Surfing the Möbius Band: An Example of the Union of Art and Mathematics

Francisco Saez de Adana

Dept. of Computer Science, Universidad de Alcalá, Spain, kiko.saez@uah.es

Abstract

This paper shows an example of how mathematics can be part of an artistic narrative, in this case in a superhero comic called The Silver Surfer. The traditional meaning of the Möbius band as the unending and the cyclic is mixed with the graphic potential of the comics. The result is a story that not only uses this symbol in its plot, but also creates the panel pacing considering the geometrical properties of the band, showing how the graphic elements of the comics are combined with geometry.

Introduction

The Möbius band (Figure 1) is geometric figure was discovered independently by the German mathematicians August Ferdinand Möbius and Johann Benedict Listing in 1858, owing its name to the first of them [3]. It is a single-sided and single-edge surface. To understand this, the best example is to see what happens if the problem of coloring the supposed external face of the band is considered. After solving this problem the whole band will be colored. Therefore, it does not make sense to talk about the inside face and the outside face. In addition, if you try to go over the edge with a finger, you can see that at some point you go back to the beginning, which shows that this edge is unique. Another very interesting property of the band is that it is a non-orientable surface, which means that one moves parallel along the length of the band, the beginning is reached again with the inverted orientation. Therefore, a person who moves lying over a Möbius strip looking to the right, will appear looking to the left after making a complete turn.

Figure 1: *Image of the Möbius band.*

This paper shows how this geometrical figure has excited the imagination of some writers and artists who have used the band as an inspiration to create their stories. The paper highlights the example of a story of the Marvel superhero Silver Surfer, because in this case, the significance of the Möbius band is not only used in the plot of the story, but also in its page layout. The potential of the comic medium provides the possibility of using the Möbius band in a different way that it has been used before in the fiction, as it is shown in this paper.

Silver Surfer and Mathematics

Silver Surfer is a superhero created by the cartoonist Jack Kirby in 1966 for the Marvel series of Fantastic Four. Stan Lee, the writer of the series, found a character in the story drawn by Kirby that was not in his original plot [1]. However, Lee was fascinated with the character and made it his own, making different stories over the decades with him as protagonist in collaboration with such renowned artists as John Buscema, John Byrne or Moebius, in addition to Kirby himself. In most of these stories, Lee uses the character for a sort of existential reflection, in such way that some of the most emotionally charged stories he wrote throughout his career had Silver Surfer as the protagonist.

About three years ago, a Silver Surfer series of the character appeared. This new series was written by Dan Slott and illustrated by Mike Allred. In a very different way than Lee's works, it is also a deep reflection of what it means to be a cosmic superhero like Silver Surfer in a universe of fiction like Marvel. Moreover, Slott and Allred's stories are a reflection on the relationships of an almost almighty being with human beings, represented, in this case, by the character of Dawn Greenwood with whom Silver Surfer travels along the universe and establish a relationship of love and friendship that serves as an excuse to theorize about the role of the human being in the universe.

In issue 11 of this new series in the story entitled "The Moebius Madness of Silver Surfer" [7], Slott and Allred decide to conduct a formal experiment and the storytelling of that issue is arranged in such way that the page layout has the form of a Möbius band. From the beginning, the Möbius band has fascinated both mathematicians and laymen, becoming a metaphor for change, turn, and renewal. The curious thing is that the Möbius band has achieved one of the basic objectives of Bridges: the union of mathematics and arts. Not only have its appearances in math, science and engineering grown considerably over the decades, but it has also fascinated writers, artists and filmmakers who have included the band in their fictional stories.

The Möbius band in fiction has always symbolized the unending, the cyclical and, therefore, serves as a strong reflection on time in the universe and its relation to space. In this way, the episode "Time Squared" [6] of Star Trek: The New Generation mentions the so-called theory of Möbius in which certain decisions can turn the time into something cyclical condemning the characters to repeat again and again the same events in a loop without exit. The Argentinean film "Möbius" [5] directed in 1996 by Gustavo Mosquera, on the other hand, tells how the subway network of the city of Buenos Aires has become so complex that even the engineers who designed it are unable to reproduce it. When a train is lost, a mathematician comes to the conclusion that the complexity of the network has created a band of Möbius that the train is running infinitely out of sight of the rest of the world. The story, inspired by the short tale "A Subway Named Möbius" [2] written in 1950 by A.J. Deutsch and located in the city of Boston, serves as a metaphor about the people disappeared during the Argentine dictatorship. Therefore, there are, generally, two ideas associated to the Möbius band that are used in fiction. On one hand, the idea of and endless loop, as happens in the Star Trek episode mentioned above. This idea has a relationship with the usual depiction of the Möbius band in an infinty-symbol shape. On the other hand, the odd topological properties of this geometrical figure, as in "A Subway Named Möbius" and the Argentinean film inspired by it in which these topological properties give as result subway trains disappearing by ending up on 'the other side'

