Evolving Patterns

The following rugs are experiments in the creation of textiles incorporating “evolving patterns” (note 1). At Azmas Rugs we got involved in making such rugs by chance after Professor Craig S. Kaplan graciously replied to an email expressing interest in weaving “tessellation” rugs in July 2019.

The term “Evolving Patterns” has been proposed for general usage by Professor Kaplan because it is a looser definition than “Parquet Deformations” which is a strictly defined term. That term is used by Professor William S Huff a Professor of Architecture at State University of New York to describe an exercise that he devised for his students in which a tiling pattern changes or evolves **in one direction.**

Douglas Hofstadter has described Parquet Deformations as: A Subtle, Intricate Art Form. (note 2).

Huff did not design any parquet deformations himself. Hofstadter nevertheless credits him with meta-composing hundreds of parquet deformations from his students in the same manner as a conductor elicits a performance from his orchestra. These parquet deformation designs have been archived at the Ulm School of Design and date between 1961 and 1998. Some of the best examples of these designs have reproduced in detail in the recent book Space Tessellations: Experimenting with Parquet Deformations by Werner Van Hoeydonck (note 3).

The rugs below include collaborations with Professor Craig S. Kaplan, David Mrugala and Michael Rowan to each of whom I am grateful. Hopefully there will be additional collaborations that will be completed. I believe that working as a collective has given wider insight into our explorations. We have yet to produce any of Professor Huff’s patterns into rugs but hope we can do so one rug at a time in the not-too-distant future in different constructions such as flatweaves, Sardinian Rugs and handknotteds.

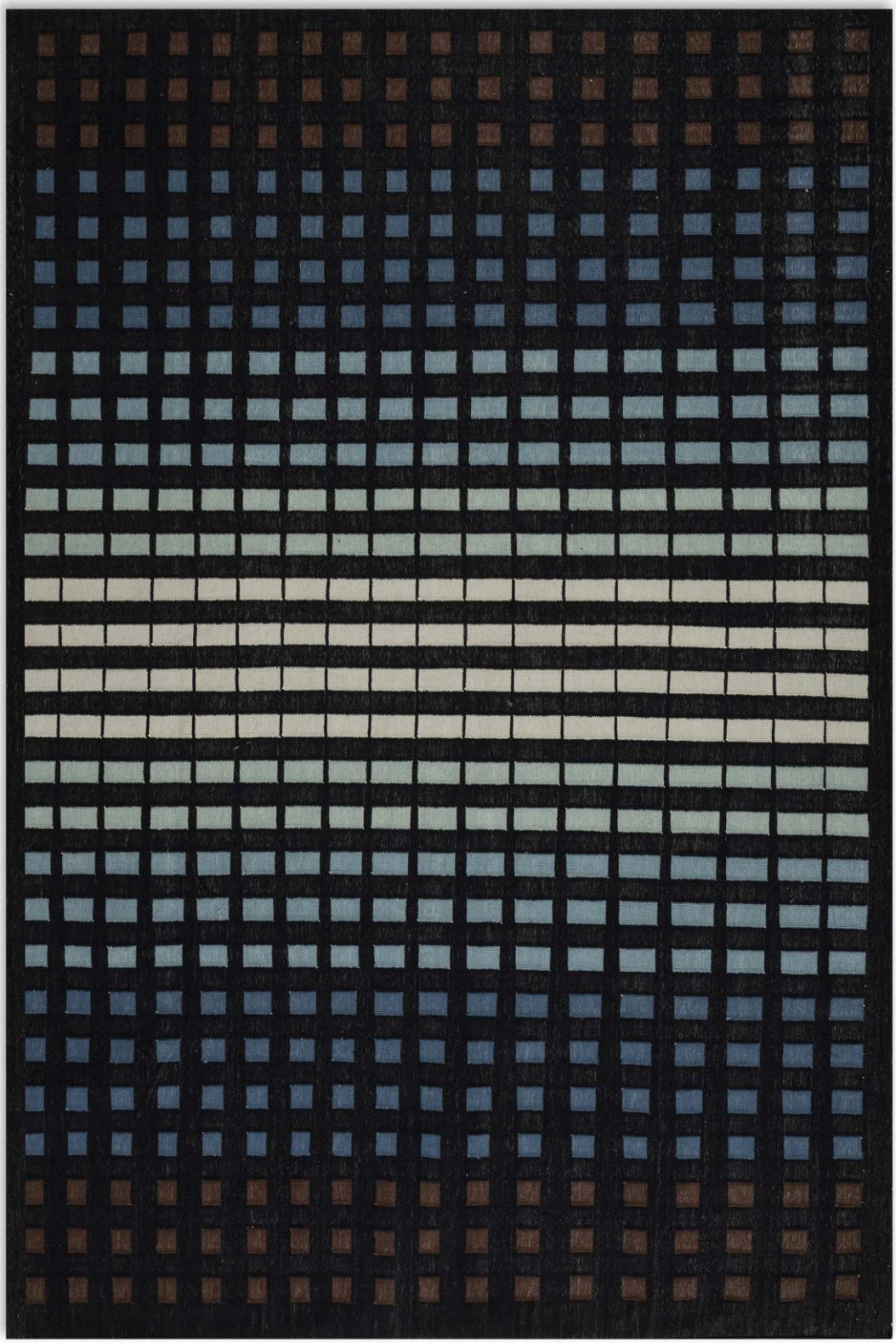
“Evolving patterns” are explorations in the meaning of asymmetry.

Physicists have studied the conditions before the Big Bang and ascertained that before that instant there was almost equal quantities of matter and anti-matter. The reason matter prevailed is due to an asymmetry arising from an elementary particle known as Higgs Boson. (note 4)

Superficially appearances that seem symmetric are in fact asymmetric for example the human face, DNA (which is right handed), the glucose molecule etc.

In nature there are “changes in phase” where component parts of a system are redistributed in new ways.

Developing “evolving patterns” might give us a better sense that our world is not “static and symmetric” but rather dynamic and ever changing.



1. **Oscillation of Grid 0 to 1 (Blue)** Designer: David Mrugala

Oscillation is a property of proportional harmony. This rug expresses this harmony in a repetitive variation between two states, from 0 to 1 and back to 0. This rug captures the movement of varying colors and shapes, always in a constant state of change.

The size of the rectangles shifts according to the algorithm which is based on the sine function.

