Manfred Mohr

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***Liquid Symmetry,* Manfred Mohr**
September 6–October 15, 2022

Opening reception: Friday, September 9, 6–8 PM
Gallery hours: Tuesday–Saturday: 11 AM–6 PM

Manfred Mohr utilizes algorithms to engage rational aesthetics, a practice that invites logic to produce visual outcomes. While his career spans over sixty years, the intricacy of Mohr's work with algorithms has only increased over the decades. *Liquid Symmetry*, the title of this exhibition and the artist's latest work phase, contextualizes Mohr's relationship to generative procedures, grounding pieces from 2021–2022 with both historical hand-drawn (1969) and plotter-drawn computer generated compositions. Exhibited works showcase Mohr's generative procedures through custom software installations, aluminum reliefs, printed triptychs, and drawings on paper.

As a true pioneer of digital art, Mohr has written algorithms since 1969. The artist's algorithms, which he references as rules with a beginning and end, are built from imposed and random selection principles deemed as "aesthetical-filters" used to construct and calculate images. Artworks like *P-014-1415* and *P-016-7089 (Random Walk)* from 1969 demonstrate early algorithms as hand-drawn computer calculations, a precursor to the artist's 1970 use of the plotter, a computer controlled drawing machine. From 1969 onward Mohr worked exclusively with the computer, developing and writing algorithms for his visual ideas. A black and white color palette with varying shades of grey was utilized until 1999, when color entered Mohr's work as a result of new parameters.

In 2002, the artist began building his own computers to execute generative processes—non-repeating, real-time, screen-based animations. Generative procedures continue to inform his practice, resulting in the *Liquid Symmetry* series developed in 2020. This series is expressed in two different iterations—*P3010* and *P3011*. Both work phases employ an algorithm where a diagonal path, together with its spatial symmetrical counterpart, passes through an 11-dimensional hypercube. The randomly colored line segments of the path move through 11-dimensional space, creating color fields when projected in 2-D. The hypercube, a geometric figure in four or more dimensions, is the main visual instrument of Mohr's oeuvre. *P3020-A* reveals the algorithm behind *Liquid Symmetry* at work. Presented as custom-software, this algorithm is closely related to Mohr's earlier work phase *Artificiata II-traces* (2012-15) which captured the history of n-dimensional rotations. *P3020-A* is exhibited alongside *P2210-A* to portray the similarities in rotated n-dimensional diagonal-paths projected in 2D.

The white line segment in *P3010* is associated and connected to a randomly chosen transparent color. The cube's rotation leaves transparent color traces, and the overlapping transparency creates an unimaginable color space. The finished work is printed in dye-sublimation on an aluminum plate and bent by 10 degrees along the red symmetry line to emphasize the inherent symmetry relation of this artwork. The bent aluminum plate is fitted in a black aluminum frame.

In the *P3011* series, each white line segment is associated and connected to a randomly chosen opaque color, which while rotating, creates a solid color shape. The algorithm can choose either one color or multiple colors for these line segments. In this work, the algorithm creates unpredictable and unimaginable color-shapes that are printed in dye-sublimation on aluminum and laser-cut to form a metal relief. From 1969 to today, Mohr's artworks continue to transcend imagination through the expression of points, lines, squares, cubes, and their relationships through algorithms applied to different dimensions.

This exhibition is accompanied by a catalog titled *Liquid Symmetry.* bitforms gallery would like to thank Margit Rosen for her contribution of the essay, "The Whole Thinking Becomes Me" to this publication.

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Manfred Mohr
b.1938 in Pforzheim, Germany
Lived in Barcelona 1962-1963 and Paris 1963-1983
Lives and works in New York, NY since 1980

Manfred Mohr is a leader within the field of software-based art. In the early 1960's he discovered Professor Max Bense's writing on information aesthetics. These texts radically changed Mohr's artistic thinking, and within a few years, his art transformed from abstract expressionism to computer-generated algorithmic geometry. Encouraged by the computer music composer Pierre Barbaud, whom he met in 1967, Mohr programmed his first computer drawings in 1969 after learning the Fortran IV programming language to create compositions that he executed as ink drawings on paper. He started his research in 1969 at the Faculty of Vincennes, Paris in the group "Art et Informatique," where he co-founded the seminar. Initially he did not have a plotter at this facility and had to draw his computer calculations as printed out xy points by hand on paper. Frustrated, he looked for a better solution.

He contacted the Institute of Meteorology in Paris which granted him access in 1970 to a Benson 1284 flatbed plotter and a CDC 6400 computer, the most powerful machines of that time. He worked there nearly each night between 1970 to 1983—combining research and programming to create his unique artworks. A logical and automatic construction of pictures, where he used algorithms to calculate the images.

Before he got access to the institute of Meteorology, some of his earliest drawings were executed on a light pen plotter (1969) and also on a large Zuse flatbed plotter at the University of Darmstadt in Germany (1970). Mohr's first major museum exhibition, *Une esthétique programmée*, took place in 1971 at the Musée d'Art Moderne de la Ville de Paris. It has since become known as the first solo show in a museum of works entirely calculated and drawn by a digital computer. During the exhibition, Mohr demonstrated his process of drawing his computer-generated imagery using a Benson flatbed plotter for the first time in public. Mohr's pieces have been based on the logical structure of cubes and hypercubes—including the lines, planes, and relationships among them—since 1973.

Mohr's work is in the collections of the Centre Pompidou, Paris; ZKM | Center for Art and Media, Karlsruhe; Whitney Museum of American Art, New York; Joseph Albers Museum, Bottrop; Mary and Leigh Block Museum of Art, Chicago; Victoria and Albert Museum, London; Ludwig Museum, Cologne; Wilhelm-Hack-Museum, Ludwigshafen; Kunstmuseum Stuttgart, Stuttgart; Stedelijk Museum, Amsterdam; Museum im Kulturspeicher, Würzburg; Kunsthalle Bremen, Bremen; Musée d'Art Moderne et Contemporain, Strasbourg; Daimler Art Collection, Berlin / Stuttgart; Musée d'Art Contemporain, Montreal; The Tel Aviv Museum of Art, Tel Aviv; Espace D'Art Concret (EAC), Mouans- Sartoux; Museum für Angewandte Kunst, Cologne; Borusan Art Collection, Istanbul; McCrory Collection, New York; Esther Grether Collection, Basel; Thoma Art Foundation, Chicago; Anne + Michael Spalter Digital Art Collection, Rhode Island; Fondation Guy & Myriam Ullens, Geneva.

Solo exhibitions and retrospectives of his work include ARC – Musée d'Art Moderne de la ville de Paris; ZKM, Karlsruhe; Joseph Albers Museum, Bottrop; Wilhelm-Hack-Museum, Ludwigshafen; Museum for Concrete Art, Ingolstadt; Kunsthalle Bremen; Museum im Kulturspeicher, Würzburg; and Grazyna Kulczyk Foundation, Poznan; Featured Artist at Art Basel, Basel, Switzerland ; Center for the Arts, Virginia Tech; Simons Center Gallery, Stony Brook.

Mohr's work has also been exhibited at ZKM, Karlsruhe; MoMA, New York; Centre Pompidou, Paris;
Whitney Museum of American Art, New York; Grand Palais, Paris; Hamburger Bahnhof, Berlin; Whitechapel Gallery, London; Prague City Gallery (G HMP), Prague; Victoria and Albert Museum (V & A), London; CCCB, Barcelona; Kunstmuseum Stuttgart; Kunstmuseum Bremen, Bremen; Vasarely Museum, Budapest, Espace D'Art Concret (EAC), Mouans- Sartoux; Museum Ritter, Waldenbuch; Centro Cultural de la Villa, Madrid; MoCA, Los Angeles; National Museum of Modern Art, Tokyo; SFMOMA, San Francisco; Musée d'Art Contemporain de Montréal, Montréal; Muzeum Sztuki Lodz, Poland; Neue Nationalgalerie, Berlin; MoMA PS1, New York; Neue Nationalgalerie, Berlin; New Tendencies 5, Zagreb; Fundacion Banco Santander, Madrid; Leo Castelli Gallery, New York; and Galerie Paul Facchetti, both in Paris and Zürich.