The interesting thing about Silver Surfer's story is that it makes use of the comic medium. It follows the idea started by Alan Moore at issue 15 of the series Promethea [4], in which, on a double page (Figure 2), the characters went through a band of Möbius from which only the reader could take them out by turning the page. However, Slott and Allred create a more complicated scheme in which each panel layout of every page follow the form of a band of Möbius. The idea is that Silver Surfer is immersed in a temporal loop that makes him repeat the same events over and over again, until he realizes that it is free will that can free himself from that cycle. The novelty provided by Slott and Allred is that the band is not only part of the plot, but also the storytelling itself is configured in the form of a band of Möbius (Figure 3). The narrative expertise of an author such as Mike Allred allows us to make use of the full potential of the comic, as a graphic narrative, to show the reader what a single-sided geometric figure like the Möbius band means.
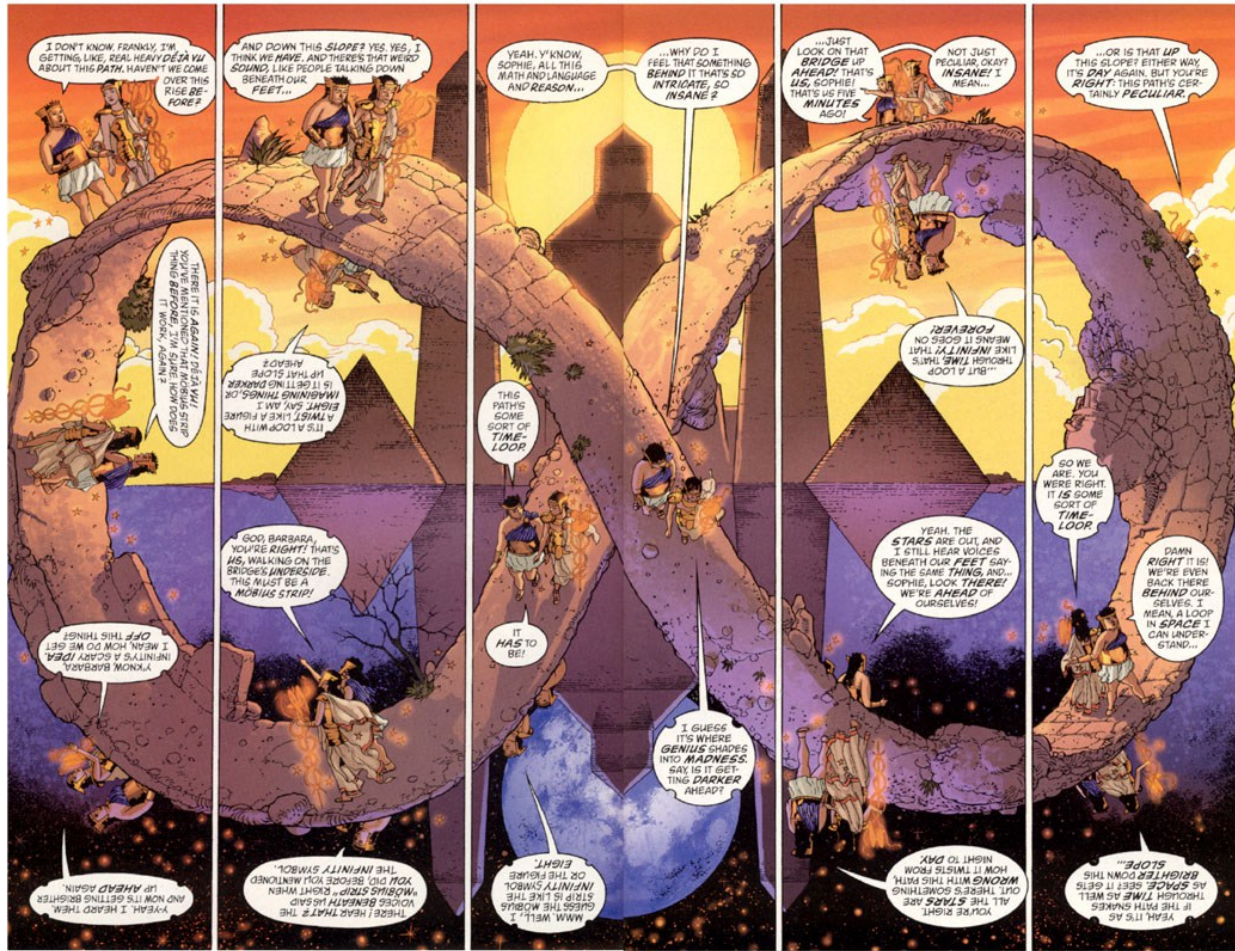
Figure 2: *Double page of Promethea issue 15 introducing the Möbius band in the story.*
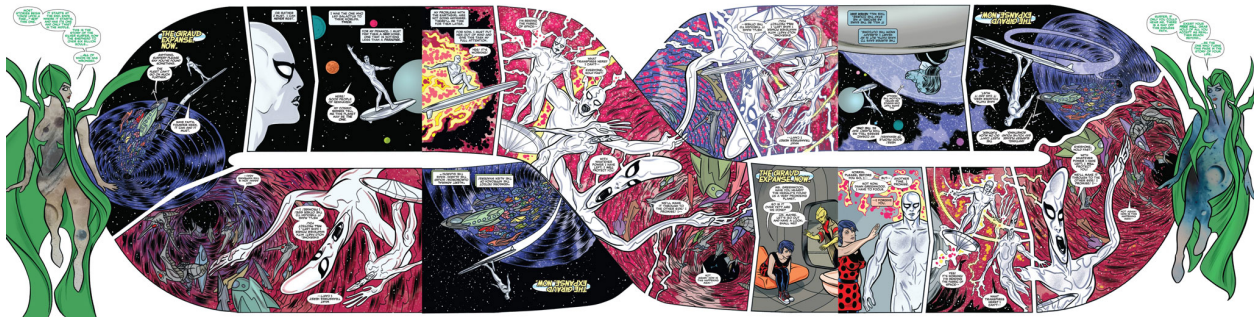

