

MEDIA COLUMN

In addition to longer reviews for the Media Column, we invite you to watch for and submit short snippets of instances of women in mathematics in the media (WIMM Watch). Please submit to the Media Column Editors: Sarah J. Greenwald, Appalachian State University, greenwaldsj@appstate.edu and Alice Silverberg, University of California, Irvine, asilverb@math.uci.edu.

A Non-Linear Take on the Flatland and Sphereland Films

Alice Silverberg

I enjoyed the delightful 35 minute animated film versions of the classic *Flatland* and its lesser known quasi-sequel *Sphereland*. They were released directly to DVD in 2007 and 2012, respectively. According to the film's website, the *Flatland* movie has been viewed by over a million students internationally.

Flatland: The Movie (also known as *Flatland: A Journey of Many Dimensions*) is loosely based on Edwin Abbott Abbott's 1884 satirical novella *Flatland: A Romance of Many Dimensions*, while the film *Flatland²: Sphereland* is loosely based on *Sphereland: A Fantasy About Curved Spaces and an Expanding Universe*, which is Cornelie J. Rheinboldt's 1965 English translation of Dionys (Dionys in the English version) Burger's 1957 Dutch novel *Bol-land: Een roman van gekromde ruimten en uitdijend heelal*.

While one purpose is educational, the films can be appreciated by audiences of all ages. The bonus features on the DVDs include perspectives by the cast and by geometer Tom Banchoff, and some mathematics and physics worksheets along with notes for the instructor.

Spoiler Alert for *Sphereland*: Flatlanders live on a disk planet in a solar system with other planets and stars (sic), which they eventually learn is on the surface of a sphere. Each dimension from 0 to infinity has a physical reality. And there are parallel universes out there, including a Flatland that is the surface of a torus.

The all-star casts were impressive. Both films feature Kristen Bell as the voice of Hex and Michael York as the God-like Spherius from Spaceland. Brothers Martin Sheen and Joe Estevez voice the brothers Arthur Square and Abbott Square in the *Flatland* film. In the *Sphereland* film the

Over-Sphere in the fourth dimension is voiced by Kate Mulgrew, who played Captain Janeway on *Star Trek: Voyager*, and the minor character Captain Aero is voiced by Danica McKellar, who studied mathematics at UCLA and is a force for encouraging girls to like and do math. In this day and age of excessive narcissism, I especially appreciated Tony Hale's rendition of the King of Pointland; in a bonus interview, Hale refers to this character as "just a sad emasculated point." It's great that such prominent celebrities were enthusiastic about giving their all for some short animated educational math films.

Class stratification was a major theme of *Flatland*. York reminds us in an actor interview that Abbott anticipated a number of political and sociological trends. Circles were superior. As stated in the *Flatland* film, "The more sides you have, the greater your angles, so the smarter you are." Irregular polygons were viewed as monsters who could be "cured" by surgery, or executed.

Abbott's *Flatland* society was blatantly sexist, though the author pointed out that his novella was meant as a satire. The lowest classes of males were triangles. A Law of Nature says that each male child generally has one more side than his father. Females were the lowest of the low, since they were straight lines. These pointy females were potentially lethal to the males, and this led to draconian restrictions on their movement. Abbott's "Frail Sex" is "wholly devoid of brain-power," and his female Flatlanders "have neither reflection, judgment nor forethought, and hardly any memory." On the bright side, at least they weren't concerned about dieting.

The *Sphereland* book starts with the premise of *Flatland*, and does not change that women are lines. It takes place 70 years after the events depicted in Abbott's book, allowing the society to transform into a somewhat more egalitarian one, and ends up doing pretty well for a book of its time, though I don't know how faithful the English translation is to the Dutch original—perhaps some reader can enlighten us on this?

