A Digital Tribute to M.C. Escher

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Abstract

This paper aims to show how digital methods provided by computers and digital programs can help us to pay tribute to the masterful methods of non-digital adepts like M.C. Escher and in this case specifically by creating a metamorphosis like what are known as Metamorphosis I, II, and III among Escher's works using the mapping techniques of the fractal program Ultra Fractal.

Introduction

The most important factor in this kind of transforming tessellation is to find definable geometric relations between each two neighboring tiles and keep it across the whole tile work from the beginning to the end. At the first step, the author has applied two mappings called *Semi Regular Tesselation IV* and *Sqaure Limit* on an *Embossed (Julia)* fractal in Ultra Fractal [1] to produce a uniform hexagonal tessellation like Figure 1, the hexagonal unit tile of which shown in Figure 2a. As the morphing path of the tessellation is supposed to be longitudinal, different columns, each of which composed of uniform units, are required to pave the tile sheet from the right to the left step by step (Figures 2b-2f). In order to have the next column in every step, simply a number of the numeric settings of the mapping parameters are changed at constant rates in Ultra Fractal, similarly applied to all steps sequentially.

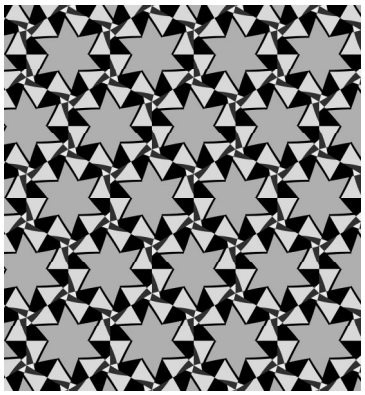

Figure 1: *A uniform hexagonal tessellation created in Ultra Fractal.*

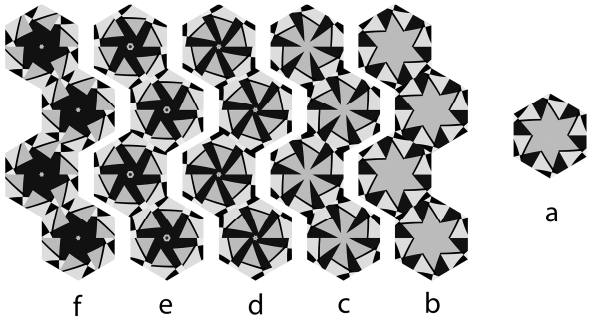

Figure 2: *(a) the very basic constructing unit of the uniform tessellation shown in Figure 1; (b) to (f) the first five vertically zigzag columns provided for the construction of the transforming tessellation.*

Zigzag columns are placed side by side one after another in Adobe Photoshop to come up with a plain transforming tessellation, the final result of which could be seen in Figure 3. The appearance of similar endings on the very left and right sides is indicative of the completion of a thorough cycle of transformation in the applied mapping methods.

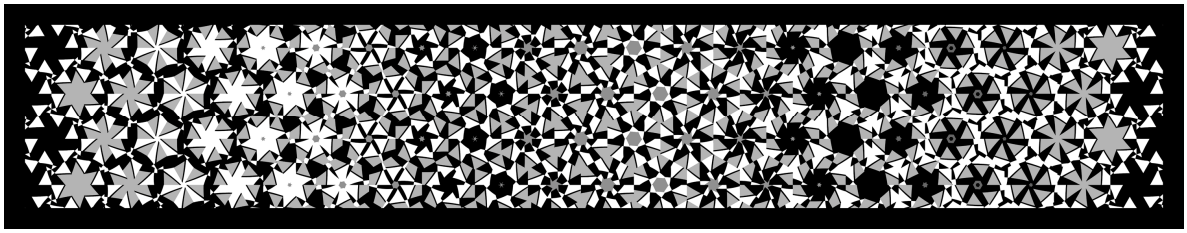

Figure 3: *A transforming tessellation with similar endings on the left and on the right.*

The second phase of work consists of some Photoshop work, using the *threshold* tool to provide a 100% contrast one-color image. Changing the level of threshold, the segregating threshold deciding the conversion of different levels of grays to black or white is specified. Figures 4, 5, and 6 represent the application of three different levels of threshold on our tessellation, which merging sets of tiles enjoying closer darkness or lightness levels, help to have completely different visual results.