Mohr is the recipient of an ACM SIGGRAPH Distinguished Artist Award for Lifetime Achievement in Digital Art; Golden Nica from Ars Electronica, Linz, Austria; the Camille Graesser-Preis, Zurich; D.velop Digital Art Award, Berlin, and a New York Foundation for the Arts Fellowship.

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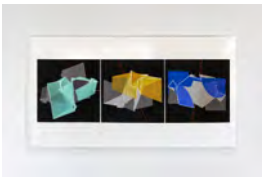
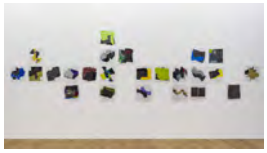
Manfred Mohr | *liquid symmetry*
September 6–October 15, 2022



Manfred Mohr
P3008-A, 2020-22
Digital pigment print
54.5 x 30 in / 138 x 74.5 cm

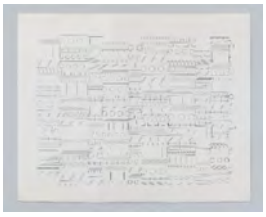
Manfred Mohr
P3011_2, 2020-21
Aluminum relief, computer generated lasercut
39.8 x 43.7 in / 101 x 111 cm



Manfred Mohr
Print-1–Print-24, 2022-21
Inkjet on paper
14.2 x 14.2 in / 36 x 36 cm, each

Manfred Mohr
Zeichnung C, 1967
Hand drawing on paper
19.7 x 23.6 in / 50 x 60 cm

Manfred Mohr
P-031b, 1970
Plotter drawing on paper
22.8 x 29.1 in / 58 x 74 cm



Manfred Mohr
P-065a-large, 1970
Plotter drawing on paper
24 x 29.5 in / 61 x 75 cm

Manfred Mohr
P-016-7089, 1969
Computer calculation hand drawn on paper
23.6 x 23.6 in / 60 x 60 cm

Manfred Mohr
P-016-7089, 1969
Computer calculation hand drawn on paper
23.6 x 23.6 in / 60 x 60 cm

Manfred Mohr
P-100-large, 1972
Plotter drawing on paper
36.2 x 36.2 in / 92 x 92 cm

Manfred Mohr
P3020-A, 2020-2022
Custom software (color, silent), square LCD screen, computer
20.25 x 20 x 4.1 in / 51.4 x 50.8 x 10.5 cm, framed

Manfred Mohr
P3011_10, 2020-21
Aluminum relief, computer generated lasercut
43.3 x 43.7 in / 110 x 111 cm

Manfred Mohr
P3011_9, 2020-21
Aluminum relief, computer generated lasercut
42.6 x 47.2 in / 108 x 120 cm

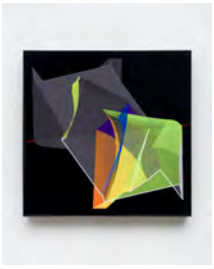
Manfred Mohr
P3011_3, 2020-21
Aluminum relief, computer generated lasercut
32.6 x 54 in / 83 x 137 cm

Manfred Mohr
P3010_2, 2020-2021
Dye sublimation on aluminium
16.9 x 16.9 x 2 in / 43 x 43 x 5 cm

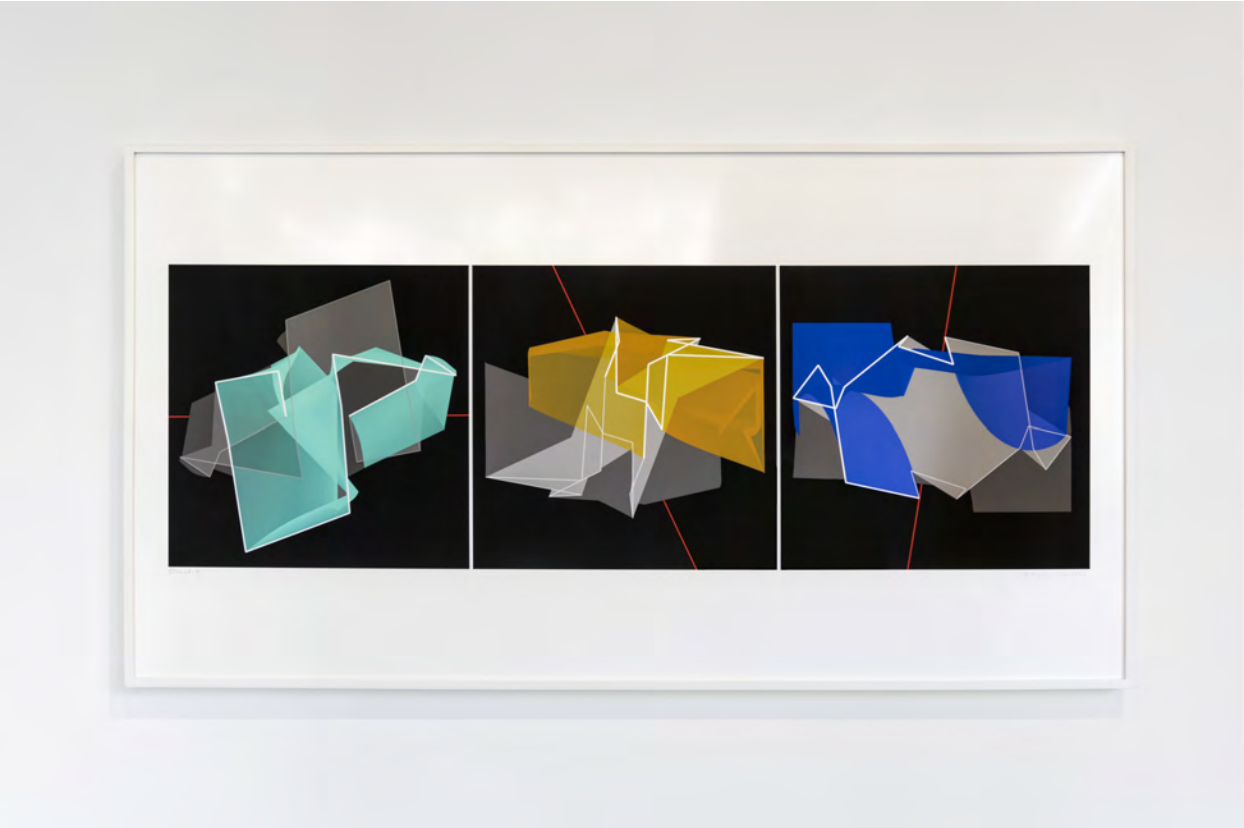
Manfred Mohr
P3010_3, 2020-2021
Dye sublimation on aluminium
16.9 x 16.9 x 2 in / 43 x 43 x 5 cm

Manfred Mohr
P3010_5, 2020-2021
Dye sublimation on aluminium
16.9 x 16.9 x 2 in / 43 x 43 x 5 cm

Manfred Mohr
P3010_1, 2020-2021
Dye sublimation on aluminium
16.9 x 16.9 x 2 in / 43 x 43 x 5 cm



Manfred Mohr
P3010_4, 2020-2021
Dye sublimation on aluminium
16.9 x 16.9 x 2 in / 43 x 43 x 5 cm



Manfred Mohr
P3008-A, 2020-22
Digital pigment print
54.5 x 30 in / 138 x 74.5 cm

Manfred Mohr's newest work phase, titled *Liquid Symmetry*, was developed in 2020. This series employs an algorithm where diagonal paths pass through an 11-dimensional hyper-cube. These paths, projected in 2D, are shown as thick white lines connected to a symmetrical counterpart, seen as a thin grey line. A red symmetry line is drawn through these endpoints and extended to the limiting square of the work space. Each white line segment is associated and connected to a randomly chosen color. Grey line segments are associated and connected to only one solid grey color. A second, darker grey color fills the original space between the two diagonal paths before they are rotated. In tiny angular steps, the two linked diagonal paths (white and grey lines) are rotated in 11 dimensions for 25 seconds and projected in 2D, leaving color traces. This algorithm is closely related to Mohr's earlier work phase *Artificiata II* (2012-15) that captured the history of n-dimensional rotations.

