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H.P. Lovecraft: a Horror in Higher Dimensions

Thomas Hull
Merrimack College

H.P. Lovecraft is one of the most influential figures of horror fiction. Time and again one finds horror fiction maestros—Stephen King, Clive Barker, and even young, hip horror writers like Poppy Z. Brite—paying homage to Lovecraft's work. To this day, writers pay tribute, by writing stories "in the style" of Lovecraft or extending Lovecraftian themes to modern contexts. This is all the more amazing when one learns that Lovecraft's fiction follows a rather nontraditional approach to horror, fitting more appropriately into the subgenre of *weird fiction*. Specifically, Lovecraft was primarily interested in creating an appropriate mood to inspire in the reader a sense of *cosmic horror*: that the hopes, dreams, and philosophies of humankind are inconsequential to the larger universe, and that as a result the chaotic forces of nature could wipe out human existence in the blink of an eye without anyone even noticing.

Lovecraft did not achieve such a mood through realistic devices such as comets smashing into the Earth. He did employ a rich pantheon of unspeakably hideous monsters, and Lovecraft is perhaps best known for his creation of entities like Cthulhu, Nyarlathotep, and Yog-Sothoth. But focusing on this colorful cast of "characters" too much misses the point. Rather, Lovecraft's attitude toward horror relied on a basic premise which is concisely captured in what is perhaps his most popular quotation, from *Supernatural Horror in Literature*:

> The oldest and strongest emotion of mankind is fear, and the oldest and strongest kind of fear is fear of the unknown.

Lovecraft's cosmic horror was thus achieved through devices that would, he hoped, feel completely foreign and unknown to the reader. This mood was meant to be crafted in unfamiliar and uncomfortable territory—a hard goal to achieve. Lovecraft was perfectly aware that if he made his stories too fanciful they wouldn't inspire any feeling of awe or terror. At the same time if his devices were too realistic they would miss capturing the fear of the unknown. As Lovecraft wrote to one of his contemporaries in 1932,

> I have had many severe criticisms because of the *concrete and tangible* nature of some of my "cosmic horrors." Variants of the general theme include defeats of the visible laws of time ... and transcensions of the boundary-lines of Euclidean space.

This passage provides our first indication that Lovecraft consciously utilized mathematical concepts to help build the mood for which he was striving. In fact, elements of mathematics can be found in many of Lovecraft's stories at a variety of different levels.

Any reader of Lovecraft will run across mathematical references and vocabulary. During the climax of one of his most popular tales, "The Call of Cthulhu," when some stumbling sailors accidentally release Cthulhu from his eons-old imprisonment in the ancient, sunken city of R'lyeh, Lovecraft writes, "After vigintillions of years great Cthulhu was loose again, and ravening for delight." How many writers have used "vigintillion" not once, but in two stories? (He also used it in "The Dunwich Horror.") How many mathematicians know that this stands for 10^{63}?

Furthermore, during the sailors' horrifying visit to the city of R'lyeh, the narrator of "The Call of Cthulhu" summarizes 2nd mate Johansen's description of the place:

> ... he dwells only on broad impressions of vast angles and stone surfaces–surfaces too great to belong to anything right or proper for this earth ... I mention this talk about angles because it suggests something Wilcox [a previous character who was plagued with dreams of Cthulhu] had told me of his awful dreams. He said that the geometry of the dream-place he saw was abnormal, non-Euclidean, and loathsomely redolent of spheres and dimensions apart from ours. Now an unlettered seaman felt the same thing whilst gazing at the terrible reality.

Illustration by Greg Nemec

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What better way to convey a sense of an unknown, alien, yet powerful landscape than to use mathematical language that, while just as unknown to most readers, simultaneously conveys levels of mystery and legitimacy to the environment? What's more, readers who do have an understanding of non-Euclidean geometry can also appreciate this effect. What would be more unsettling to one's sense of reality than to encounter physical examples of, say, hyperbolic geometry transplanted into our Euclidean world? Lovecraft's use of strange geometry is effective for both the mathematical literate and layman.

While the sailors were fleeing the ravening Cthulhu, one of Johansen's comrades was "swallowed up by an angle of masonry which shouldn't have been there; an angle which was acute, but behaved as if it were obtuse." Images of Escher-esque landscapes come to mind, but it seems that Lovecraft possessed at least a casual understanding of non-Euclidean geometry.

This fits with biographical accounts of Lovecraft. He lived from 1890 to 1937, and as a youth he was an avid student of astronomy, producing several amateur journals on the subject before the age of nineteen. In extensive letters that he wrote to friends, it is clear that Lovecraft possessed a somewhat detailed understanding of Einstein's theory of relativity and through this he would have become exposed to the concept of non-Euclidean geometries. Lovecraft's use of abnormal geometries to capitalize on human fear of the unknown is found in many of his other stories as well, including "At the Mountains of Madness," "Through the Gates of the Silver Key," and "Dreams in the Witch House."

