Mathematical Sequential Art

Susan Happersett
344 Grove Street # 10 ● Jersey City, NJ ● USA
fibonaccisusan@yahoo.com

The creation of sequential art, defined as a series of related images viewed together as one work of art, is an opportunity for mathematical artists to enrich their practice, add a new dimension to their work and to engage a broader audience.

The goal of mathematically based art is to illustrate the beauty and patterns of a mathematical theme. In order to make this aesthetic connection it is sometimes beneficial to show a series of narrative illustrative images. The viewer will have a richer visual experience, as well as an opportunity to cognitively process a fuller spectrum of the aesthetics of the mathematics behind the art. There are numerous definitions for sequential art, but it is most often associated with comic book art work. I will define sequential art more broadly as a series of images shown together to create a narrative, or in other words, to tell a story. The work of art comprises of multiple images because the individual images, as well as the connection between these images, contribute to the work. Sequential Art is not new. Sainte-Chapelle in Paris features fifteen medieval stained glass windows each consisting of a series of panels sequentially telling a story, for instance, the story of the life of Esther.

Sequential art can manifest itself in a multitude of media and formats. A series of drawings, prints or paintings exhibited together is the most obvious technique, but there are other possibilities, like artist's books and stop-motion video. Sequential art does not have to be figurative. The subject matter may be abstract, as long as there is a connection between the images, for instance a mathematical concept. Focusing on mathematical sequential art, I distinguish two types: linear and non-linear sequential art. In linear sequential art the mathematics mandates a certain order of the images. In a non-linear sequential art work the artist illustrates a mathematical theme by creating a series of permutations of the theme and showing them together to tell a more complete visual story on the topic. The order of these permutations is less relevant.

Good examples of linear themes are the Fibonacci sequence or other growth patterns. I have created numerous stop-motion videos, books, and series of drawings in which a mathematical sequence or progression is expressed. The book "Fibonacci Flower" published with Purgatory Pie Press is comprised of a series of prints depicting a flower, mathematically generated using the Fibonacci Sequence. “Fibonacci Scroll” is a stop-motion video of a scroll of counted markings, where the number of marks increase and decrease according to the Fibonacci Sequence. "Eight Columns" is a series of eight marking drawings based on the Fibonacci Sequence (See Figure 1). The drawing grid for each drawing is in a 3:5 ratio. The center of each drawing is where the sequence begins. In the first drawing the center columns contains 1's and the sequence continues outward with 2's then 3's then 5's, all the way to the border of the grid with 13's. The second drawing has columns of 2 markings at its center, then outward columns of 3's, 5's, all the way to 21's. The third drawing starts with 3 marks in each center column then 5's, etc. to the outer borders with 34 markings per grid. This progression continues until the eighth and last drawing is completely filled with 34 markings per grid square. In each of these art works the sequence in which the images are viewed is important to illustrate the mathematical sequence underpinning the work.

Anne Burns has made a number of movies using a series of computer images shown in a stop-motion sequence. A good example of this non-linear sequential art is her “Movie1”. In this movie she creates sepia-toned swirling circular images, creating an ever-changing portrait of complex functions in all of their undulating glory. Burns describes her process for this work:

> *This animation was made by drawing the vector field defined by a complex function in the xy-plane. In each frame one (or more) of the parameters defining the function is varied in small increments. The color of each vector is determined by the arctangent of the angle the vector field makes with the horizontal* [1].

In "Movie1" Burns' audience is able to experience the beauty of complex functions by seeing the concept as a sweeping cycle of permutations, creating a breath taking visual effect. Another example of non-linear sequential art is the work of Emil Salto. He created a series of twenty unique photograms titled "Hypercubes (the 4th dimension)" inspired by the work of mathematician Charles Hinton. Ten of the photograms are published in sequence in the book Mute Science [2].

Sequential art can offer a new vibrant aesthetic to algorithmically generated art. There are many opportunities and untapped possibilities for artists making mathematically-inspired art to broaden their practice to include sequential art. It gives viewers more complete access to the mathematical subject matter. From my experience some of my most fulfilling times as an artist have been showing my Fibonacci Artist's books at art exhibitions with a general art world audience. It is very exciting to see the ah ha! moment as I unfold the pages of an accordion book and the viewers see the numerical progression and the intrinsic beauty of the patterns in the Fibonacci Sequence. Mathematical subject matter by its nature of progressions, sequences, series and algorithms is a perfect starting point for making art work using multiple images.

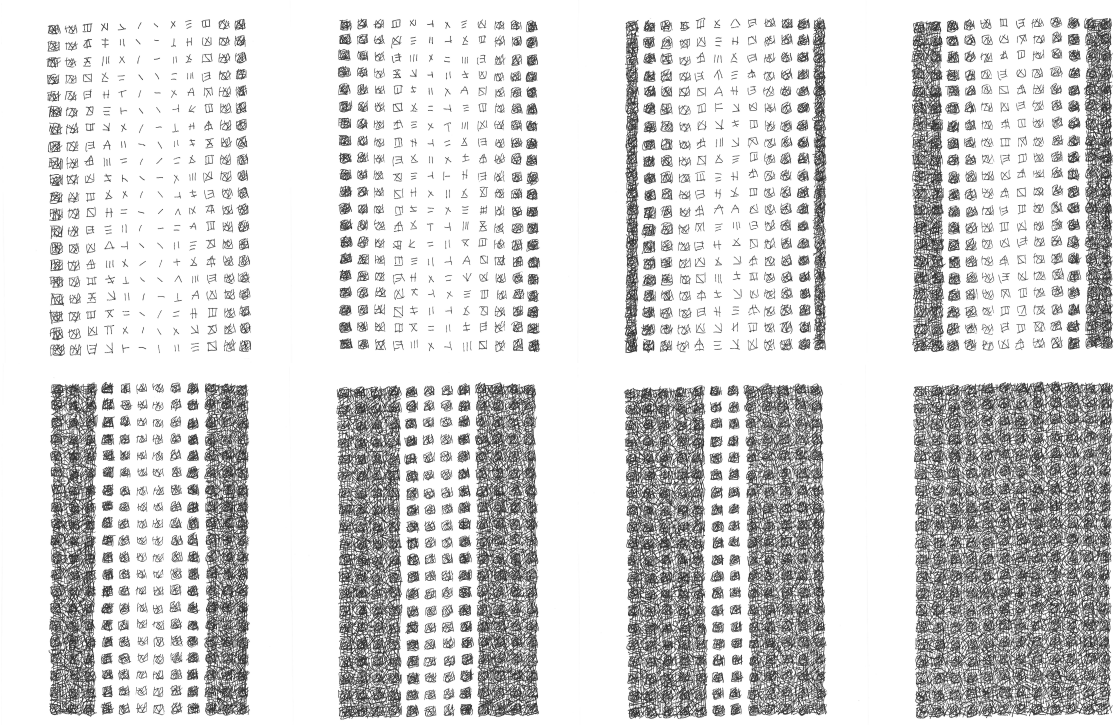

Figure 1 – "Eight Columns" by *Susan Happersett*

[1] A. Burns, http://anneburns.net (as of 9-Mar-2012).
[2] E. Salto, *Mute Science*, Revolver Publishing, Copenhagen, Denmark, 2011.