

These Digital Artworks Depict the Impossible-to-Visualize Hypercube

WRITTEN BY ROBERT BARRY

February 15, 2016 // 08:20 AM EST

Like Share 661K

Follow 148K followers

YouTube 737 k

Motherboard

NEWSLETTER ([HTTPS://CONFIRMSUBSCRIPTION.COM/H/1/62B347AD88B7A90A](https://confirmsubscription.com/H/1/62B347AD88B7A90A))

In 1907, an English mathematician and patent clerk named Charles Howard Hinton put a handful of loose change down on a table and pictured a galaxy.

(<http://www.forgottenfutures.co.uk/flat2/flat2-0a.htm>) He called this world Astria, a “plane world” whose two-dimensional inhabitants walk around the rim of each circle. Astria may sound pretty absurd, but Hinton’s flattened universe was intended to demonstrate a serious mathematical concept. For if we can imagine the response of an Astrian citizen to our three-dimensional space, then we can begin to picture our own bafflement before geometries of four or even more dimensions.

Just a few years earlier, Hinton had proposed the name “tesseract” to describe the four-dimensional analogue of the cube. Today, squares extending into four or more dimensions are referred to as “hypercubes” or “n-cubes.” Hinton recognised that (<https://archive.org/details/anewerathought00falkgoog>) it was basically impossible to fully represent his tesseracts on a flat surface; one could only make models representing “the appearance a Tesseract would present to us if shown in various ways.” But a little thing like impossibility was never going to deter Manfred Mohr.

One of the earliest pioneers of digital art, for nearly 40 years now Mohr has been making algorithmic artworks inspired by and derived from the figure of the hypercube. In his very latest works, he traces its complex paths through up to a hundred dimensions of space. It has become, he told me, an “alphabet” from which he can spell out a limitless number of “abstract visual words.” Everything in his work extends from it and he sees no end to the possibilities.



P1650_C (2015). Image: Manfred Mohr/Carroll/Fletcher

For instance, *P1650_C* (2015), a recent work on display as part of a new exhibition at London's Carroll/Fletcher gallery (<http://www.carrollfletcher.com/exhibitions/49/overview/>), begins with a single line

show in two dimensions: a simple right angled hinge. It then shows how the same line would look from all three of the viewpoints necessary to get a complete view of the same line if it were projected in three dimensions, all six of the different viewpoints necessary to capture it in four dimensions, and on, up to the 55 angles on a now-thoroughly-kinked line projected into 11 dimensions.

“One line in all its possibilities of projections,” Mohr describes it. “As if I were looking at it from the side, from the top, from the bottom... it’s like a language made out of one single element and its mathematical possibilities of projection.”

(/EN_US?TRK_SOURCE=HEAD|

“Suddenly I create a symphony of lines coming from somewhere which nobody understands, but I understand the logic of it.”

Another pair of recent works (*P1682_1435* and *P1682_1866*) follow the zig and zag of a theoretical path cutting diagonally across a hypercube of a hundred dimensions.