The ancient art of rug weaving meets 21st century digital design through simple pattern.

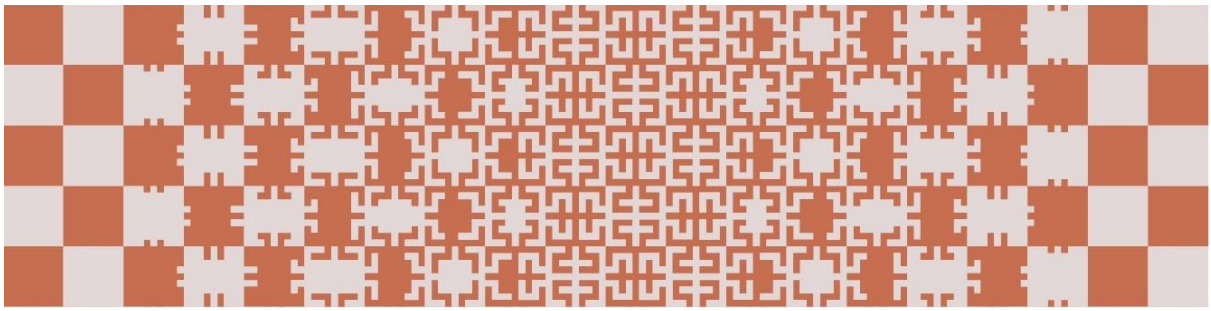
The Designer

David Mrugala is a German practicing architect and currently an Assistant Professor at Konkuk University in Korea. He was born and educated in Germany where he received his Dipl.-Ing. with distinction at the Karlsruhe Institute of Technology. He has worked for several international practices in Germany, India and Thailand where he was responsible for numerous projects in architecture, urban planning, and landscape architecture.

David believes that the ancient art of rug weaving can be transformed using 21st Century digital design using simple pattern. The three rugs that he has designed might well be the beginning of this process.

2. Grid by Kaplan

Professor Craig S Kaplan at the University of Waterloo has explored parquet deformation in the square format of Laves tiling (4.4.4.4) to create maze-like patterns:



The squares of the tiling are each divided into finer grids and at each evolutionary step the edge shape shifts to enclose and liberate one grid cell. Hofstadter refers to deforming the path by "introducing a 'bump' or 'pimple' or 'tooth' whereas Kaplan refers to this a "grid-based' evolution.

Space Tessellations: Experimenting with Parquet Deformations p 115.

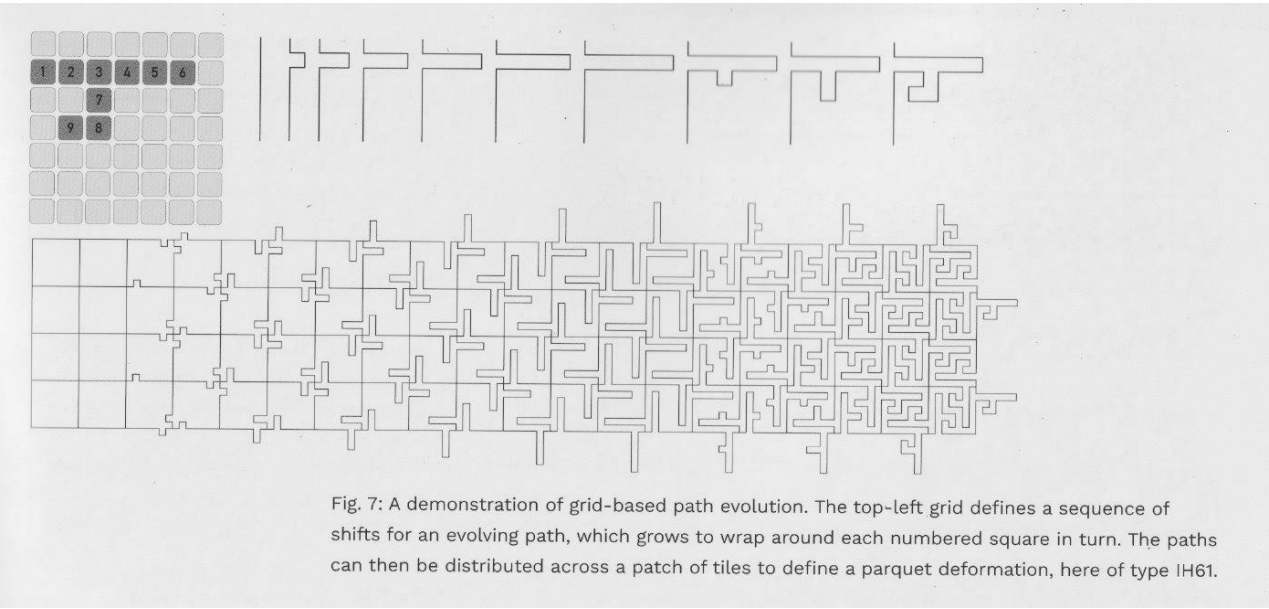


Fig. 7: A demonstration of grid-based path evolution. The top-left grid defines a sequence of shifts for an evolving path, which grows to wrap around each numbered square in turn. The paths can then be distributed across a patch of tiles to define a parquet deformation, here of type IH61.