Using the algorithm and particularities of P3010, three images are calculated and placed in "dialogue" next to each other to create a triptych printed on inkjet on paper. The red symmetry line is drawn in the image, but the symmetry bend is omitted.

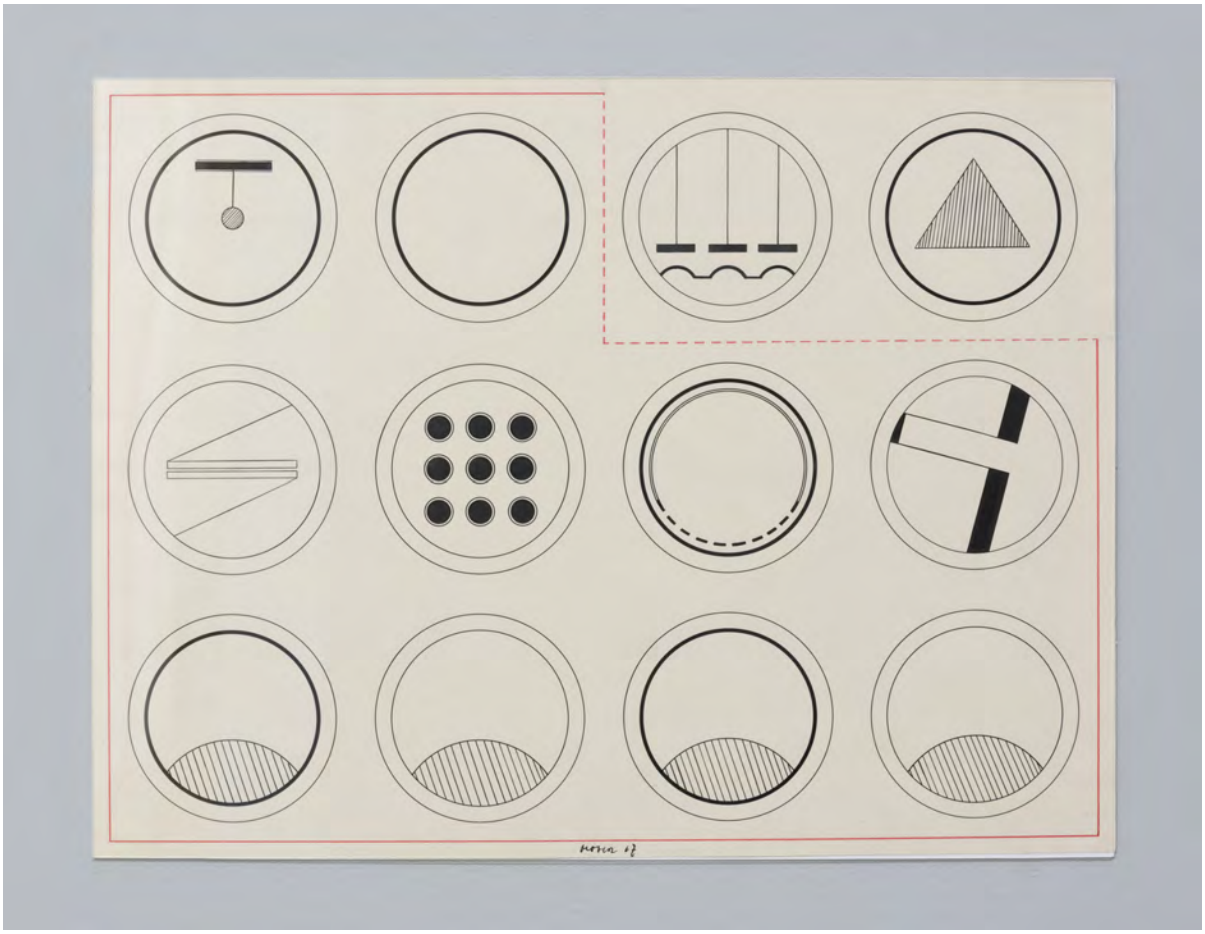
Manfred Mohr
P3011_2, 2020-21
Aluminum relief, computer generated lasercut
39.8 x 43.7 in / 101 x 111 cm

Manfred Mohr's newest work phase, titled L*iquid Symmetry*, was developed in 2020. This series employs an algorithm where diagonal paths pass through an 11-dimensional hyper-cube. These paths, projected in 2D, are shown as a thick white lines connected to a symmetrical counterpart, seen as a thin grey line. A red symmetry line is drawn through these endpoints and extended to the limiting square of the work space. Each white line segment is associated and connected to a randomly chosen color. Grey line segments are associated and connected to only one solid grey color. A second, darker grey color fills the original space between the two diagonal paths before they are rotated. In tiny angular steps, the two linked diagonal paths (white and grey lines) are rotated in 11 dimensions for 25 seconds and projected in 2D, leaving color traces. This algorithm is closely related to Mohr's earlier work phase *Artificiata II* (2012-15) that captured the history of n-dimensional rotations.

In the *P3011* series, each white line segment is associated and connected to a randomly chosen opaque color, which while rotating, creates a solid color shape. The algorithm can choose either one color or multiple colors for these line segments. In this work, the algorithm creates unpredictable and unimaginable color-shapes, which in the finished work are printed in dye-sublimation on aluminum plates and then cut out by a laser beam, forming the most interesting metal reliefs. The red symmetry line and the bending of the metal plate are omitted here.

