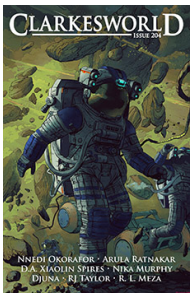
**Axiom of dreams** *Arula Ratnakar.* Clarkesworld Magazine, issue 204, September 2023 (148 pages, 22,570 words)

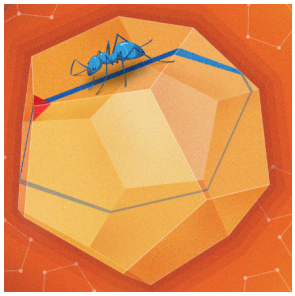





Arula Ratnakar

Arula Ratnakar is a neuroscientist, an artist, and a science fiction author. The current novella *Axiom of dreams* appeared in the science-fiction magazine Clarkesworld where you can read it, but it is also available as a 2.5 hour podcast. In this story the mathematics are central.

It plays in Boston, a few decennia in the future where Alvira is hoping to be admitted as a math PhD student. She is participating in a program where a brain chip is implanted that should help her during her sleep to solve her mathematical problems. Her boyfriend Kyle works in a neuroscience lab experimenting with fungi-drugs on mice. Alvira is forbidden to use drugs with the chip, but she enjoys the effects of 'shrooms' and even the chip company experiments with her. In her dreams her real life mixes with the math reality of a dodecahedral world that is populated by creatures like the friends Axiom from Face Four and Lemma from Face Eight, and other mathematical named individuals that are hoping to be one day Unveiled. Their god Truth lives in the most sacred Mountain Temple 11-10-12 and reveals itself in the fractals of the Mandelbrot set. The pentagonal faces are called Cities and opposite ones show the same type of landscape: grasslands, deserts, tundras, forests or oceans. The top face is numbered 1, the bottom gets 12, while 2-6 are the faces in the upper half numbered clockwise and 7-11 are the lower ones numbered counterclockwise. So the vertices are named by the numbers of the 3 meeting faces, There is a temple on each of the 20 vertices. There are sacred roads[1] which are the shortest paths starting at a temple, crossing 6 Cities with the highest possible face number, but never visiting another temple. This dodecahedral net is in fact part of Alvira's research.



The story is told, switching between the human world with Alvira and Kyle and the dodecahedral world with Axiom and Lemma. We join Lemma and Axiom travelling to the Mountain temple where the high priest Contradiction guides them into the temple to witness the Unveiling of the Nash equilibrium. An Interpretation Machine records this and tells Axiom to meet the creator in Face 5. Later it turns out that Unveiling means to be offered in a dream to the creator in the 13th Face.

At some point, during a drugs trip, Alvira 'falls' in the math world of her brain chip, and both world become a third real one. She meets Axiom in Face 5. Together they travel to Lemma's home since Lemma has been chosen for Unveiling. They discuss the possibility of finding a complementary system in which it will be possible to avoid Gödel's incompleteness theorems by defining some invariance which would allow to decide on the complete Truth. In the math world the mathematical individuals try to uncover the interpersonal structures, while in the human world individuals try to uncover the mathematics. Both look for Truth in a complementary way. When Alvira wants to bring Axiom to her real world, she tears Axiom apart.

Alvira decides to close the portal between the two worlds. Young Alvira dies in the real world, but grows old in the math world, When the old math Alvira is Unveiled she ends up as a spot that is not in the Mandelbrot set.

In the real world, the fraudulent brain chip company that experimented by combining it unlawfully with drugs is shut down. A most surprising read!

Adhemar Bultheel

[1]The proof that such a trajectory exists was given in a paper by J.S. Athreya and D. Aulicino *A trajectory from a vertex to itself on the dodecahedron.* Am. Math. Mon. 126, No. 2, 161-162 (2019). There are Numberphiles videos available about this topic.