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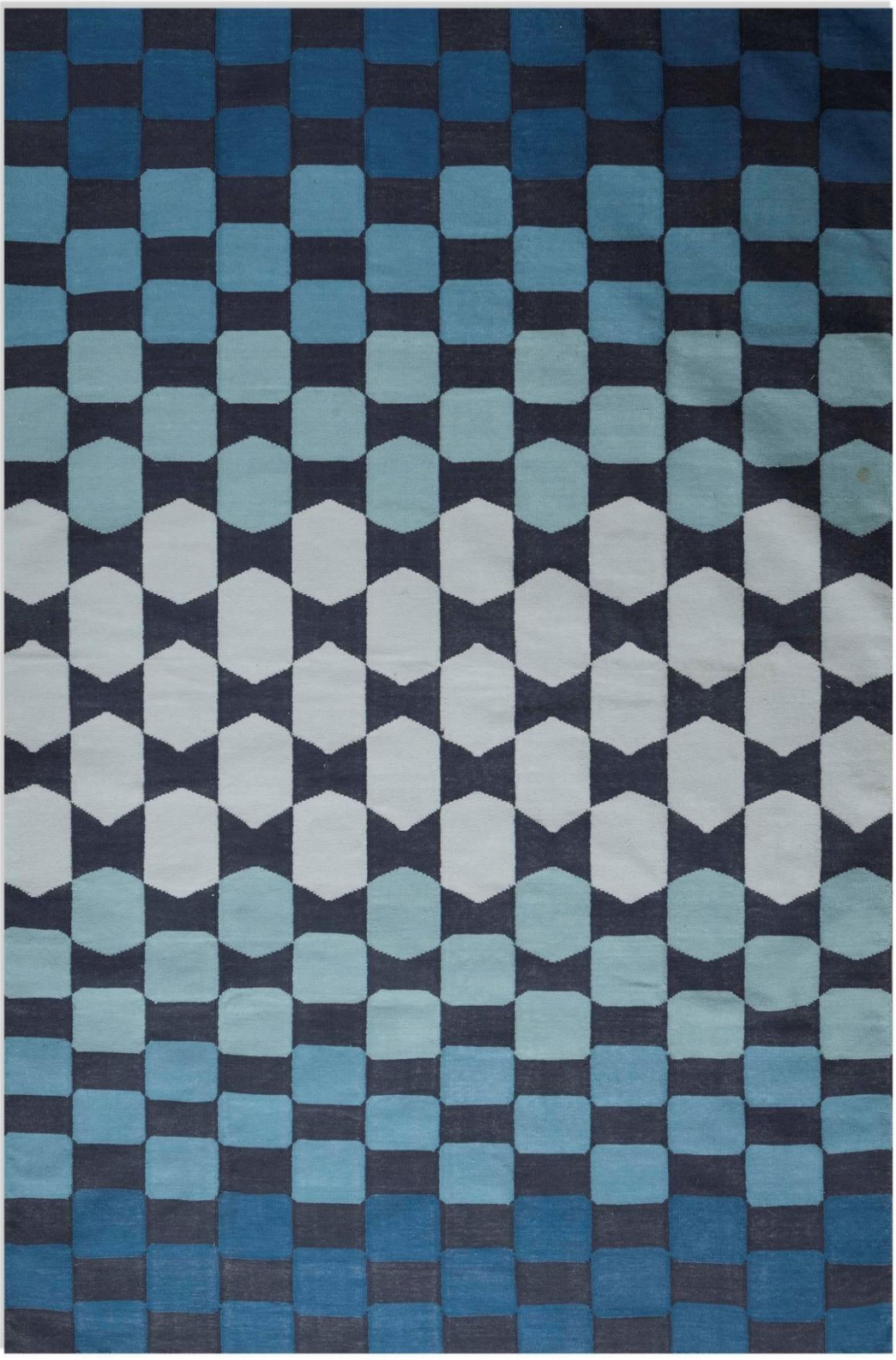


DESIGN NO CD 2065 COTTON YARN 5x7 FEET

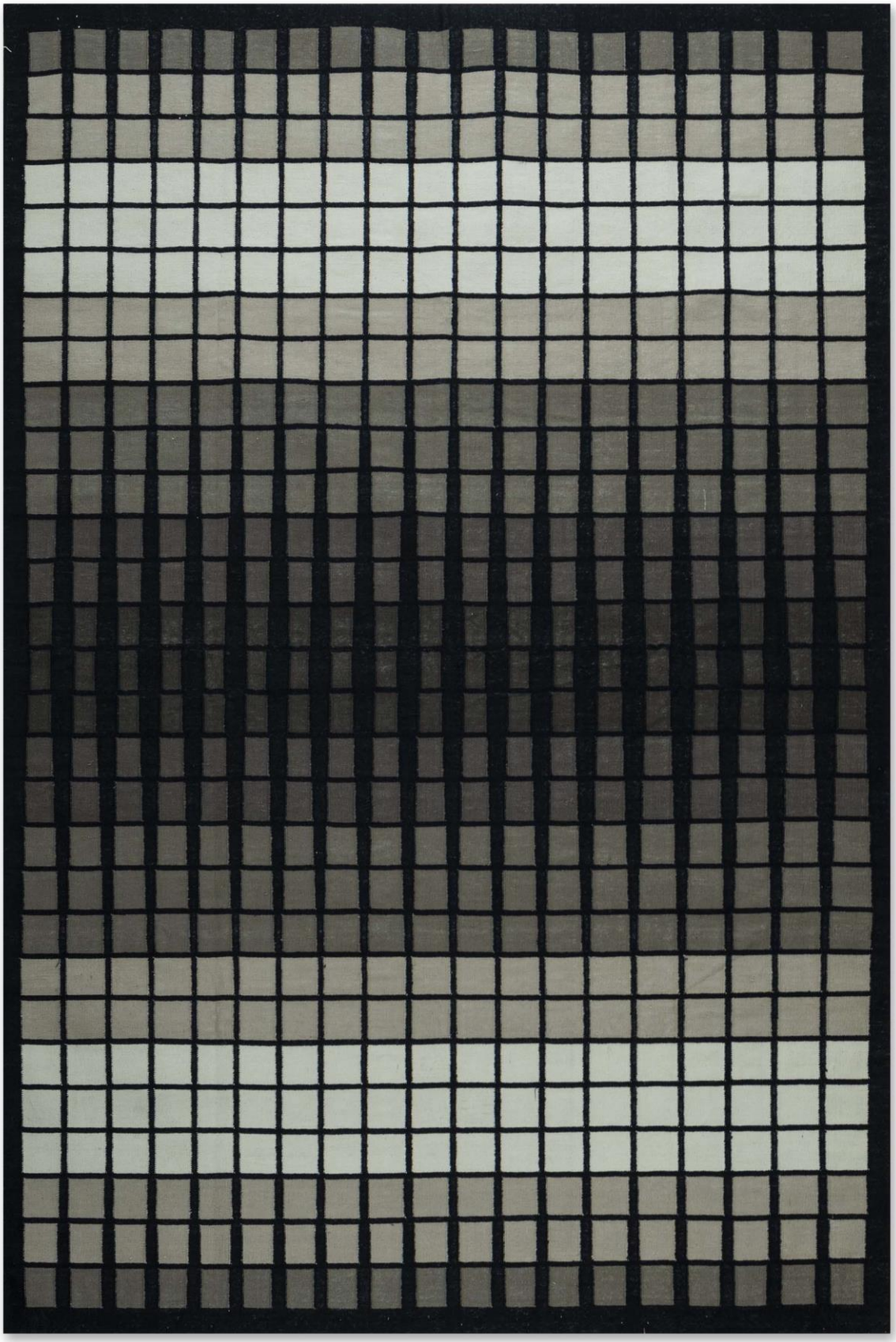
3. Shapeshifter by Michael Rowan

The is similarity in the shapes at both ends: squares and rectangles but it is unclear which is figure and which is ground. The blue squares evolve into and its light blue hexagonal lozenges in the center whereas the black rectangles evolve into bow ties in the center.

