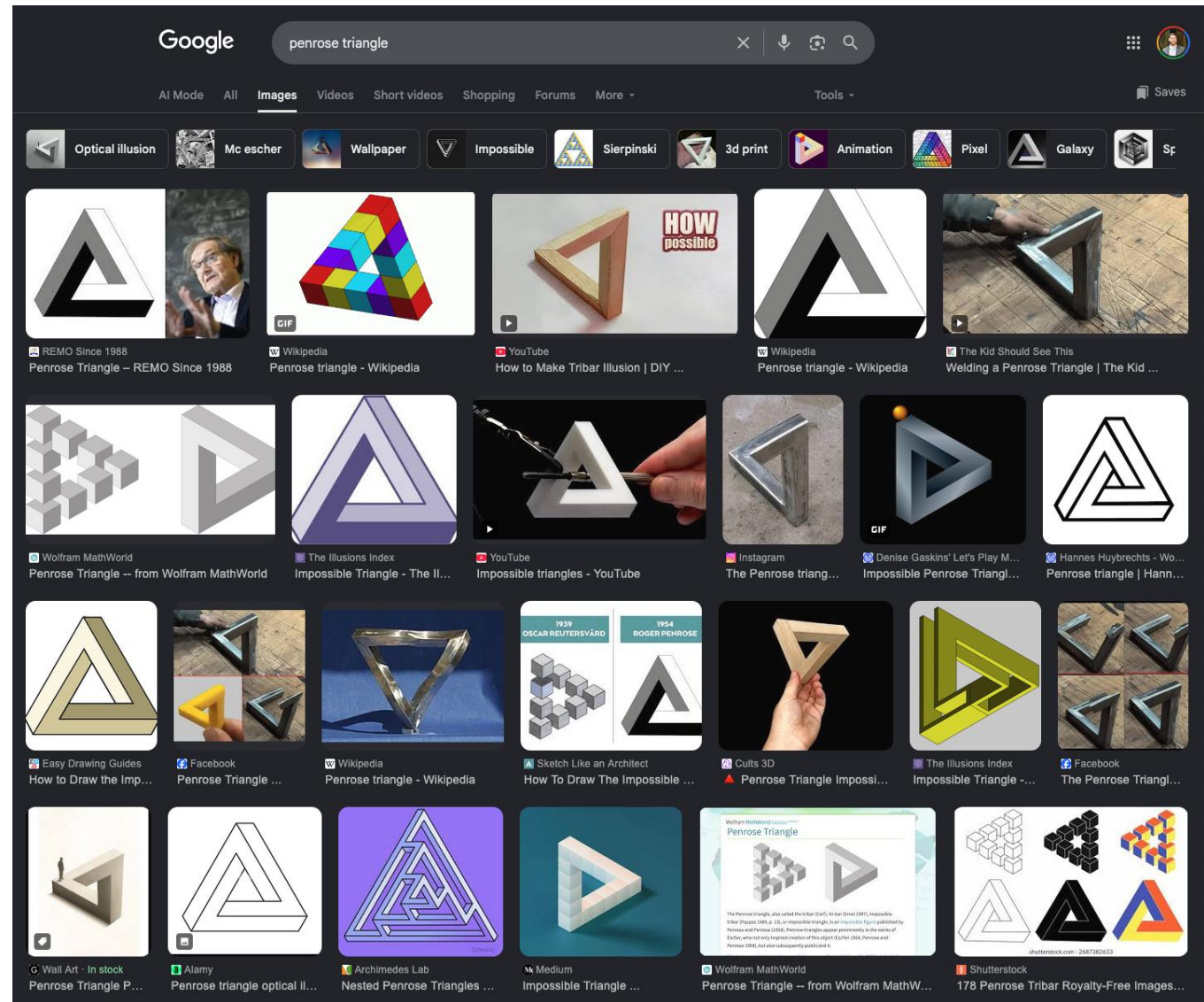
Pro ▾



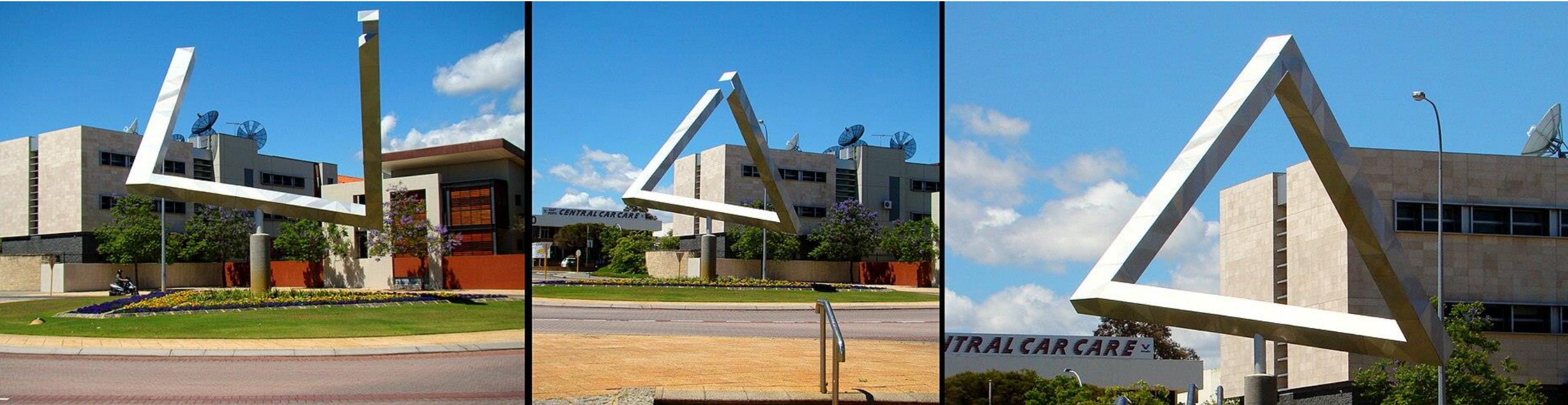
Why is this figure impossible?

