

Goldbach Tilings

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Abstract

A simple, though still unproved mathematical concept was utilized in making drawings and paintings which were visually interesting and maintained references to nature. Christian Goldbach (1690-1764) conjectured that any even number greater than two has at least two primes that sum to that number. A series of drawings, paintings and assemblages involved partitioning a rectangle into an even number of triangles. Upon completion of the division, the triangles were rearranged corresponding to two prime numbers until an aesthetically satisfying adjustment was produced. Color and texture heightened the visual effect as well as lent a human hand significance to the abstract image.

During the Summer, 1998 I attended AM 98, Art and Mathematics Conference at the University of California at Berkeley. I am an artist. The meetings were fun and inspiring because I was awakened to visual art which utilized mathematics and was visually stimulating as well. One could say that this discovery on my part is no discovery because of the intrinsic beauty already offered in a conjecture, theorem or a proof. Yet a plain white sheet of well manufacture 100% rag paper has an intrinsic beauty as well. However in spite of the intimidation of spoiling something that is already perfect, artists such as myself are more than willing to risk marks on that perfect sheet paper which may express various personal criteria.

After the meetings I explored the possibilities for finding a simple mathematical concept to see what I could discover about making that concept visually interesting as well as maintaining abstract references to nature. After four years I have a body of work based on the conjecture from Christian Goldbach (1690-1764) that any even number greater than two has at least two primes that sum to that number. This conjecture works well for me because it offers a structured base for creating an artwork yet; I can control how it will be integrated into my work as opposed to something like the series of numbers in a Fibonacci's sequence which offer leads to a spiral.

While attending the MOASIC 2000, Mathematics and Art Conference at the University of Washington I had an opportunity to offer a brief slide presentation of the works I had completed thus far.

My current series of drawings, paintings and assemblages involves partitioning a rectangle into an even number of triangles. Upon completing the divisions, I rearrange the triangles corresponding to two prime numbers until an aesthetically satisfying adjustment is produced. Color and texture heighten the visual effect as well as lend a human hand significance to the abstract image.

The even number 32 and the prime numbers 13 and 19 are often my formula of choice when designing my Goldbach series. The basic repetition of the triangles serves as a design element which gives compositional unity to the completed painting or drawing. Even when several triangles are combined the eye sees the similarities which supply order rather than chaos. However the companion of repetition is variety. Theme with variation is the key to interesting composition. Variation involves texture, color, size, emphasis and balance. A series of images (shapes, colors,

textures) builds up an all-over pattern. Variety can be expressed by gradual changes such as the gradual changes from one color to another. A gradual color change may be balanced by abrupt change from smooth to more heavily textured surfaces. Repetition and variation create a rhythm or visual groupings that are repeated and the viewer may easily pick out recurring patterns such as triangles, squares, trapezoids, and undefined shapes created by the merging and separation of the basic triangles.

Visual illusions that I have chosen to ignore include the possibility of using linear perspective or overlapping to create an appearance of deep space and offering a distinction between figure and ground. (For example, in a landscape with a tree the tree may be the primary figure supported by sky and earth and water.) I have not ignored positive and negative shapes; however I do strive to treat them equally by giving them nearly equal accommodation on the surface of support. It becomes obvious when viewing these works that the emphasis on depth is shallow allowing the importance of shape, pattern, rhythm, texture, and color to dominate.

The surface quality or texture in these works varies from flat and relatively smooth to rough and scratchy to the touch. Works painted, drawn or printed on paper tend to be smooth and are enhanced visually through color choices. Assemblages on stretched canvas are designed with actual texture taken from nature such as seeds, leaves, flowers, pods, and peelings; as well as modeling compounds, and the addition of papers, Styrofoam and other tactile materials.

Between 1992 and 2000 my artwork was mindful of a block of trees referred to by my father as “the shelterbelt” which stood adjacent to the quarter mile driveway which led to the modernized farmhouse where I lived from infancy until the age of nine. Frequently the series based on the Goldbach conjecture reveals an awareness of landscape. I can effortlessly see similarities to my Shelterbelt series particularly in the pastel drawings that I completed during 1998-2000. The combination of the bare, spiky branches of the hardwoods, the thick needles of the evergreens and the filling in effect of shrubs form a dark valued block in the local rural winter landscape. Basic values and perceived shapes blend and separate with the change of seasons forming a visual abstraction in nature which interests me particularly now because of my newly discovered relationship to my new work.

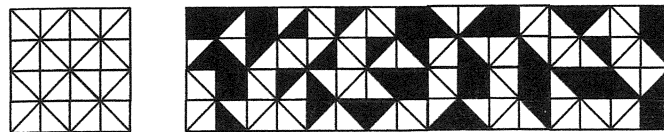


Figure 1: Sample of grid and grid with tilings

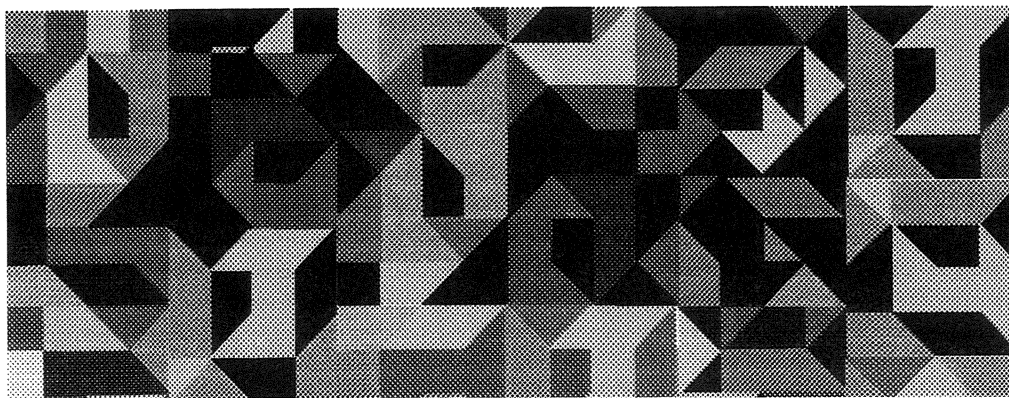


Figure 2: “Goldbach Series”, work on paper