This could be a mediative pattern with the sharper lozenges denoting a more discerning awareness whereas the squares and rectangles could symbolize conceptual thoughts appearing, becoming more defined and then moving away over the upper edge.

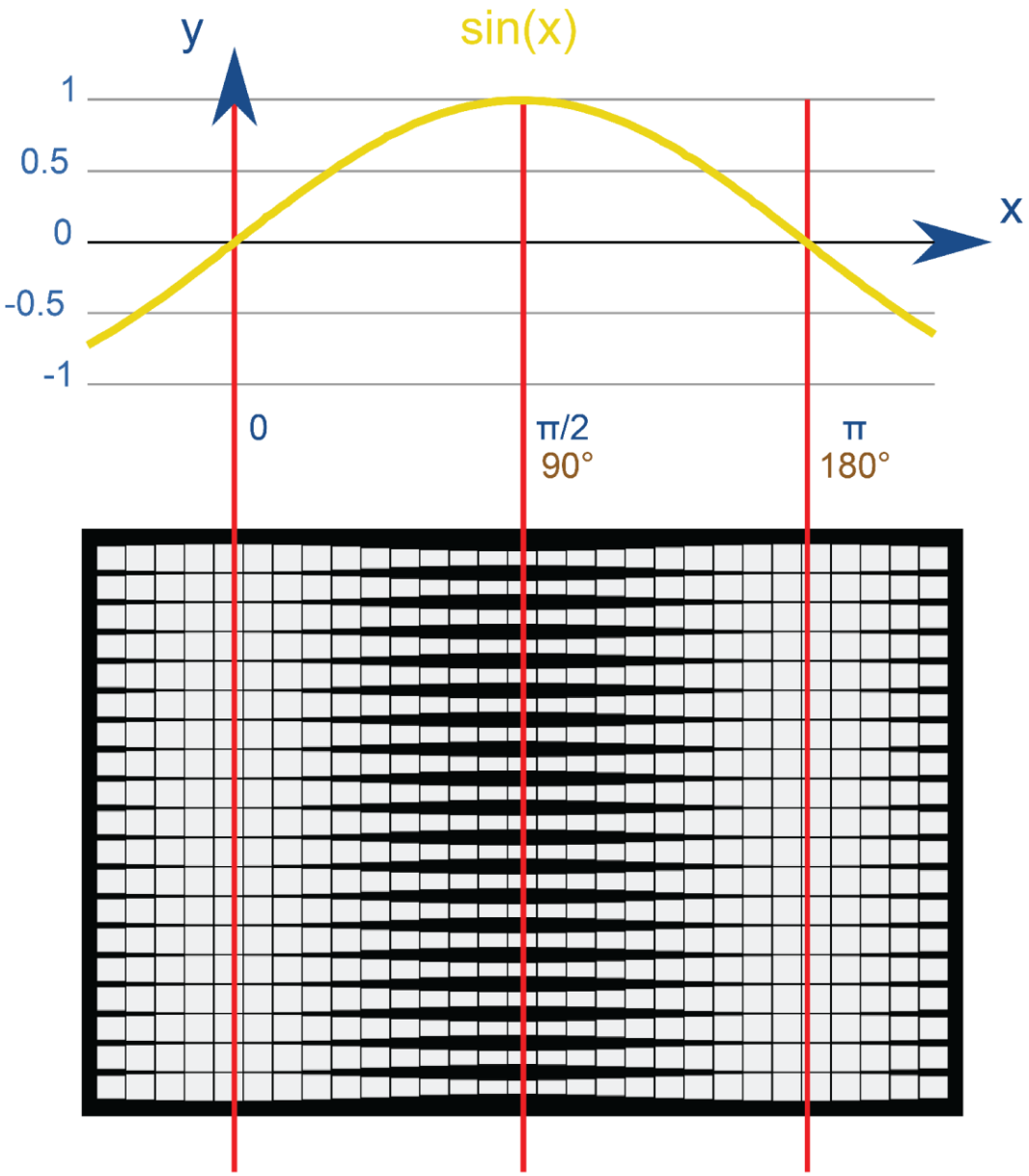
The Designer

While studying Nuclear Physics at Harvard Michael created mathematically-inspired drawings based on fractals, Parquet deformations and impossible shapes (note 5). He has generously allowed us to reproduce his patterns as weavings.



4. Oscillation of Grid 1 to 0 (Beige) by David Mrugala

Below is an illustration of how the above rug pattern evolves in tandem with the Sine function.



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5. **Hooked Hex by Professor Craig Kaplan**

Professor Kaplan has created a Kelim pattern designer (note 6). This is an earlier exploration by this leading computer scientist in this area of pattern design.