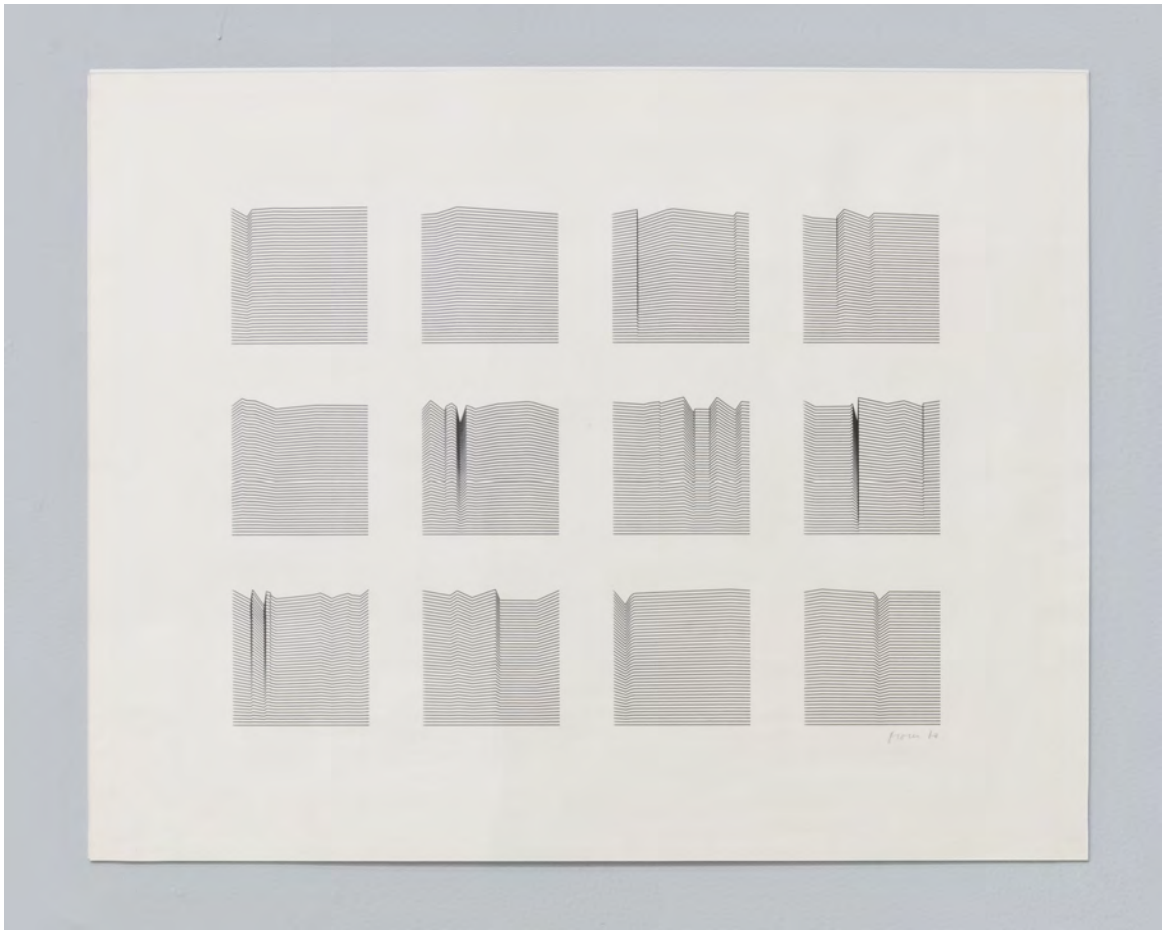
Manfred Mohr
Print-1–Print-24, 2022-21
Inkjet on paper
14.2 x 14.2 in / 36 x 36 cm, each

This series of 24 prints uses the algorithm of P3011, which is based on a diagonal path through an 11-dimensional hypercube projected in 2-D. A thick white line is connected to its symmetrical counterpart along the edges of the hypercube, seen as a thin grey line. The two paths are connected at their common endpoints. The typically red symmetry line is drawn here as a white symmetry line and the symmetry bend is omitted.



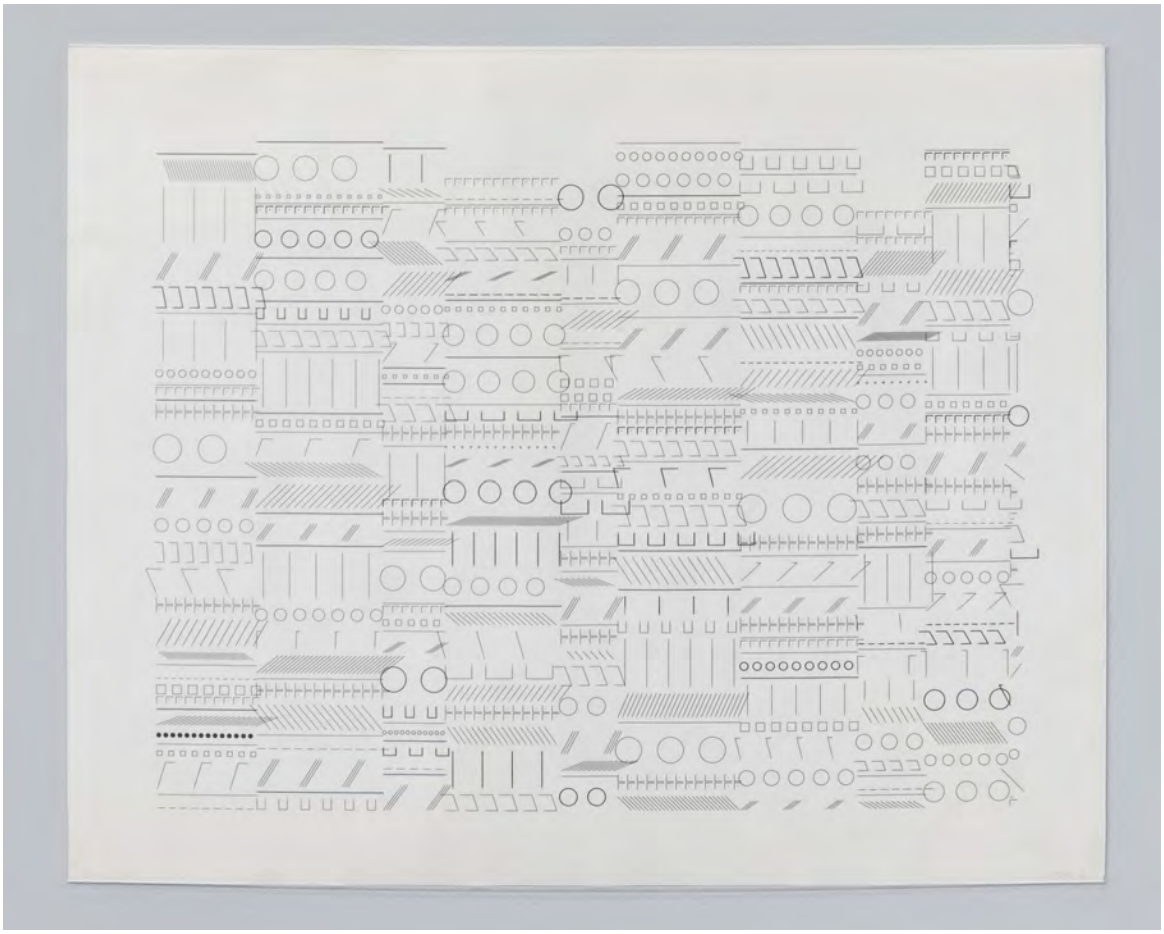
Manfred Mohr
Zeichnung C, 1967
Hand drawing on paper
19.7 x 23.6 in / 50 x 60 cm

This work phase (1966-69) introduces geometry and constructibility (but not yet the computer) into Mohr's work. In a subjective selection process, geometric elements influenced by electronic and other technical signs are created and distributed over the entire pictorial surface. Since all signs (forms) are surrounded by a pictorial force, they create in their juxtaposition a network of abstract visual tension.



Manfred Mohr
P-031b, 1970
Plotter drawing on paper
22.8 x 29.1 in / 58 x 74 cm

Between 1969-1972, Mohr introduced a logical and automatic construction of pictures. For the first time, algorithms (rules with a beginning and an ending) were used to calculate the images. The artist's consequent thinking is rendered visible through computer programs, resulting drawings were realized by a computer controlled drawing machine (plotter). Mohr set the parameters of different line characteristics, creating an alphabet of arbitrary generated elements. Individual algorithms were invented for each work from which all forms and structures are solely generated. The algorithms are built from imposed and random selection principles which the artist deems "aesthetical-filters".



