



Fractal Findings

Mohawk Group | Believe in Better™

Mohawk Group
160 South Industrial Blvd.
Calhoun, GA. 30701
800.554.6637
mohawkgroup.com

Mohawk Group



With the ever-increasing stresses on students and teachers, creating school environments that provide calm, comfort, and healing is more important than ever. One powerful solution is to integrate nature's fractal patterns. Natural fractals are scientifically proven to reduce stress, enhance cognition, and promote feelings of calmness. Developed through our collaboration with 13&9 Design, Fractals Research, and PBK, the Fractal Findings modular carpet collection is inspired by nature's fractal patterns. Explore the fascinating science behind fractals and learn how the collection can enhance engagement, focus, and comfort, transforming student experiences for the better.

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Collaborators

Mohawk believes in the transformative power of design to improve student well-being and educational outcomes. Through strategic partnerships and cutting-edge research, we are redefining learning environments to foster wellness, creativity, and focus.

Arch. Martin Lesjak and Dr. Med. Univ. Anastasija Lesjak

Co-Founders of 13&9 Design and ScienceDesignLab

Award-winning product design studio 13&9 continues their partnership with Mohawk Group to create fractal patterns for this collection that enhance spaces and promote mental health, productivity, and well-being in learning environments. Together with Prof. Dr. Richard Taylor, they founded ScienceDesignLab to develop stress-reducing designs for interior and exterior applications.



Dr. Richard Taylor

Professor of Physics, Psychology, and Art / Head,
Department of Physics, University of Oregon
Director of Fractals Research and Co-Founder of ScienceDesignLab

With more than 350 scientific publications, Dr. Richard Taylor is a pioneer in fractals research. In his work with ScienceDesignLab, Richard contributes his expertise to create visually stimulating patterns proven to enhance well-being and cognition.



Melissa Turnbaugh

Senior Principal, Firmwide Pre-K-12 Market Leader, PBK

In her role at PBK, Melissa Turnbaugh serves as a resource and advocate for research-based, student-centered, and purpose-driven learning environments. Through a partnership with PBK on the Fractal Findings collection, Mohawk Group draws on Melissa's expertise in educational architecture to ensure the designs meet both aesthetic and functional needs for diverse learning environments.





Biophilic Design & Fractals

To tap into the benefits of our innate affinity with nature, biophilic design incorporates fractals: natural patterns that repeat at different magnifications, like tree branches and cloud edges. Over the course of 600 million years, our eyes have evolved to recognize and respond to the visual complexity of fractals. Viewing them induces a unique balance of physical and mental benefits that artificial patterns cannot replicate