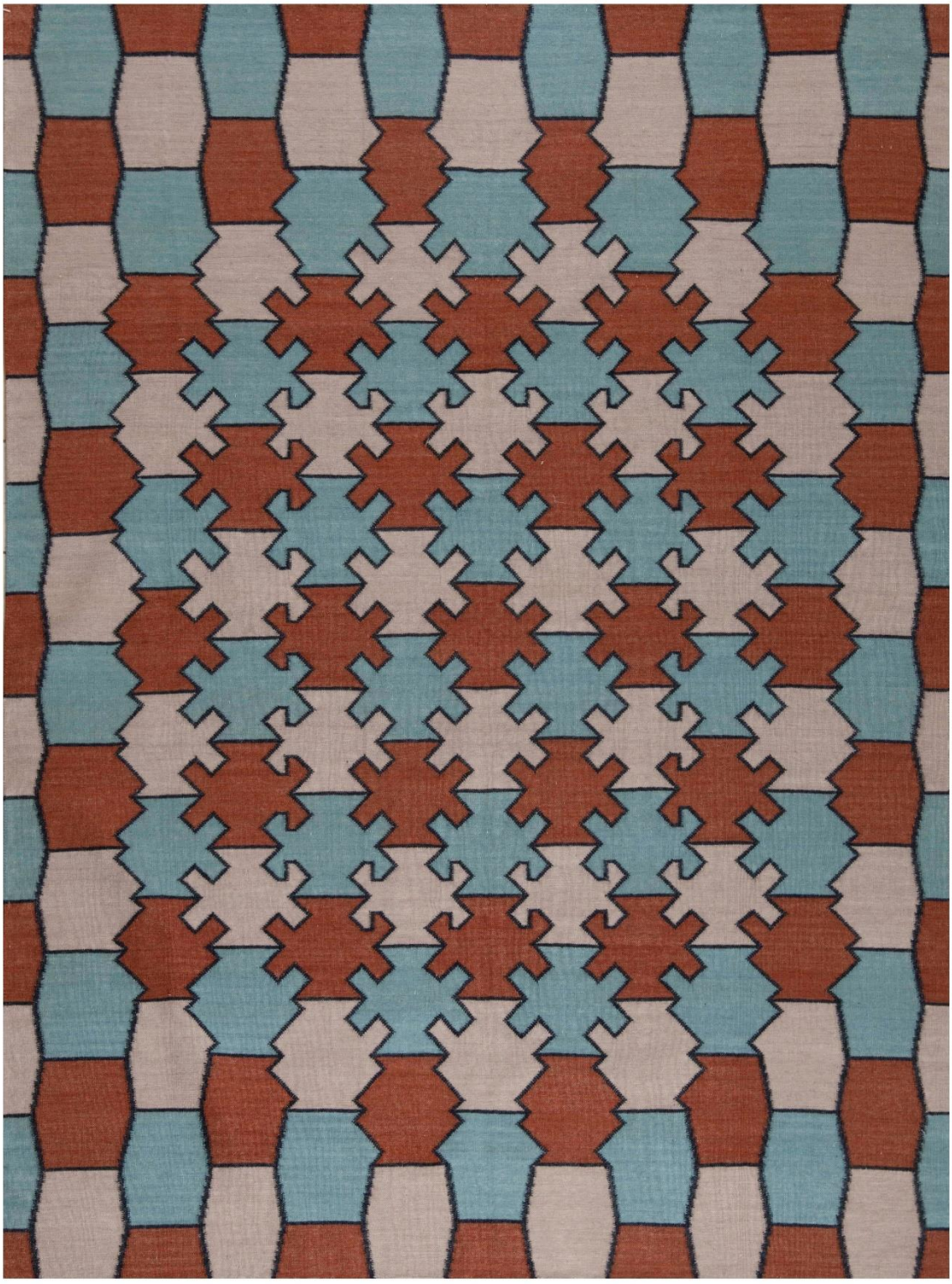
The Designer

Professor Craig S. Kaplan is an Associate Professor in Computer Science at the University of Waterloo with an interest in a range of interdisciplinary topics.

At the forefront of parquet deformation research, he is chiefly concerned with the interactions between mathematics and art. Coalescing his knowledge of computer graphics, classical and computational geometry, graph theory, and tiling theory, he creates tools and algorithms that generate ornamental patterns.

Topics explored by Professor Kaplan in the past include: the art of M.C. Escher, particularly his regular divisions of the plane; the mathematical structure and generation of Islamic geometric patterns; black-and-white line art, especially mazes and labyrinths; traditional Chinese and European papercutting; and graphic design based on calligraphy.

Professor Kaplan has also conducted research and maintains interests in human-computer interaction, computational geometry (including computational aspects of tiling theory) and programming language design.