Manfred Mohr
P-065a-large, 1970
Plotter drawing on paper
24 x 29.5 in / 61 x 75 cm

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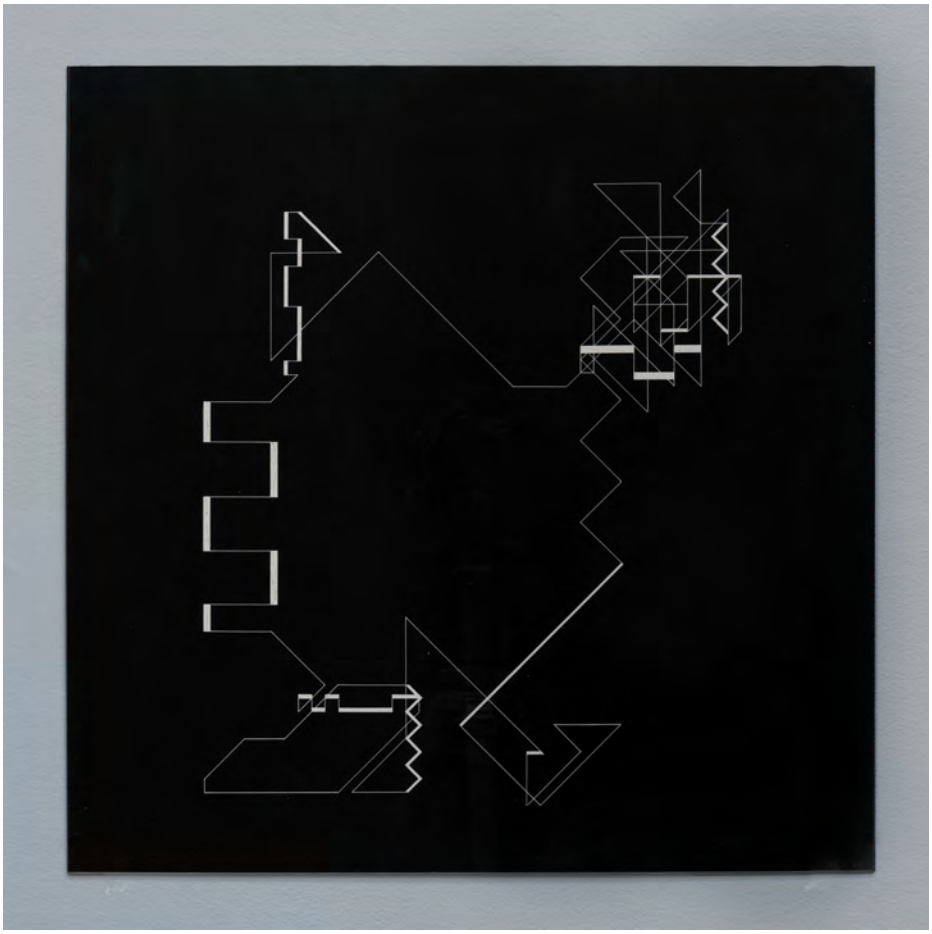

Manfred Mohr
P-016-7089, 1969
Computer calculation hand drawn on paper
23.6 x 23.6 in / 60 x 60 cm

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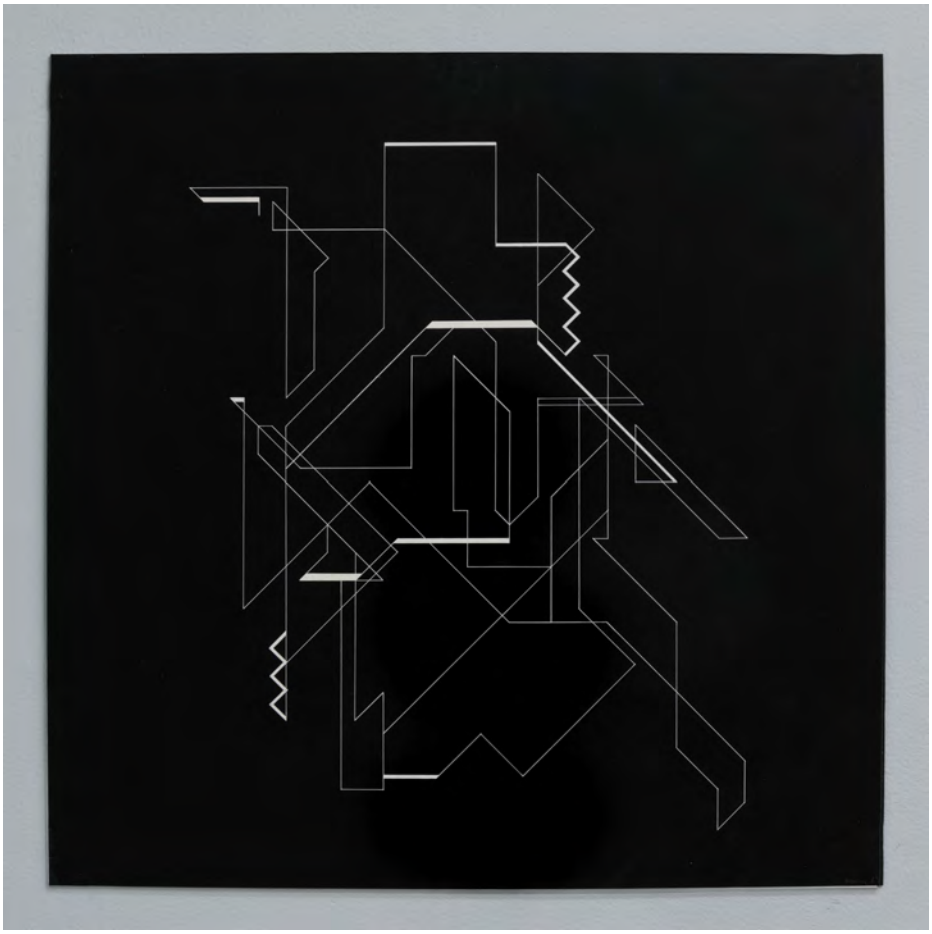

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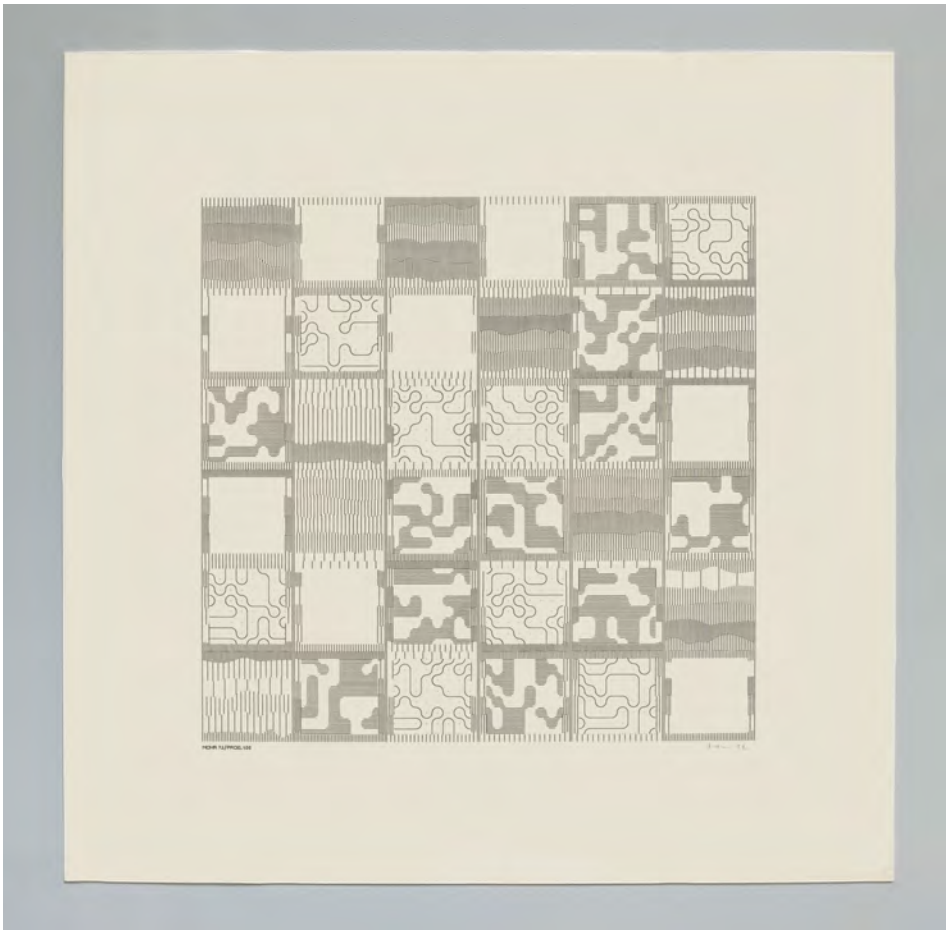

Manfred Mohr
P-100-large, 1972
Plotter drawing on paper
36.2 x 36.2 in / 92 x 92 cm

Between 1969-1972, Mohr introduced a logical and automatic construction of pictures. For the first time, algorithms (rules with a beginning and an ending) were used to calculate the images. The artist's consequent thinking is rendered visible through computer programs, resulting drawings were realized by a computer controlled drawing machine (plotter). Mohr set the parameters of different line characteristics, creating an alphabet of arbitrary generated elements. Individual algorithms were invented for each work from which all forms and structures are solely generated. The algorithms are built from imposed and random selection principles which the artist deems "aesthetical-filters".