The films are admirably modern and egalitarian, especially compared to the quaint but antiquated *Flatland* book, with the *Sphereland* film being better in this regard. In the *Flatland* film, while women can be (literally) multi-sided and the girl Hex is a hexagon, her grandmother Arlene Square is portrayed as a traditional housewife who stays home while her husband Arthur Square goes off to work carrying his briefcase. Arthur's boss is the strident and reviled "Miss Helios," perhaps intended to come across as a frustrated old maid. Arthur and his brother are bluish, while Arlene

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and Helios are pinkish. A Flatlander axiom is “Configuration Makes the Man.” The King of Lineland’s two dippy Queens say “Hail to the King” on his command, and not much else. On the other hand, Hex’s mother was a mathematician, though her ideas about three dimensions led to her and her husband’s untimely deaths under orders from the Circles.

In both the Sphereland film and (the translation of) the novel on which it is based, the Flatlanders are more egalitarian and open-minded than their ancestors. The film *Sphereland*, which takes place 20 years after *Flatland: The Movie*, is a comedy and also a love story between the two hexagons Hex and Puncto. Flatland society has progressed—“all shapes gained geometric rights.” Both of the Flatland women are respected professionals, despite Puncto’s superior Captain Aero being an isosceles triangle. Aero and the initially arrogant and self-important circle Dr. Hubble are open-minded enough to accept the evidence of higher dimensions. While the King of Lineland still has two Queens, they speak up for themselves indignantly.

While I think the films are excellent, I have two quibbles.

A bit disconcerting was that the films retained some of the mysticism and religious aspects of Abbott’s Flatland book. In the Flatland film, the circles are “Priests,” Hex turns out to be “the prophet,” her school is “St. Euclid,” and claims about a third dimension are “blasphemous” and “heretical.” In the Sphereland film, Spherius addresses the Over-Sphere as “Oh divine Over-Sphere” (which she rejects dismissively), and some of the music in both films has a decidedly religious or mystical feel to it.

I also wondered whether they went a little too far in implying that we should take every crazy idea seriously. If someone insists they were visited by a divine being from a higher dimension, does our skepticism make us narrow-minded? Taking this into our world, how much time need we spend on a seemingly preposterous “proof” of the twin prime conjecture?

But all in all, I highly recommend these beautifully animated films to viewers of all ages, interests, and dimensions.

More information may be found at <http://flatlandthemovie.com> and <http://www.spherelandthemovie.com>. Abbott’s novella can be read on Banchoff’s website <http://www.geom.uiuc.edu/~banchoff/Flatland/> or in the DVD’s companion book *Flatland: The Movie Edition*, which includes the film’s screenplay.

I thank producer Seth Caplan for generously providing review copies of both DVDs.

Breaking News: Katherine G. Johnson’s Presidential Medal of Freedom

Sarah J. Greenwald

At age 97, Katherine G. Johnson has just become what I believe is the first mathematician ever to have won the Nation’s highest civilian honor, the Presidential Medal of Freedom. I’m watching the streaming video at <https://www.whitehouse.gov/campaign/medal-of-freedom> (it is also available at <https://www.youtube.com/watch?v=BH8JzxtGD34>). I need to jump to about 47:19 to see President Obama’s comments. He begins the awards ceremony by describing Johnson’s life and mathematical work, revealing her name first, followed by the other sixteen honorees. My favorite quote is: “In her thirty-three years at NASA, Katherine was a pioneer who broke the barriers of race and gender, showing generations of young people that everyone can excel in math and science and reach for the stars.” After Obama’s comments, the medals are awarded alphabetically, and Johnson’s official award introduction begins at 1:16:48. It is exciting to see a mathematician awarded and I’m so happy for her (and that the applause is just as loud for her as it is for the celebrity honorees).

For more information on Katherine G. Johnson, see her MAKERS Profile videos at <http://www.makers.com/katherine-g-johnson>. Ron Eglash reviewed these in the May–June 2015 issue of this newsletter.



Katherine G. Johnson, President Barack Obama, Willie Mays. Photo credit: NASA/Bill Ingalls