I thought LLMs only regurgitated their training data. Including the SVG from Wikipedia and elsewhere.

The mathematical answer likely has to do with these fascinating “negative space” objects called “cohomologies” that occur when local data does not fit a global picture.



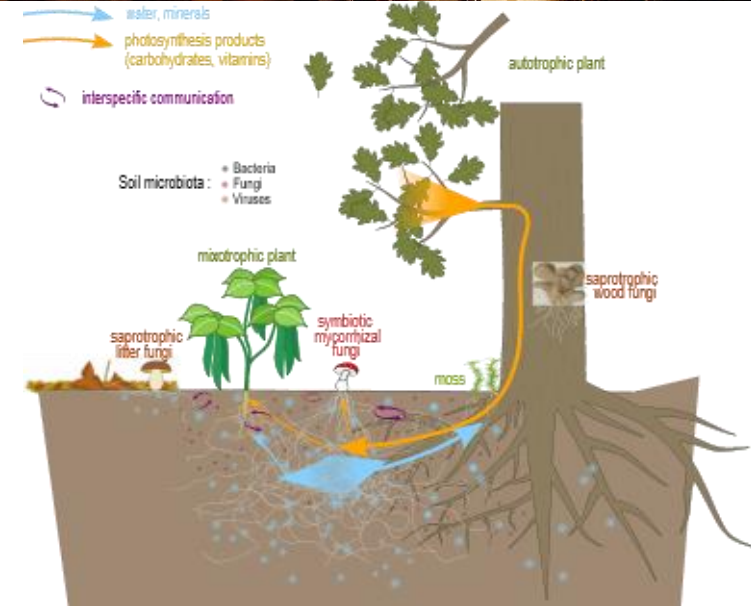
LLMs by nature lack a ‘singular perspective’



In short: LLMs use multiple **attention heads** in concert, all “voting” on what meaning to consider of what word. The impossible triangle is only viewable from a single perspective. The “unity of perspective” is a convenient illusion from chat.

A new metaphor?

- What is it like to talk to a symphony?
- How might we communicate with an ant colony or a large fungal network?
- AI is not human even if it plays one on the screen. Before we search for a conscious AI or even a self-aware one, we should consider what it means to be a being of bits without a singular perspective.
- ...and what happens when “world models” adopt such a perspective?





Thank You

Berniehogan.me/penrose
bernie.hogan@oii.ox.ac.uk

Bernie Hogan
Associate Professor and Senior Research Fellow



Sources

- Cover Image / Slide 21: By Bjørn Christian Tørrissen - Own work by uploader, <http://bjornfree.com/galleries.html>
- Slide 2. Penrose Triangle. By Tobias R. – Metoc - <https://commons.wikimedia.org/w/index.php?curid=2520370>
- Slide 3. Palace Logo. By Jsherbert36 - <https://commons.wikimedia.org/w/index.php?curid=94233639>
- Slide 4. Godel, Escher, Bach. Cover. Penguin Books.
- Slide 22: Mycelium network. By Charlotte Roy, Salsero35, Nefronus - <https://commons.wikimedia.org/w/index.php?curid=92921450>
- Slide 22: Symphony. By Hanserblich - <https://commons.wikimedia.org/w/index.php?curid=7142520>

All other sources are author's original or cited in text from Academic work

Academic References

And further reading

- Cervantes, V. H., & Dzhafarov, E. N. (2020). Contextuality analysis of impossible figures. *Entropy*, 22(9), 981.
- Ghrist, L., & Ghrist, R. (2026). Impossible by Degrees: Cohomology & Bistable Visual Paradox. arXiv preprint arXiv:2602.09313.
- McAndrew, A., & Baker, J. A. (2020). The geometry of impossible figures. In *Proceedings of the 25th Asian Technology Conference in Mathematics* (pp. 114-125). Mathematics and Technology, LLC.
- Penrose, L. S., & Penrose, R. (1958). Impossible objects: a special type of visual illusion. *British Journal of Psychology*, 49(1), 31.
- Penrose, R. (1992). On the cohomology of impossible figures. *Leonardo*, 25 (3/4). 245-247.