Manfred Mohr
P3020-A, 2020-2022
Custom software (color, silent), square LCD screen, computer
20.25 x 20 x 4.1 in / 51.4 x 50.8 x 10.5 cm, framed

Video documentation: https://vimeo.com/750061475

Manfred Mohr's newest work phase, titled *Liquid Symmetry,* was developed in 2020. *P3020-A* showcases the live generative algorithm the artist used to create exhibited works. The computational work demonstrates the unending sequence of diagonal paths that pass through an 11-dimensional hyper-cube. These paths, projected in 2D, are shown as thick white lines connected to a symmetrical counterpart, seen as a thin grey line. A red symmetry line is drawn through these endpoints and extended to the limiting square of the work space. Each white line segment is associated and connected to a randomly chosen color. Grey line segments are associated and connected to only one solid grey color. A second, darker grey color fills the original space between the two diagonal paths before they are rotated. In tiny angular steps, the two linked diagonal paths (white and grey lines) are rotated in 11 dimensions for 25 seconds and projected in 2D, leaving color traces. This algorithm is closely related to Mohr's earlier work phase Artificiata II (2012-15) that captured the history of n-dimensional rotations.

Manfred Mohr
P3011_10, 2020-21
Aluminum relief, computer generated lasercut
43.3 x 43.7 in / 110 x 111 cm

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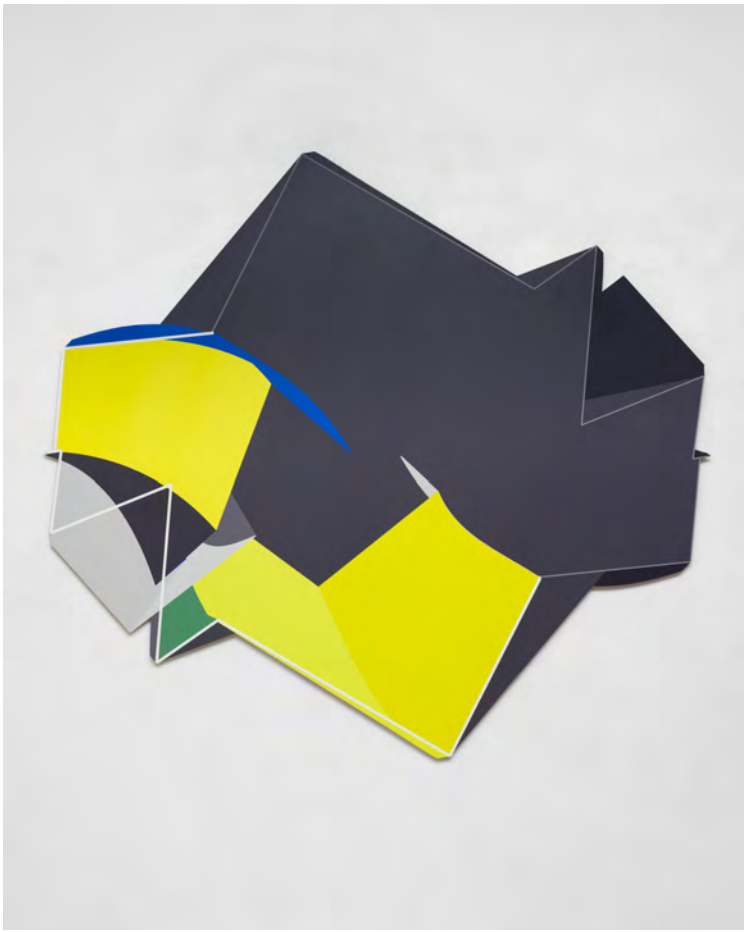

Manfred Mohr
P3011_9, 2020-21
Aluminum relief, computer generated lasercut
42.6 x 47.2 in / 108 x 120 cm

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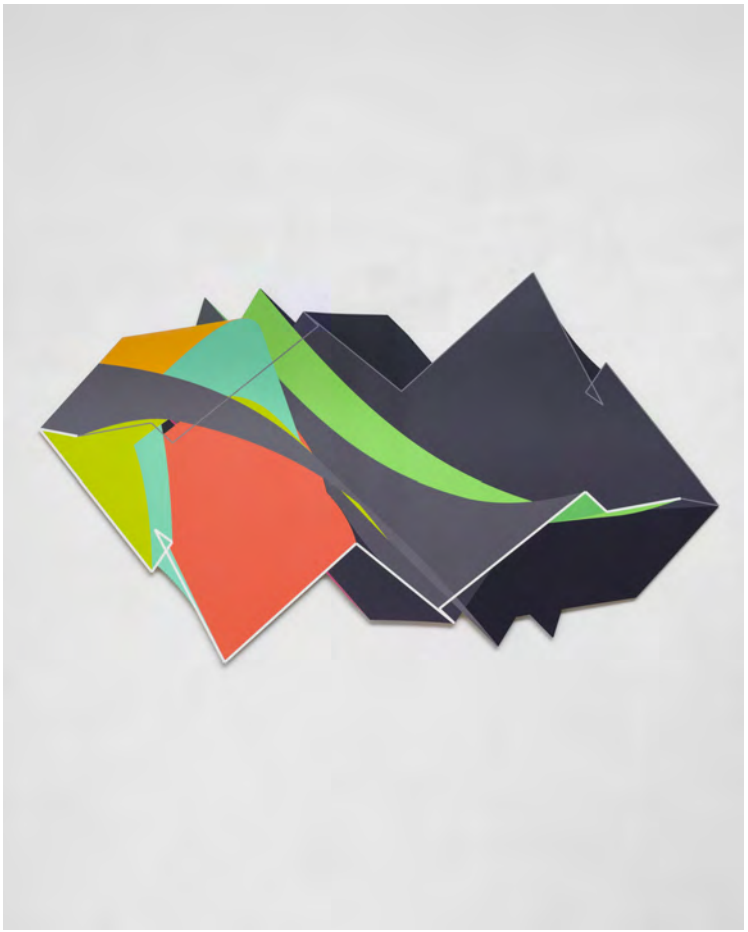

Manfred Mohr
P3011_3, 2020-21
Aluminum relief, computer generated lasercut
32.6 x 54 in / 83 x 137 cm

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Manfred Mohr
P3010_1, 2020-2021
Dye sublimation on aluminium
16.9 x 16.9 x 2 in / 43 x 43 x 5 cm

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The white line segment in *P3010* works is associated and connected to a randomly chosen transparent color. The cube's rotation leaves transparent color traces, and the overlapping transparency creates an unimaginable color space. The finished work is printed in dye-sublimation on an aluminum plate and bent by 10 degrees along the red symmetry line to emphasize the inherent symmetry relation of this artwork. The bent aluminum plate is fitted in a black aluminum frame.