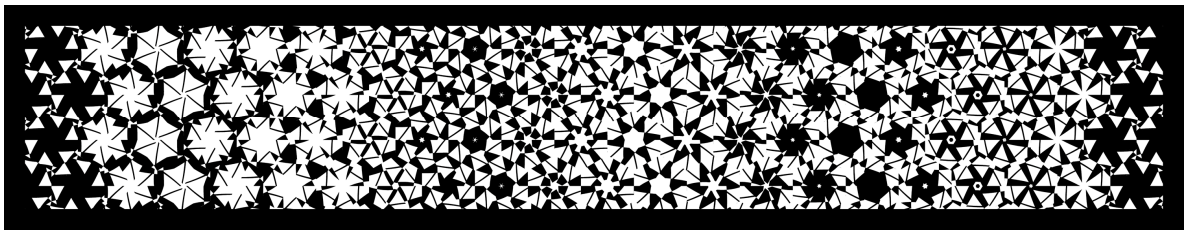

Figure 4: *A photoshopped version of Figure 3 after the application of a certain amount of "threshold".*

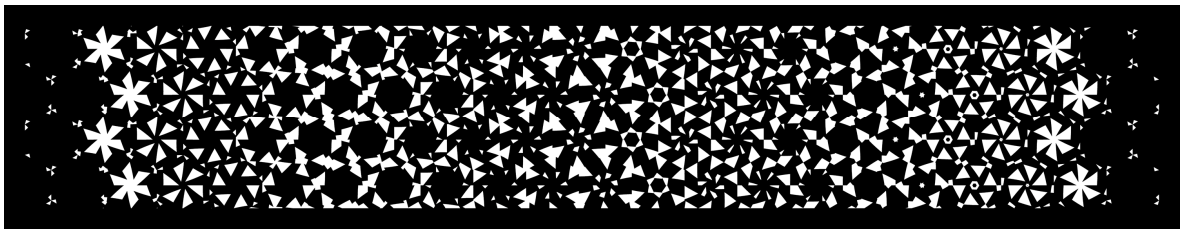

Figure 5: *A photoshopped version of Figure 3 after the application of a certain amount of "threshold".*

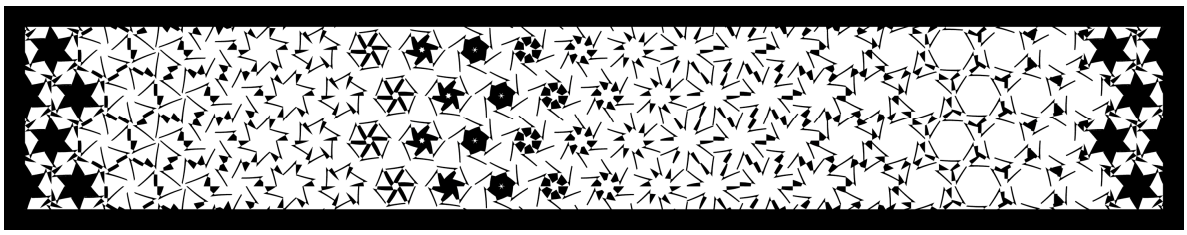

Figure 6: *A photoshopped version of Figure 3 after the application of a certain amount of "threshold".*

These tessellations are only samples of the limitless experiments and possibilities that could be launched through several mapping systems and algorithms existing in programs like Ultra Fractal.

References

[1] F. Slijkerman, http://www.ultrafractal.com/ (as of April. 20, 2013).
[2] Craig S. Kaplan, *Curve Evolution Schemes for Parquet Deformations*, in Proceedings of the Bridges 2010 Conference, edited by George W. Hart & Reza Sarhangi, pp. 95-102, 2010.