DESIGN WD 42 WOOLLEN YARN 5x7 FEET

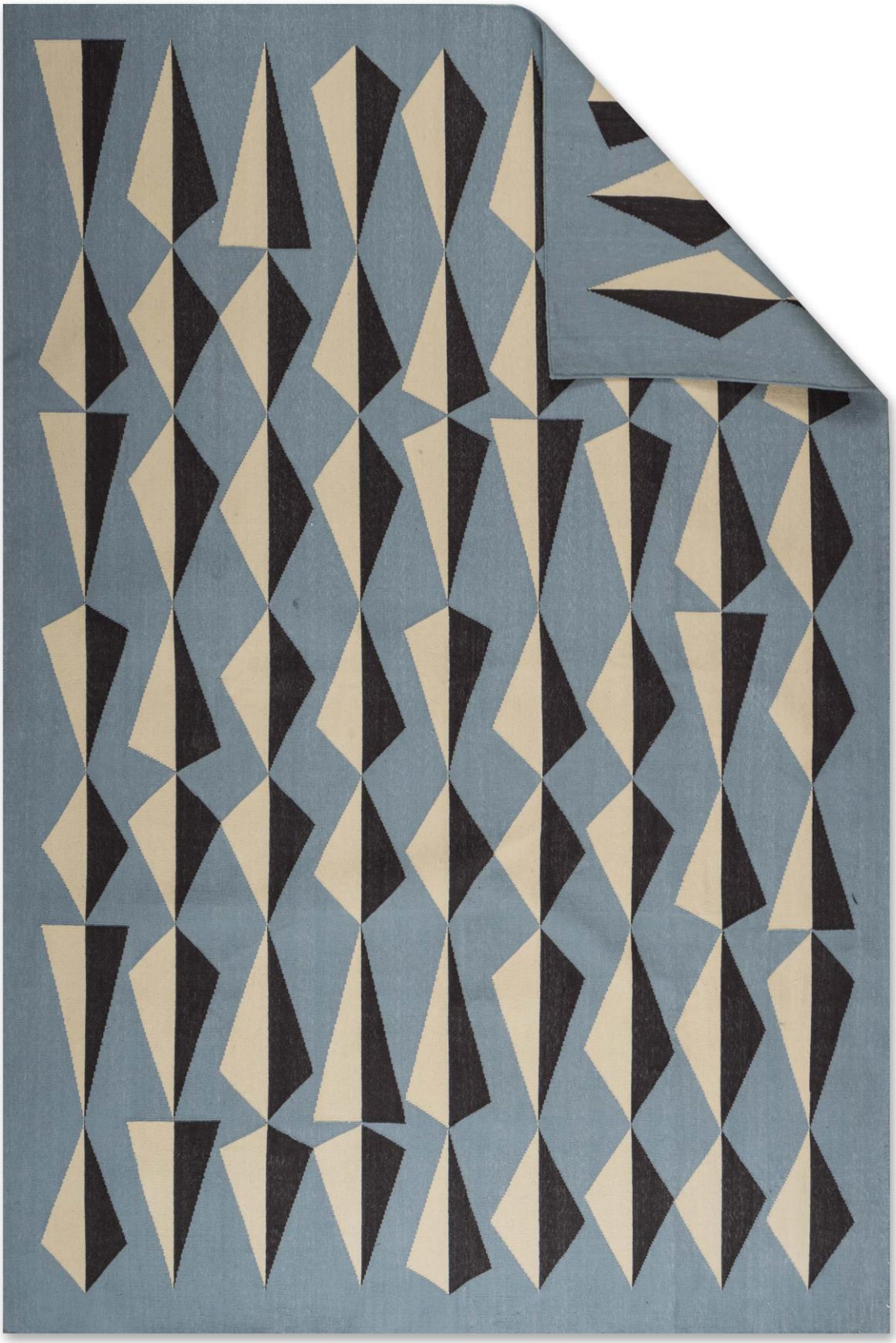
6. The Shape of Fortuity

Fortuity: Triangle

Fortuity is a state of being controlled by chance rather than design. This rug is both, design and chance that is embodied in a grid of triangles and similarity. Each work is made with a computer algorithm and always unique and never the same.

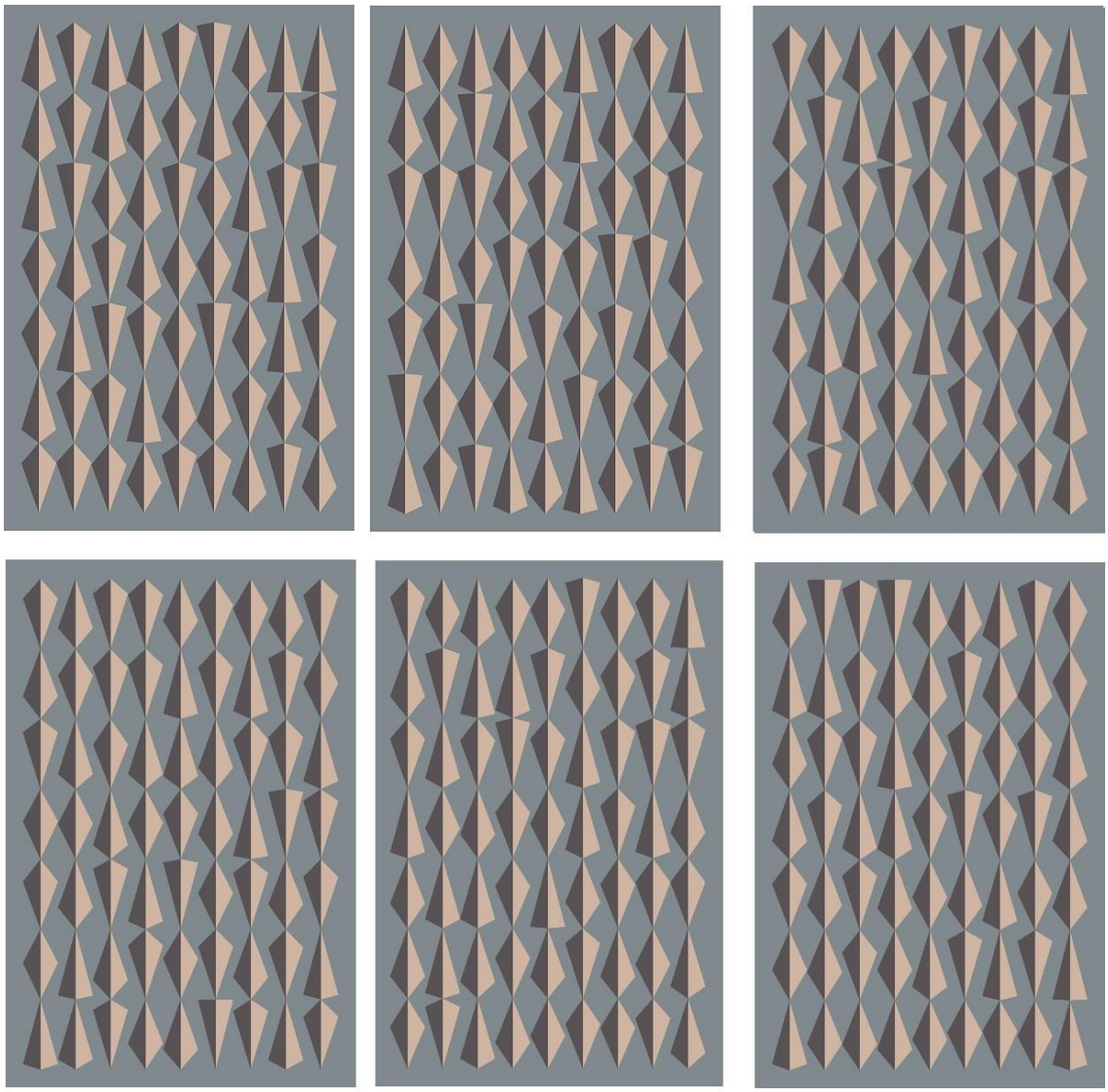
We are really excited to be collaborating with David Mrugala, a German architect, intermedia artist and educator. Is this not fortuitous?

He is the founder of “thedotisblack” (note 7) , a platform and an archive for research design on generative drawings made with algorithms.



An oft cited quote of Marshall McLuhan is that “the medium is the message”.

The pattern here does not tessellate **within** the rug. It is the rug **itself** that is part of an evolving pattern.



By way of example above are six variations. Most of the variations are noticeable near the top right. The algorithm for the design enables it to be changed infinitely.