Manfred Mohr
P3010_2, 2020-2021
Dye sublimation on aluminium
16.9 x 16.9 x 2 in / 43 x 43 x 5 cm

Manfred Mohr's newest work phase, titled L*iquid Symmetry*, was developed in 2020. This series employs an algorithm where diagonal paths pass through an 11-dimensional hyper-cube. These paths, projected in 2D, are shown as thick white lines connected to a symmetrical counterpart, seen as a thin grey line. A red symmetry line is drawn through these endpoints and extended to the limiting square of the work space. Each white line segment is associated and connected to a randomly chosen color. Grey line segments are associated and connected to only one solid grey color. A second, darker grey color fills the original space between the two diagonal paths before they are rotated. In tiny angular steps, the two linked diagonal paths (white and grey lines) are rotated in 11 dimensions for 25 seconds and projected in 2D, leaving color traces. This algorithm is closely related to Mohr's earlier work phase *Artificiata II* (2012-15) that captured the history of n-dimensional rotations.

The white line segment in *P3010* works is associated and connected to a randomly chosen transparent color. The cube's rotation leaves transparent color traces, and the overlapping transparency creates an unimaginable color space. The finished work is printed in dye-sublimation on an aluminum plate and bent by 10 degrees along the red symmetry line to emphasize the inherent symmetry relation of this artwork. The bent aluminum plate is fitted in a black aluminum frame.

Manfred Mohr
P3010_3, 2020-2021
Dye sublimation on aluminium
16.9 x 16.9 x 2 in / 43 x 43 x 5 cm

Manfred Mohr's newest work phase, titled L*iquid Symmetry*, was developed in 2020. This series employs an algorithm where diagonal paths pass through an 11-dimensional hyper-cube. These paths, projected in 2D, are shown as thick white lines connected to a symmetrical counterpart, seen as a thin grey line. A red symmetry line is drawn through these endpoints and extended to the limiting square of the work space. Each white line segment is associated and connected to a randomly chosen color. Grey line segments are associated and connected to only one solid grey color. A second, darker grey color fills the original space between the two diagonal paths before they are rotated. In tiny angular steps, the two linked diagonal paths (white and grey lines) are rotated in 11 dimensions for 25 seconds and projected in 2D, leaving color traces. This algorithm is closely related to Mohr's earlier work phase *Artificiata II* (2012-15) that captured the history of n-dimensional rotations.

The white line segment in *P3010* works is associated and connected to a randomly chosen transparent color. The cube's rotation leaves transparent color traces, and the overlapping transparency creates an unimaginable color space. The finished work is printed in dye-sublimation on an aluminum plate and bent by 10 degrees along the red symmetry line to emphasize the inherent symmetry relation of this artwork. The bent aluminum plate is fitted in a black aluminum frame.

Manfred Mohr
P3010_4, 2020-2021
Dye sublimation on aluminium
16.9 x 16.9 x 2 in / 43 x 43 x 5 cm

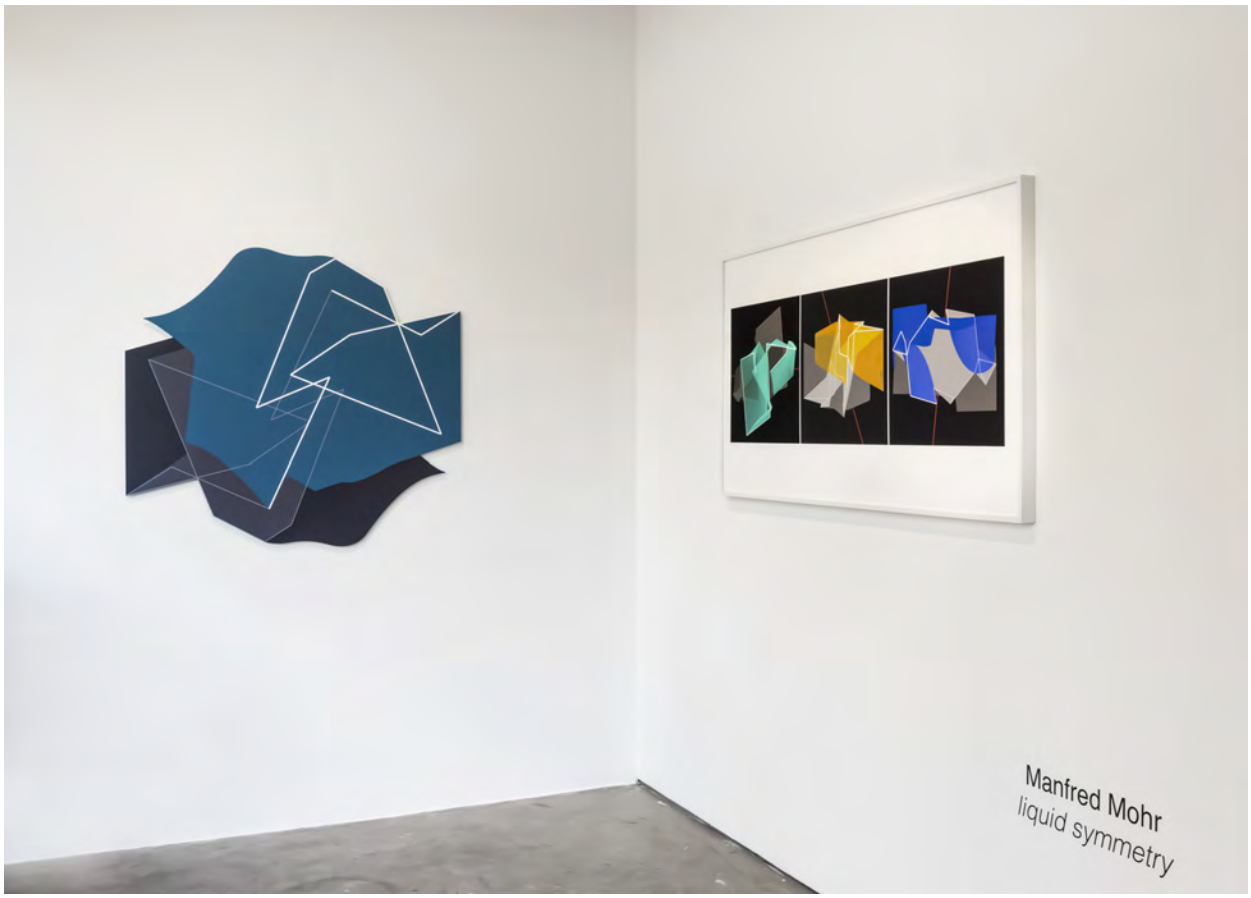
Manfred Mohr's newest work phase, titled L*iquid Symmetry*, was developed in 2020. This series employs an algorithm where diagonal paths pass through an 11-dimensional hyper-cube. These paths, projected in 2D, are shown as thick white lines connected to a symmetrical counterpart, seen as a thin grey line. A red symmetry line is drawn through these endpoints and extended to the limiting square of the work space. Each white line segment is associated and connected to a randomly chosen color. Grey line segments are associated and connected to only one solid grey color. A second, darker grey color fills the original space between the two diagonal paths before they are rotated. In tiny angular steps, the two linked diagonal paths (white and grey lines) are rotated in 11 dimensions for 25 seconds and projected in 2D, leaving color traces. This algorithm is closely related to Mohr's earlier work phase *Artificiata II* (2012-15) that captured the history of n-dimensional rotations.

The white line segment in *P3010* works is associated and connected to a randomly chosen transparent color. The cube's rotation leaves transparent color traces, and the overlapping transparency creates an unimaginable color space. The finished work is printed in dye-sublimation on an aluminum plate and bent by 10 degrees along the red symmetry line to emphasize the inherent symmetry relation of this artwork. The bent aluminum plate is fitted in a black aluminum frame.