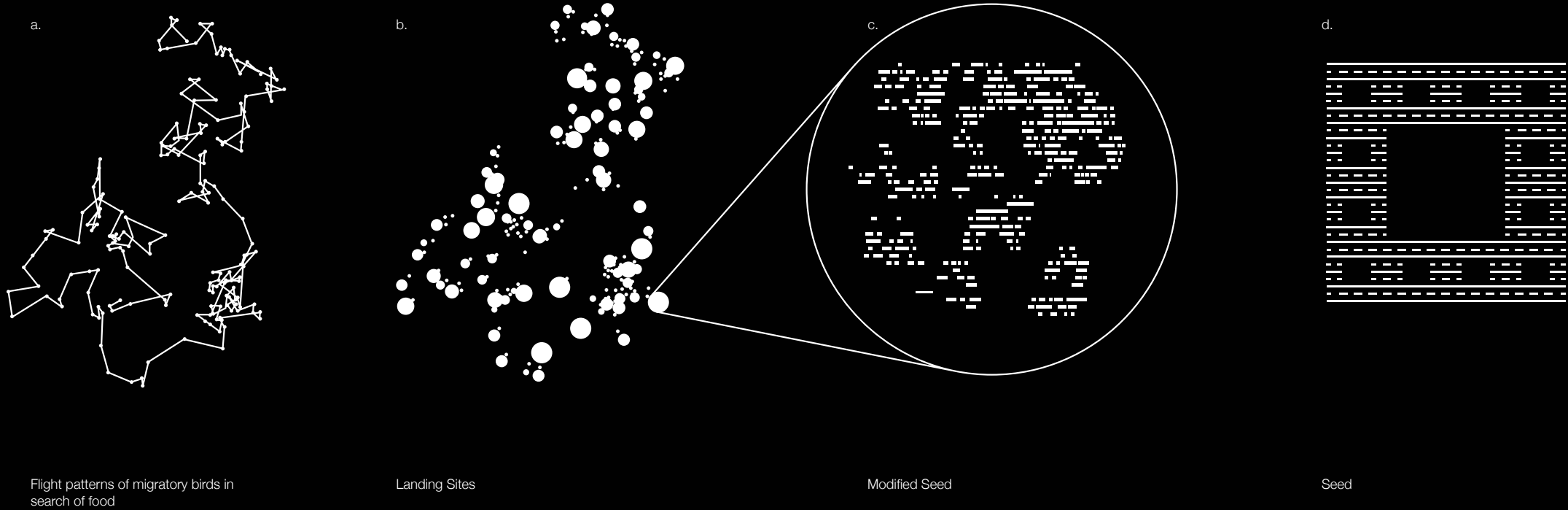
Fractal complexity is measured on a scale between $D = 1.1$ (low complexity) and $D = 1.9$ (high complexity). Our brains easily process mid-complexity fractals (mid-D values), creating a “fractal fluency” that relaxes and stimulates us simultaneously.

This neuro-aesthetic balance benefits everyone and can be tailored for neurodiversity by selecting optimal D values based on occupants’ needs. Mid-D fractals, like those in the Fractal Findings collection, are especially suited for environments such as learning spaces, promoting comfort and focus through their harmonious visual properties.



How Fractal Patterns Are Generated

The Fractal Findings patterns, part of the Fractal Library developed by ScienceDesignLab, use advanced algorithms to create biophilic designs. exploredD adapts natural fractals, like ice patterns, while discoverD generates new fractals through a Growing Fractals process inspired by animal foraging paths. Seeds are placed along these paths, refined for aesthetics, and tuned for fractal complexity (D value). Patterns are optimized for tiling and materials like carpet or LVT, blending artistic creativity and scientific precision to deliver human-centered, nature-inspired designs.



Fractals and Well-Being

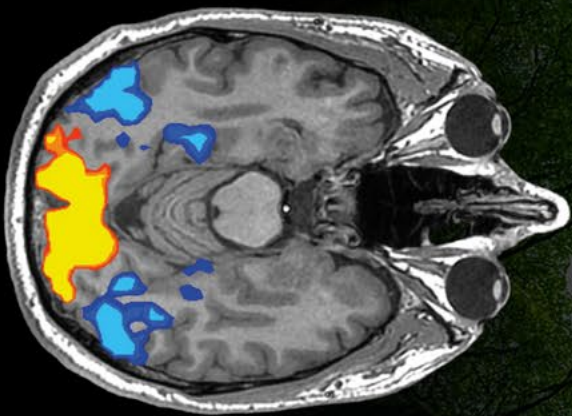
Building on 25 years of research, MRI studies show that the brain engages specific regions when processing fractal designs. Exposure to mid-complexity fractals enhances cognition and reduces stress by 60%.

Stress reduction promotes health by lowering heart rate, blood pressure, and muscle tension—helping prevent stress-related issues like anxiety, heart problems, and weakened immunity.

Inspired by “nature’s fingerprint,” Fractal Findings reconnects people with the health benefits of biophilic design. While our ancestors enjoyed daily “fractal bathing” in nature, today we spend 92% of our time indoors, with six in ten people

finding this a major source of stress. In educational settings, fractal patterns reduce stress, enhance focus, and improve cognition, fostering well-being while transforming spaces into productive, nature-inspired havens.

fMRI imaging shows that viewing fractals activates key regions of the brain, enhancing focus and reducing stress. Integrating mid-complexity fractal patterns into interior spaces taps into the brain’s natural wiring to boost cognitive engagement and well-being.