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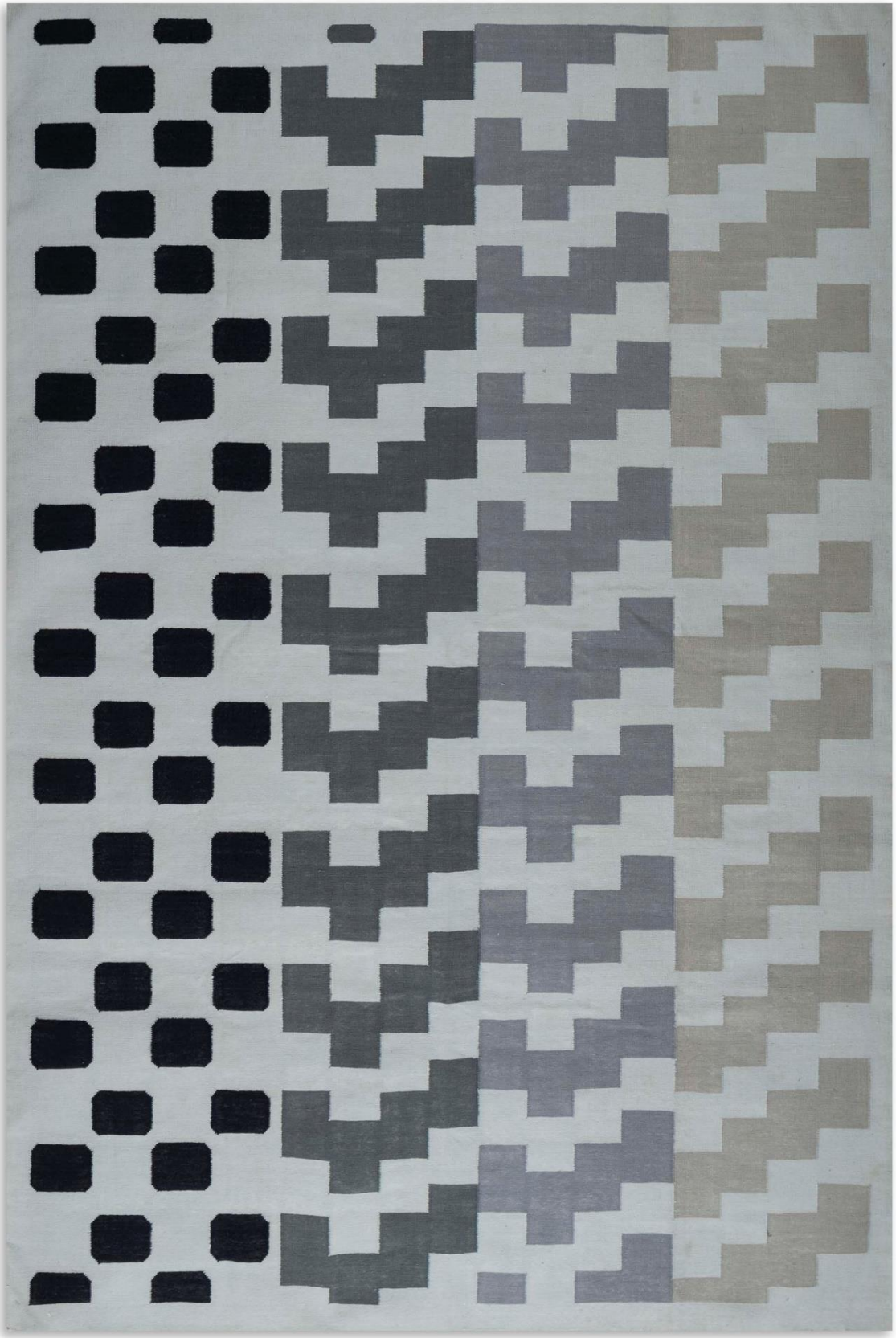
7. Homage to Gee's Bend

We see some similarity between quilt making and carpet weaving: the need to preserve a traditional craft and keep it alive so that quilters and weavers gain an income based on a skill that has great value for enthusiasts and collectors. We saw this quilt by Essie B. Petway and noted it's patterning that is dynamic rather than static:

The following design evolved from this source of inspiration:

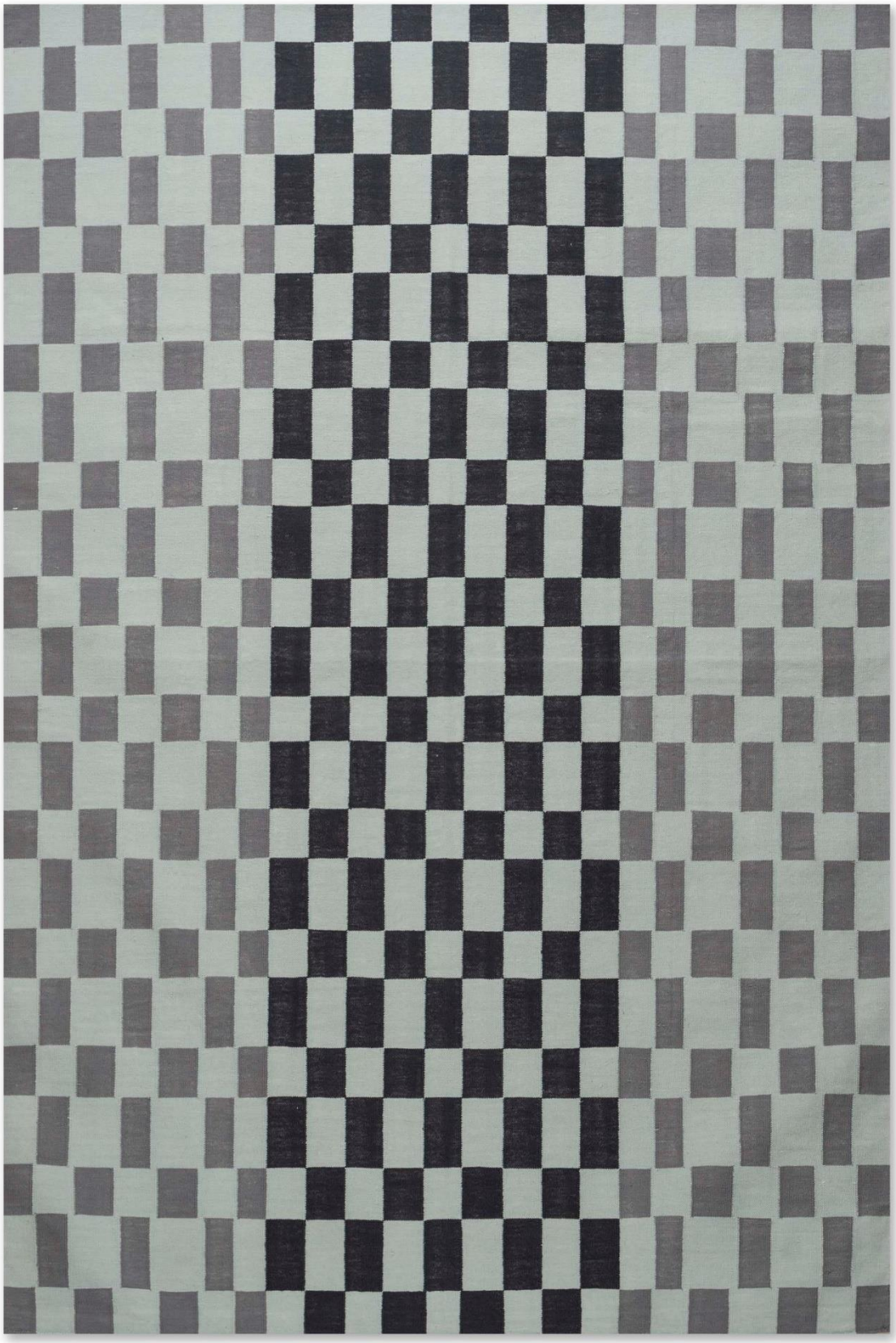


8. **Wabi Sabi**

The figure and ground are indistinct. The rectangles and square-like shapes evolve gradually. There is a slight fattening towards the center. The figure is in two common tones of brown with the darker tone in the center.

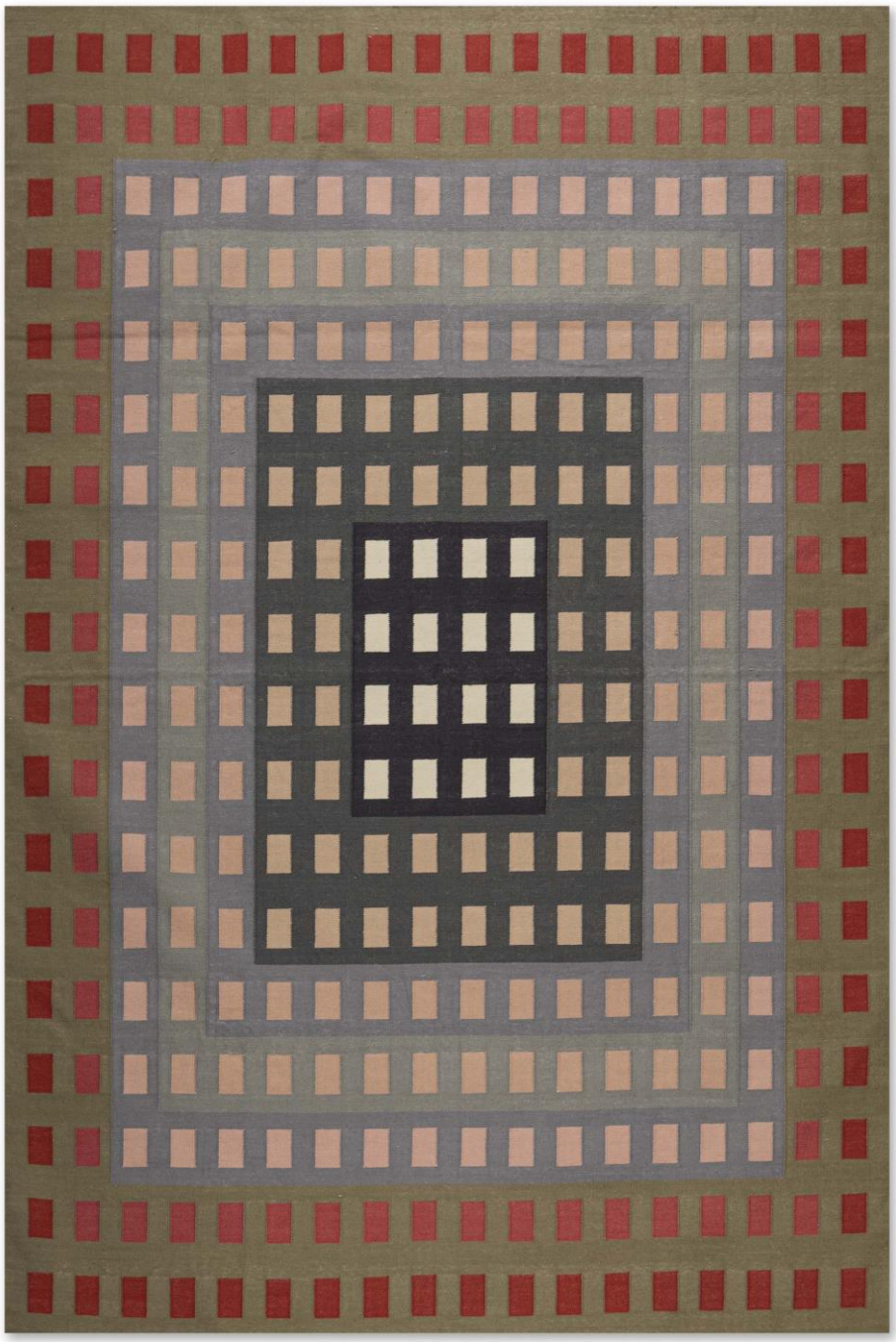
The Designer

With a career that spans over three decades in the business of interiors, Azmi Merican is well-versed in beautifying spaces. A devout scholar of textiles, ancient and modern, he is usually found behind a pile of esoteric literature.



DESIGN NO CD 2060 COTTON YARN 5x7 FEET

9. **Conflicting Color Cues**
   This a not a parquet deformation but a related study in depth perception due to color change.



Azmas Rugs

22 August 2022

References

Note 1 Page 57 of Space Tessellations: Experimenting with Parquet Deformations

Note 2 Now reproduced in Chapter 4 of Space Tessellations

Note 3

Space Tessellations: Experimenting with Parquet Deformations

by Werner van Hoeydonck (Editor), Christian Kern (Editor), Eva Sommeregger (Editor)

ISBN-13: 9783035625172
Publisher Birkhauser

Note 4 Lucifers Legacy. The meaning of asymmetry. Frank Close ISBN 0-19-866267-X

Note 5

See https://scholar.harvard.edu/mrowan/misc

Note 6

https://isohedral.ca/other/Kilim/

Note 7

https://thedotisblack.com/

Contact person: Azmi Merican

e-mail azmi.merican@gmail.com