Manfred Mohr
P3010_5, 2020-2021
Dye sublimation on aluminium
16.9 x 16.9 x 2 in / 43 x 43 x 5 cm

Manfred Mohr's newest work phase, titled L*iquid Symmetry*, was developed in 2020. This series employs an algorithm where diagonal paths pass through an 11-dimensional hyper-cube. These paths, projected in 2D, are shown as thick white lines connected to a symmetrical counterpart, seen as a thin grey line. A red symmetry line is drawn through these endpoints and extended to the limiting square of the work space. Each white line segment is associated and connected to a randomly chosen color. Grey line segments are associated and connected to only one solid grey color. A second, darker grey color fills the original space between the two diagonal paths before they are rotated. In tiny angular steps, the two linked diagonal paths (white and grey lines) are rotated in 11 dimensions for 25 seconds and projected in 2D, leaving color traces. This algorithm is closely related to Mohr's earlier work phase *Artificiata II* (2012-15) that captured the history of n-dimensional rotations.

The white line segment in *P3010* works is associated and connected to a randomly chosen transparent color. The cube's rotation leaves transparent color traces, and the overlapping transparency creates an unimaginable color space. The finished work is printed in dye-sublimation on an aluminum plate and bent by 10 degrees along the red symmetry line to emphasize the inherent symmetry relation of this artwork. The bent aluminum plate is fitted in a black aluminum frame.



Manfred Mohr
liquid symmetry
Installation view
bitforms gallery nyc
September 6 - October 15

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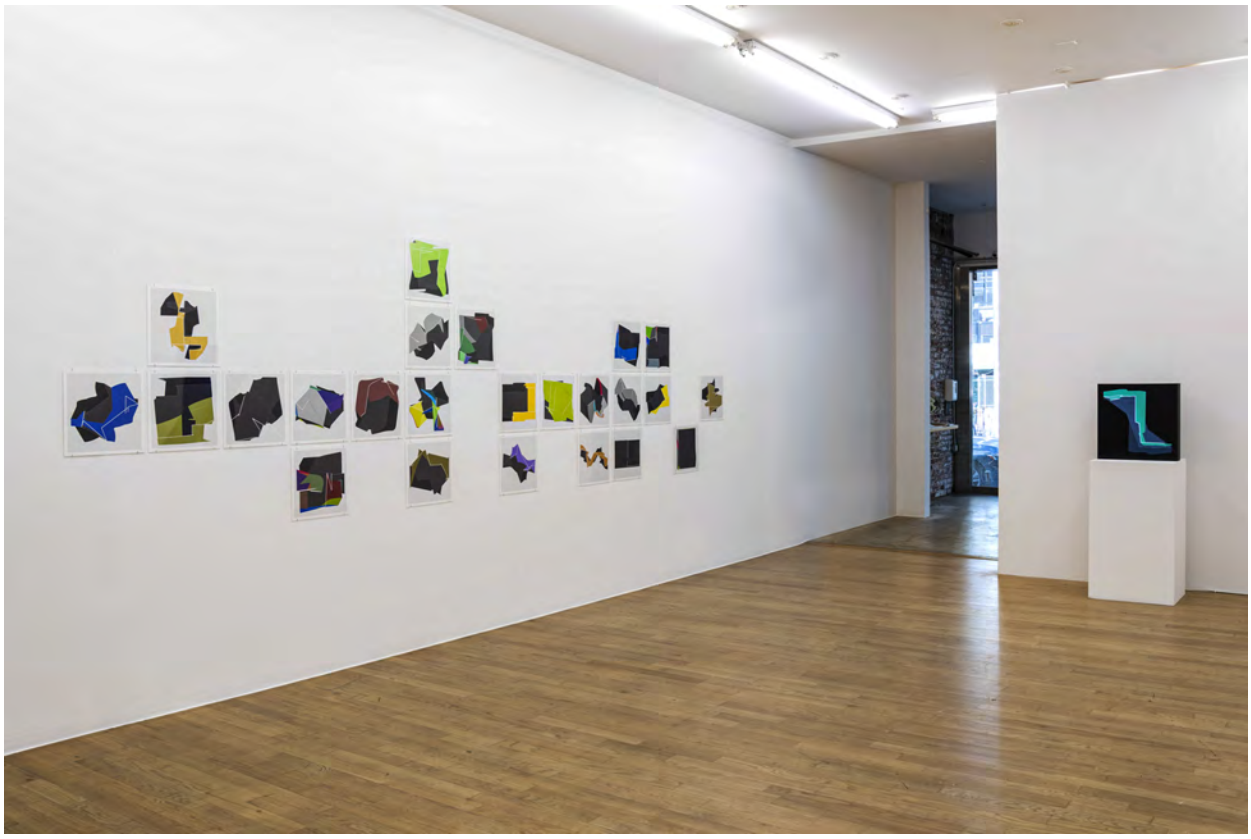

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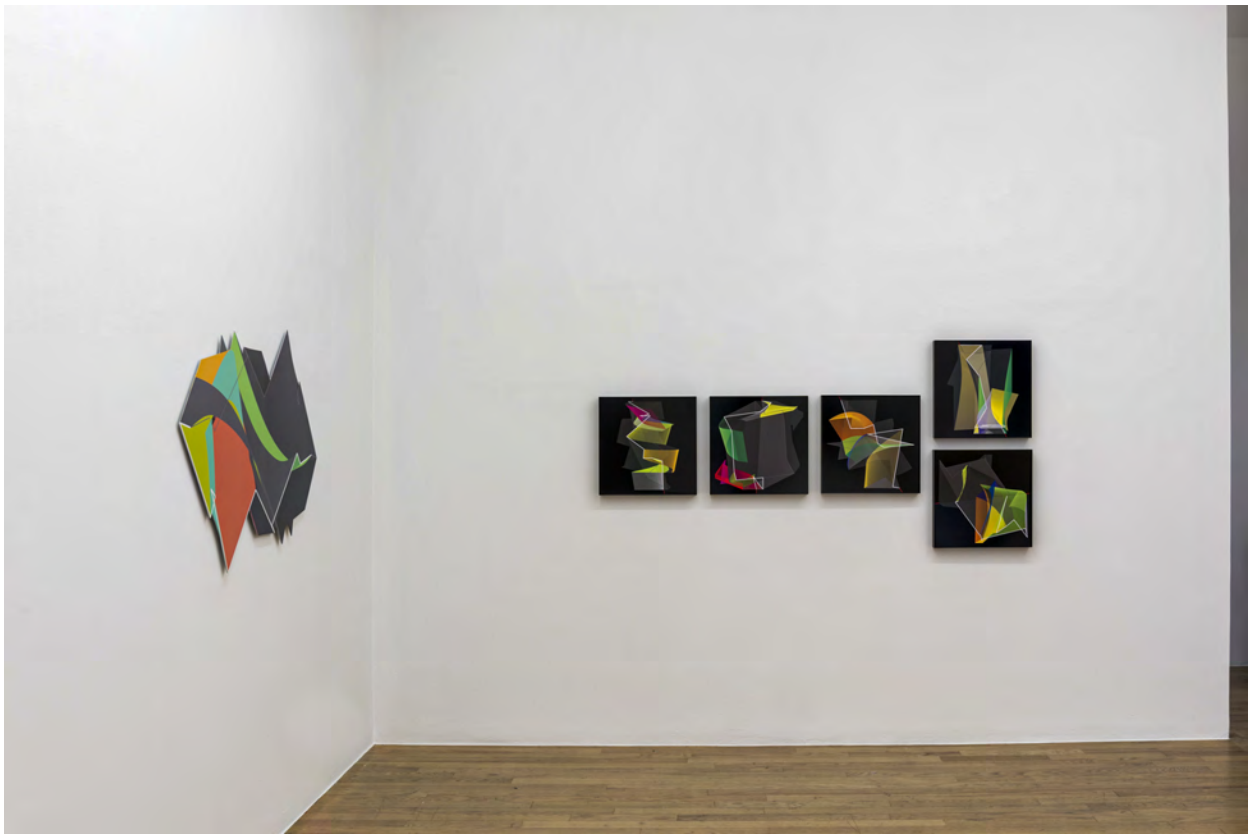

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