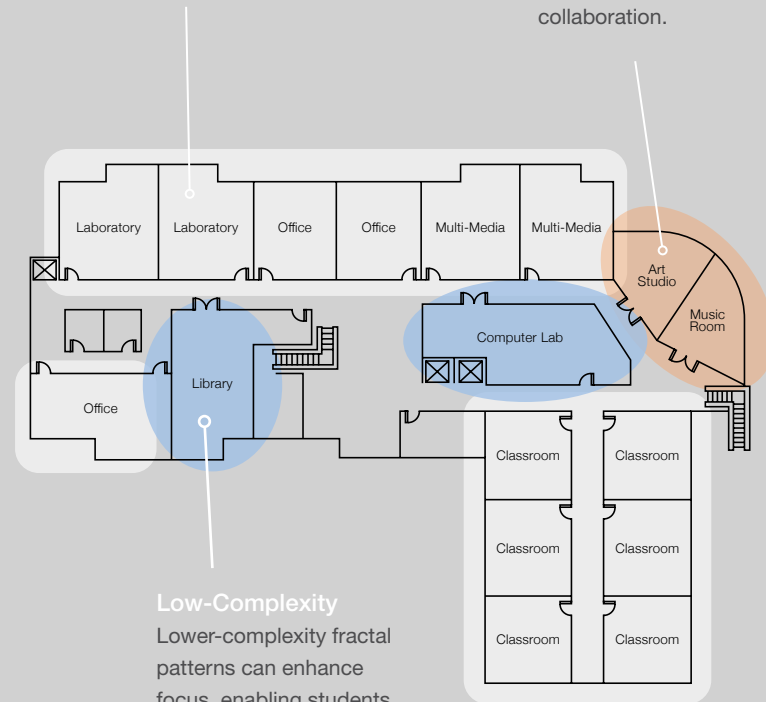


Application in Educational Environments

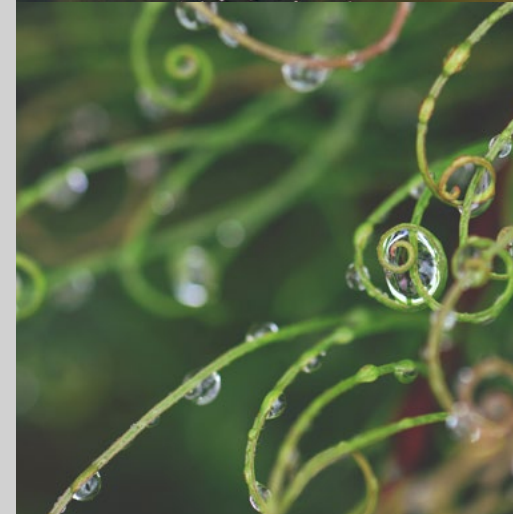
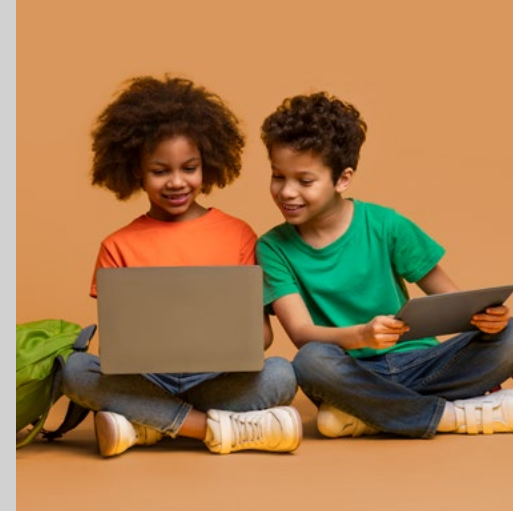
Classrooms featuring fractal designs on floors, walls, or furnishings can provide a neuro-aesthetic balance of stimulation and relaxation. Fractals in the mid-complexity range ($D = 1.35$ to 1.63), as leveraged in the patterns for Finding Fractals modular carpet, are proven to foster focus, creativity, and engagement—qualities essential for cultivating a productive and supportive educational spaces.

