

Reality Conditions: Short Mathematical Fiction

by Alex Kasman

THE MATHEMATICAL ASSOCIATION OF AMERICA, 2005, 247 pp., US \$37.50, ISBN 0-88385-552-6

REVIEWED BY MARY W. GRAY

Whatever its deficiencies, C. P. Snow's *Two Cultures* [1] concept of mutually incomprehensible dialogue between scientists and others lives on. For as intriguing as the collection of short fiction in *Reality Conditions* might be to mathematicians, it is difficult to believe that many of the stories would appeal to, or indeed be understood by, those on the "other side" of the cultural divide. In one story, the eponymous Topology Man relates what may be music to a mathematician's ears, but is unfortunately probably just jargon to the rest of the world:

In a Hausdorff space, like the one we live in, the bad guy ... can always avoid the superhero ... because he can get into a disjoint neighborhood out of his reach. But if this was the right sort of non-Hausdorff space, he wouldn't be *able* to avoid me.

But the villain Homotopy responded to this maneuver by growing the basketball at our hero's feet, twisting it around him, and inverting it to imprison the Topology Man. The resourceful topologist reacted:

Endowing the basketball with the topology of a Klein Bottle, I was able to escape. The floor of the basketball court began to deform again. It returned to being flat, but now each point was continuously shifting and moving around, making it almost impossible to stand.

Invoking Brouwer's Fixed Point Theorem, the Topology Man continues:

I leapt into the air, did a back flip and landed smugly on the unique fixed point.

While there is a lot of argot in the book, many of the best lines are like the perhaps non-politically correct joke: “A Unitarian is one who believes that there is at most one god.” All the words are known to everyone, but generally only the mathematicians laugh. Not that *Reality Conditions* will provide much hearty laughter, more likely some self-satisfied smiles.

The publisher’s blurb asserts that the entire book could help form the basis of a creative course on mathematics in fiction. Maybe so, but the audience would have to be pretty sophisticated mathematically. The main effect might otherwise be to reinforce the nerdy image many have of mathematicians; some of Kasman’s mathematicians are pretty weird. An adolescent desire to emulate Superman or Xena is unlikely to be replaced by a yen to become the Topology Man or his colleague The Category Girl. In spite of the patronizing “girl” here paired with “man,” there are a satisfying number of women mathematicians in the collection, but frankly they are not likely to be seized upon as role models by today’s students. Especially not the closet mathematician whose work is uncovered in “Murder, She Conjectured”! In this, the only mystery among the 16 stories, regrettably in my view, a psychologist and mathematician pair up to try to discover the story behind the strangling of a woman in London in 1870.

What Kasman is very good at is creating the world in which mathematicians work. From the anxious graduate student, to the novice Ph.D., to the disillusioned professor, to the distinguished expert, and from the isolation of a shabby office, to the interchanges at a coffee bar, to the atmosphere at MSRI, mathematicians will recognize themselves, their colleagues, and their surroundings. The title story is perhaps the best in its ability to portray the “reality conditions” in which many of us labor. Here we see how hope can spring eternal for those who

believe their work is just a little bit away from fame. That the hero of “Reality Conditions” is called Gilgamesh is a nice touch.

The author, a faculty member at the College of Charleston who has worked in algebraic geometry with applications to physics and biology, knows his mathematics and knows his colleagues in mathematics and in academe in general. It is easy to identify with the meeting of a mathematician with a board of education in “Another New Math,” and even with the most bizarre of his characters and situations. Admittedly, however, a ransom note in “The Math Code” containing

I proved a new theorem. It was that for every pair L and B in Minkowski space, there is an A so that B times L tensor A is a subspace of Hilbert space.

does seem a bit contrived. In notes at the end of the book Kasman points out that mathematical symbols are not intended to obscure ideas from outsiders but to communicate ideas among mathematicians. Well, yes, but what about communicating with others?

“The Legend of Howard Thrush” exalts the purported inventor of subscript notation in response to the *Great Variable Shortage*. This saga of the migration of mathematicians from Princeton to Berkeley has the hero escaping from a tight situation, tied up in a room with thick cement walls and no windows:

What could he do?

Well, the first thing he did was a proof. He showed that if $f(z) = z + a^2 z^2 + a^3 z^3 + \dots$ is univalent in the unit disc then $|a^2| \leq 2$. The point is, as we all know *now*, this is a *sharp* inequality! So, he used it to cut the rope.

Now, the room was practically empty. All that was in it was a big, old desk. And all that was in the desk, in the back corner of one drawer, was an old, broken pencil! But, of course, in the hands of Howard Thrush, a pencil is a powerful tool.

What he did, quietly so that the rustlers wouldn't catch on, is to triangulate the walls, ceiling and floor of the room (standing on the desk when necessary). He just covered the room with a thousand triangles. But, you see, he did it in a clever way so that there were exactly 1502 vertices, 2504 edges and 1000 triangle faces. Then, since $1502 - 2504 + 1000 = -2$, this made for two *holes*! One of them turned out to be too small, but the other was just big enough that he could squeeze through it and get back to safety.

If only we all could escape from unpleasant situations so easily.

Another of my favorites was "Unreasonable Effectiveness," which offers an answer to the question of why so much elegant abstract mathematics is later found to have real-world applications. The stories are of mixed quality; some are real gems, others are laborious to read through. Also, I am not sure that the fact that there is mathematics in each story really makes it "mathematical fiction."

Kasman has a creative imagination and the ability to evoke characters and their surroundings effectively. Although it probably won't have the wide appeal claimed for it, *Reality Conditions* makes good reading for those who glory in absorption in mathematical ideas.

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REFERENCES

[1] C.P. Snow, *The Two Cultures*, Reissue of 1959 edition, London: Cambridge University Press, 1993.