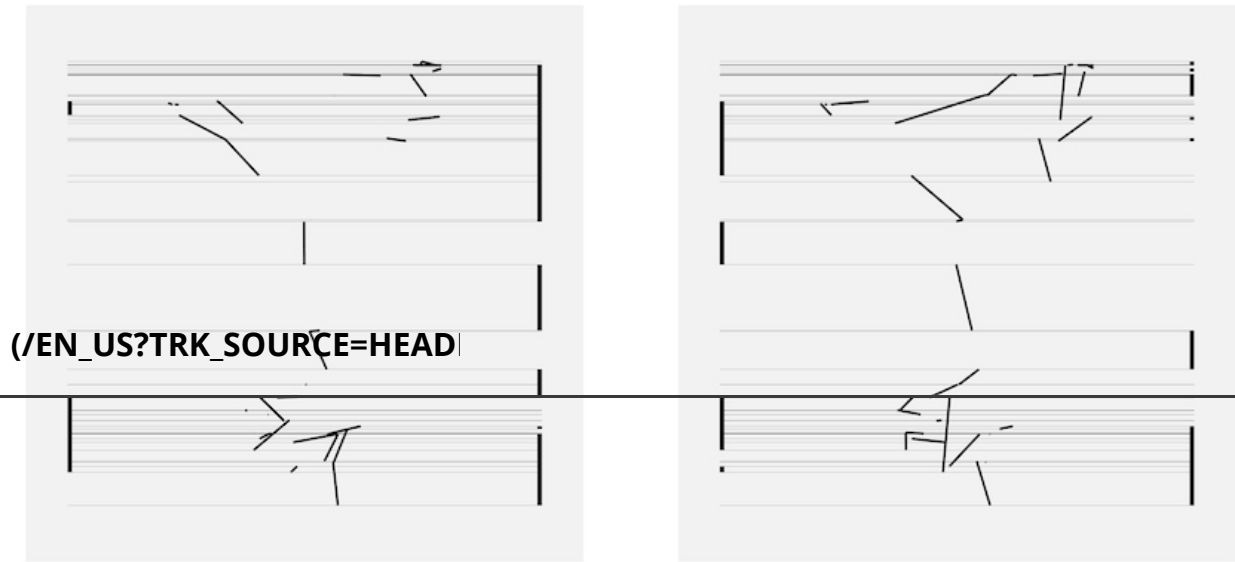
Like Share 661K

Follow 148K followers

YouTube 737 k

Motherboard

NEWSLETTER ([HTTPS://CONFIRMSUBSCRIPTION.COM/H/1/62B347AD88B7A90A](https://confirmsubscription.com/h/1/62B347AD88B7A90A))



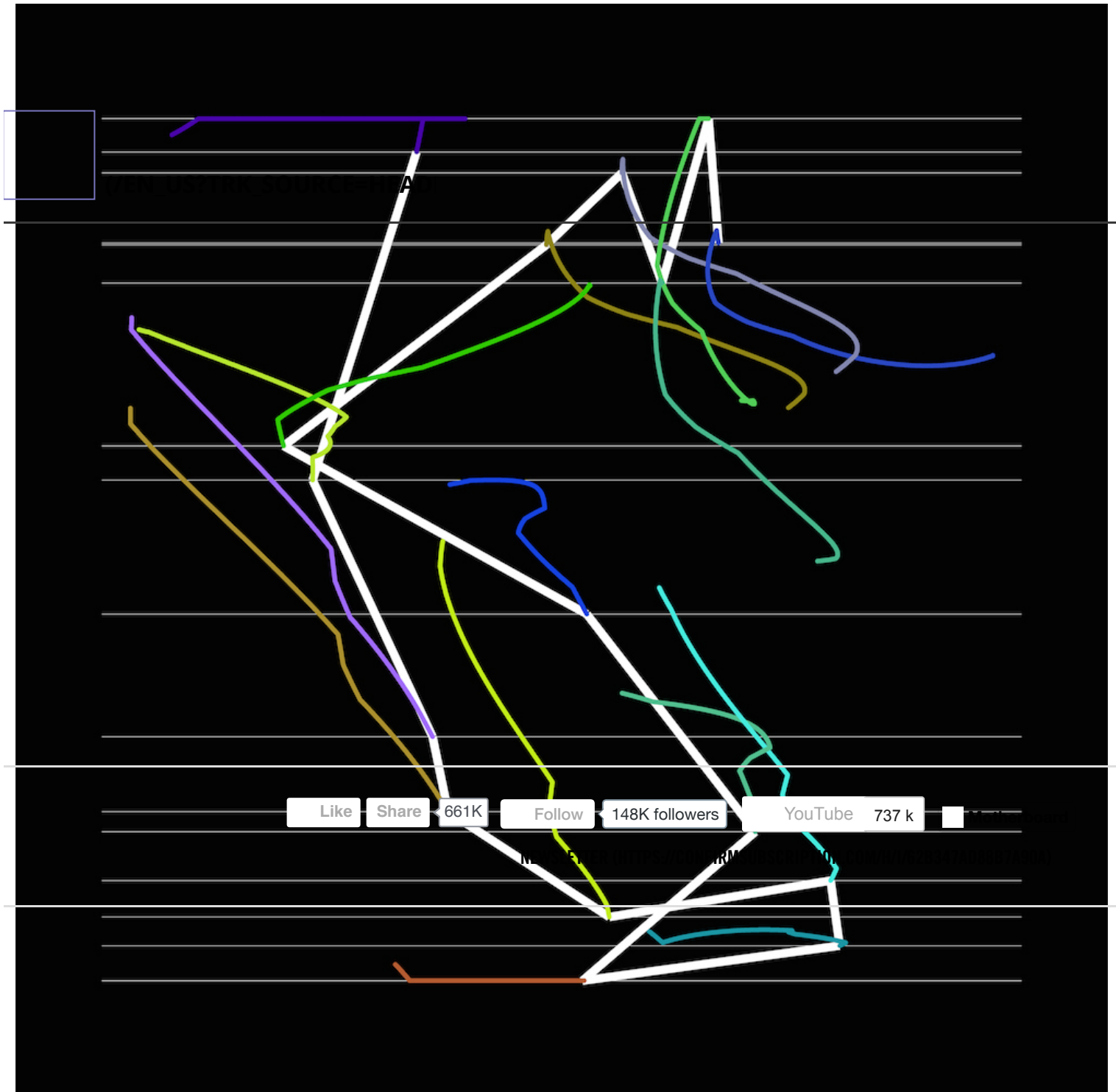
P1682_1435 (2014). Image: Manfred Mohr/Carroll/Fletcher