Mid-Complexity
Mid-complexity fractals in study areas creates calming zones that support focused learning

Higher-Complexity
Higher-complexity patterns in collaborative spaces encourage stimulation, interaction, and dynamic collaboration.

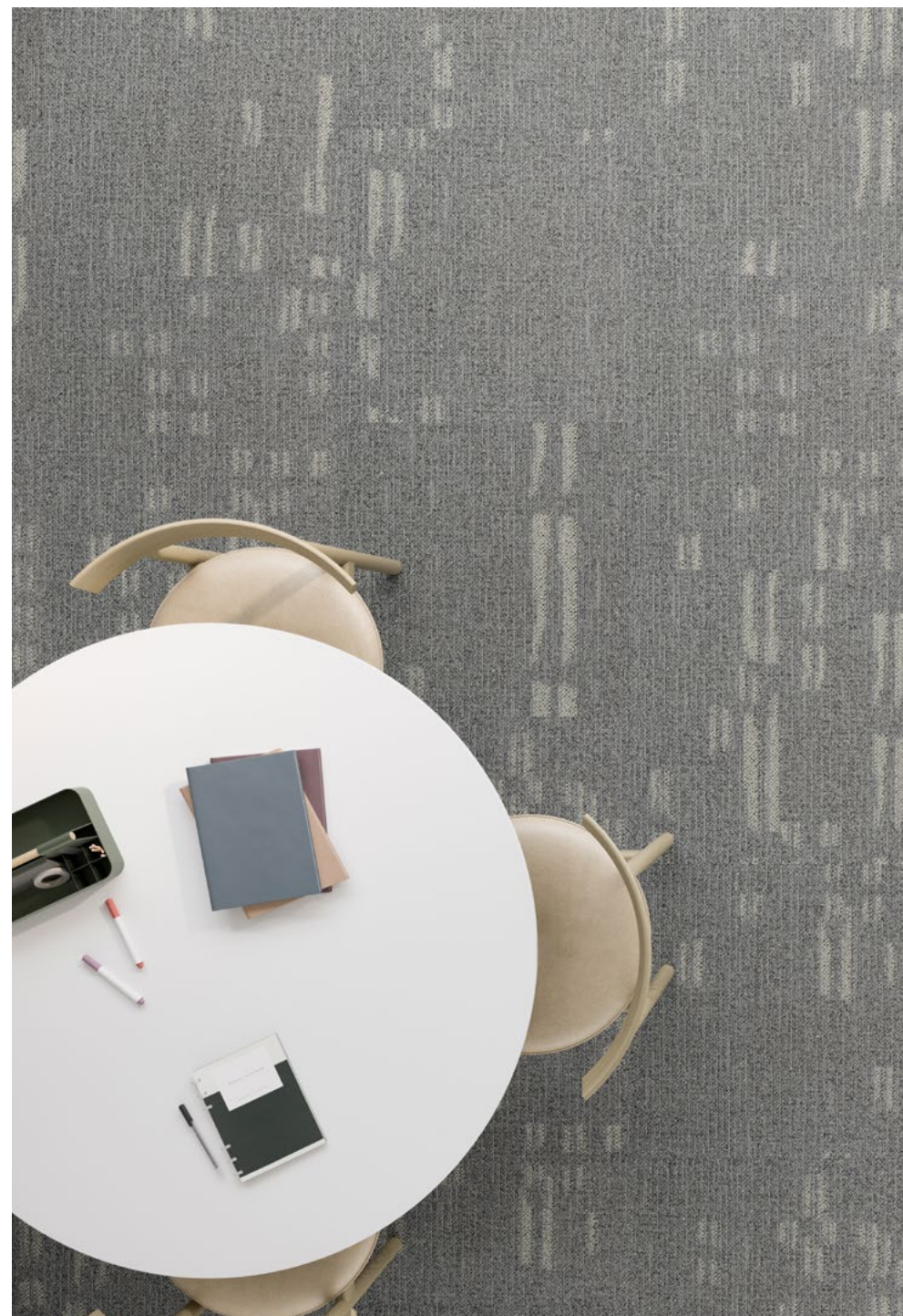


Low-Complexity
Lower-complexity fractal patterns can enhance focus, enabling students to engage more deeply with their work and supporting their capacity for quiet reflection.



In collaboration with PBK, we developed a purposeful palette as well, introducing soothing greens, inspiring blues, and warm tones that can help boost collaboration, supporting design flexibility to meet the needs of diverse learners and educators.





discoverD

discoverD creates a softly linear fractal pattern derived from animal tracks in the wild. Animal migratory paths play a crucial role in maintaining the balance of nature, biodiversity, and providing benefits to humans. These paths, followed by birds, mammals, and insects are integral to the health of ecosystems and contribute to biodiversity, food security through pollination and seed dispersal, and the environment.