Figure 3: *Page layout in Silver Surfer issue 11 showing and infinite loop as a Möbius band.*

Conclusions

"The Moebius Madness of Silver Surfer" is not only a reflection on the cyclical nature of time and space, as most of the stories that have been inspired by the Möbius band, but it also can be considered a wonderful lesson in geometry, accessible even to the reader less versed in mathematics. The innovative character at the formal and narrative level of this episode served to be awarded with a 2016 Eisner prize (for Best Single Issue/One-Shot Edition), the main prize of American comic industry. A great example of beauty of the union between art and mathematics.

However, as happens very often when a mathematical symbol is introduced in the popular culture some mistakes are made. For instance, "A Subway Named Moebius" is a drastic example. A network is composed of edges, and thus has no sided-ness to it. A Möbius band is not really infinitely long, and so there can be no way for a train can run off to infinity out of sight. In the Silver Surfer story, the page layout is not a Möbius band, it is more a flat infinity shaped band, which makes easier to include the story in the layout, but on the other hand, only highlights one of the important features of the band, his capacity of symbolize the unending, the cyclical. The important thing is this paper, is not the geometrical exactitude of the layout, but how a mathematical figure has excited the collective imagination and results in a constant reference in the literature and the art, even being used in the page layout of a comic-book.

References

[1]   R. Bartual. *Jack Kirby, una Odisea Psicodélica.* Ediciones Marmotilla, 2016.

[2]   A.J. Deutsch. "A Subway Named Möbius." *Fantasia Mathematica.* Copernicus, 1997.

[3]   J. Fauvel, R. Flood and R. Wilson. *Möbius and his Band: Mathematics and Astronomy in Nineteen-Century Germany.* Oxford University Press, 1993.

[4]   A. Moore and J.H. Williams III. "Mercury Rising." *Promethea,* no. 15, 2001.

[5]   G. Mosquera (dir.). *Moebius.* 1996

[6]   J. Scanlan (dir.). "Time Squared." *Star Trek: The Next Generation,* season 2, episode 13, 1989.

[7]   D. Slott and M. Allred. "The Moebius Madness of Silver Surfer." *Silver Surfer,* vol. 3, no. 2, 2015.