The latter story contains Lovecraft's heaviest use of mathematics. In it, Walter Gilman is a student of mathematics at the fictitious Miskatonic University, studying "non-Euclidean calculus and quantum physics." He lives in a rented room in an old, New England house that used to be the dwelling place of the witch Keziah Mason, "whose flight from Salem Gaol at the last no one was ever able to explain. That was in 1692 ... and not even Cotton Mather could explain the curves and angles smeared on the grey stone walls with some red, sticky fluid." Gilman knew a bit about Keziah's history, and that during her trial she "had told Judge Hathorne of lines and curves that could be made to point out directions leading through the

walls of space to other spaces beyond..." Thus Gilman specifically "wanted to be in the building where some circumstance had more or less suddenly given a mediocre old woman of the seventeenth century an insight into mathematical depths perhaps beyond the utmost modern delvings of Planck, Heisenberg, Einstein, and de Sitter." (Apparently Lovecraft was more familiar with the physicists of his day than with the mathematicians.) Once again, we find that Gilman's room was of a "queerly irregular shape" with odd angles between the ceilings and walls. (Which is not all that unusual for old New England homes!) What's more, the longer Gilman stayed in the witch house the more lurid dreams he had, where he would plunge "through limitless abysses," pass by "prisms, labyrinths, clusters of cubes and planes, and Cyclopean buildings," and encounter indescribable and terrifying creatures. While the trauma of such sleep played havoc on his health, he did improve in his mathematics classes, "getting an intuitive knack for solving Riemannian equations, and astonish[ing] Professor Upham by his comprehension of fourth-dimensional and other problems which had floored all the rest of the class." Of course, as the dreams intensified, a certain doom inched closer to Gilman...

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What is happening to Gilman makes explicit what is implicit in other Lovecraft stories. Lovecraft chooses to use the concept of higher dimensional space as a device to make the weird plausible. Through dreams and the peculiar geometry of his room, Gilman is able to travel along the "4th axis" of the fourth dimension to transport himself to places far away in space and time. Denizens of other Lovecraft stories, like Cthulhu and Yog-Sothoth, are said to be "beings from another dimension." A careful balance is being struck here. To merely say that these creatures are extraterrestrials from another dimension, and that what we view as the occult is actually mathematics applied to interdimensional travel makes the situation soberingly unhorrifying. But Lovecraft's point is not to merely explain things away, but to make the unfamiliar seem a little bit more justified, and then to use the nature of the explanation to add another layer of mystery and terror. One gets the impression that Lovecraft had a great intuitive grasp of what glimpses of the fourth dimension would seem like to us, how the geometry would appear "non-Euclidean" and "all wrong." And his descriptions of abominations like Cthulhu fit well with what one would imagine a fourth dimensional creature might be like in our space—how they, "were not composed altogether of flesh and blood. They had shape ... but that shape was not made of matter."

There is a fascinating consistency to Lovecraft's use of mathematics in his stories. This isn't that surprising, since many of his stories can be said to take place in the same "universe," utilizing what has become known as Lovecraft's Cthulhu Mythos. Indeed, the name Cthulhu comes up in several stories, as do many of Lovecraft's other abominations. And no good Lovecraft story would be complete it didn't contain references to certain ancient, unspeakable texts of the occult, where the reading of a single page is likely to drive a person insane. One such book is the dreaded *Necronomicon*, originally written by the mad Arab Abdul Al-hazred (a take-off of the family name Hazard which was common in Lovecraft's home town of Providence, RI). In Lovecraft's fictitious universe, this tome was first translated into English by the 16th century astrologer/mathematician John Dee, who in reality did translate Euclid's *The Elements* into English.

Yet in all of these stories we see twin ideas concerning mathematics. On the one hand, math concepts are used to describe the indescribable—to attempt to convey, in as concrete a manner as possible, a sense of the alien and the unknown in the reader. On the other hand, we see that mathematics is clearly one of the keys to understanding secrets of the universe, a universe which would drive one babbling mad if only a fraction of it were clearly comprehended. After all, most of the population is terrified and intimidated by math, yet most people also recognize the power of mathematics. What better logical support is there for inspiring a mood of terror and the unknown?

However, no literary critics discuss how such mathematics helps shape the mood of "cosmic horror" for which Lovecraft is famous. Yet the examples are everywhere. The instances where Lovecraft refers to formulas, geometry, or higher-dimensional space are peppered throughout his Cthulhu Mythos stories and offer an unmistakable literary device to create an intimidating atmosphere of the unknown.

Modern readers of Lovecraft are encouraged to approach his stories with several grains of salt. While many of his political views were quite liberal, he was a life-long staunch conservative with a number of blatantly racist views, which pop up in some of his stories without apology. Also, one has to get used to Lovecraft's characters following courses of action which even the mathematically illiterate can see will only lead to ruin. For example, unlike the protagonist of "The Case of Charles Dexter Ward," one should never, NEVER, absent-mindedly chant incantations found in forbidden manuscripts while trapped in ancient crypts. It's just a bad idea.

Nonetheless, Lovecraft was a master at capturing a certain eerie mood of unknown gulfs which very few horror writers have since come near. The fact that mathematics plays a part in this can make his stories all the more enjoyable to the mathematically-minded. ■