24" x 24" Carpet Tile | 12 Colorways

discoverD, 827 Snow Dome
Vertical Ashlar

discoverD, 975 Raven
Vertical Ashlar







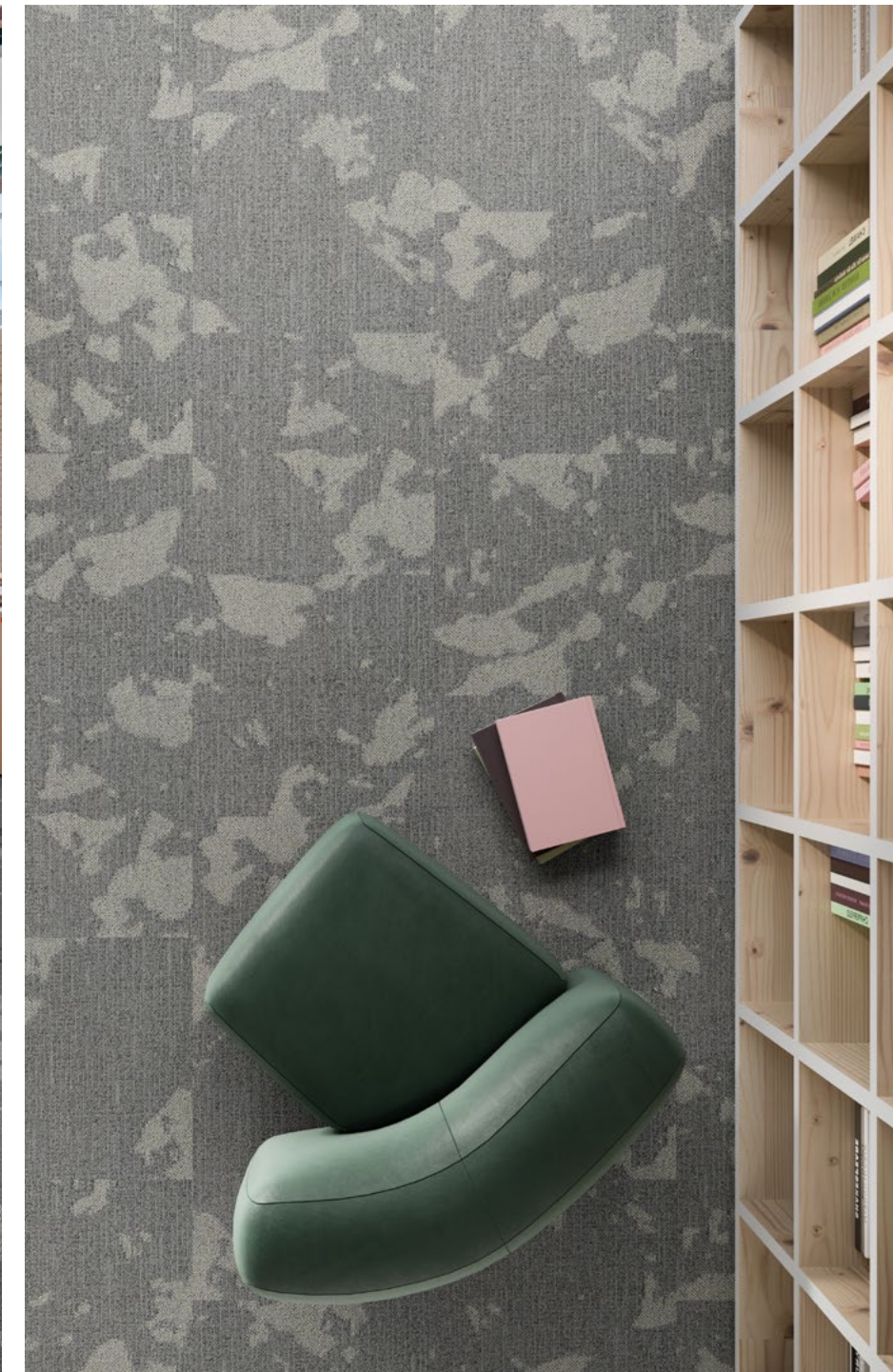
exploreD

exploreD maps out a dynamic fractal visual of fractured planes of sea ice that float in polar oceans. Preserving sea ice is crucial for maintaining the health of Earth's climate, ecosystems, and human communities. Sea ice plays a vital role in regulating temperature, supporting biodiversity, and influencing global weather patterns.

24" x 24" Carpet Tile | 12 Colorways

exploreD, 973 Bear Paw, 977 Beluga
Vertical Ashlar

exploreD, 857 Silverthrone
Vertical Ashlar





exploreD showcases Morphing Fractals, a process that transforms natural fractals by adapting the fractal characteristics of nature photography—in this case, ice patterns.



Relaxing Floors: Fractal Fluency for the Built Environment

J.H. Smith, C. Rowland, S. Moslehi, R.P. Taylor, A. Lesjak, M. Lesjak, S. Stadlober, L. Lee, J. Dettmar, M. Page and J. Himes, Published: The Journal of Nonlinear Dynamics, Psychology, and Life Sciences, 24, 127-141 (2020)



The Potential of Biophilic Fractal Designs to Promote Health and Performance: A Review of Experiments and Applications

R.P. Taylor, Published: Journal of Sustainability Special Issue “Architecture and Salutogenesis: Beyond Indoor Environmental Quality,” 13, 823 (2021)



Aesthetics and Psychological Effects of Fractal Based Design

K.E. Robles, M. Roberts, C. Viengkham, J.H. Smith, C. Rowland, S. Moslehi, S. Stadlober, A. Lesjak, M. Lesjak, R.P. Taylor, B. Spehar and M.E. Sereno, Published: Frontiers in Psychology, Environmental Psychology, Research Topic “Biophilic Design Rationale: Theory, Methods, and Applications,” 12, 699962 (2021)



Fractal Fluency: Processing of Fractal Stimuli Across Sight, Sound, and Touch

R.P. Taylor, C. Viengkham, J.H. Smith, C. Rowland, S. Moslehi, S. Stadlober, A. Lesjak, M. Lesjak and B. Spehar, A. Di Ieva (ed.), The Fractal Geometry of the Brain, Advances in Neurobiology, 36, 907-934 (2024)



A Guide to Fractal Fluency: Designing Biophilic Art and Architecture to Promote Occupants' Health and Performance

R.P. Taylor, A. Lesjak and M. Lesjak, chapter to be published in The Handbook of Neuroscience and Architecture, 2025 by Routledge

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