Such projections can take months for Mohr to calculate and comprehend as he tirelessly programs new algorithms to follow paths which are “calculable, but not imaginable.”

“I don’t know what happens up there,” he says to me, referring to the theoretical higher dimensions his works explore. “Suddenly I create a symphony of lines coming from somewhere which nobody understands, but I understand the logic of it.”

Born in 1938 in Pforzheim, a small town in the southern German state of Baden-Württemberg, Mohr only got his first access to a computer thanks to the tumultuous events of May 1968. Since the early 60s he had been bumming around Europe, working as a jazz musician and doing abstract expressionist “action paintings” somewhat in the mould of Jackson Pollock. His whole approach was turned upside down by the ideas on “information aesthetics” espoused by philosopher Max Bense. (http://monoskop.org/Max_Bense)

"My art slowly transformed from abstract expressionism to computer-generated algorithmic geometry," he said. Living in Paris since 1963, he taught himself programming languages and developed systems and formulas for what he called a "programmed aesthetic"—all without access to any actual computer. Then came the riots.



P2200_3866 (2014-2015). Image: Manfred Mohr/Carroll/Fletcher

On the 6 May 1968, (<https://libcom.org/history/1968-chronology-events-France-%2526-internationally>) some 20,000 students, teachers, and other supporters marched on the Sorbonne. Barricades were erected, cars set on fire, paving stones

pulled from the pavements. In the days that followed, these numbers only swelled. In response to the concentration of student political activity in Paris's Latin Quarter, the French government decided to break up the university system in favour of a series of smaller colleges, offering a radical new syllabus.

The most radical of the new institutions was the Centre Universitaire Expérimental in Vincennes, just east of the city. It was here that, teaching in a philosophy department headed by Michel Foucault, the psychoanalyst Judith Miller became notorious for

handing out course credits to strangers she met on the bus and declaring in a radio interview that the university was a capitalist institution that she felt it her duty to

(/EN_US?TRK_SOURCE=HEAD| disrupt as much as possible (<http://files.eric.ed.gov/fulltext/EJ832893.pdf>). It was also

here that Mohr began to teach a seminar on "Art and Information."

"It took a year," he recalls of that time, "to get a small, used SDS computer. On this machine I wrote and calculated my first programs, but since we did not have a plotter, I had to draw the calculated coordinates by hand." Eventually, having seen it on a TV show, he determined to march into the Institute of Meteorology to demand access to their computer plotter. "Luckily," he says, "that worked out very well for me."

"Think of it like a writer. For 50 years he writes using the same letters. But there's always new words, new

Like

Share

661K

Follow

148K followers

YouTube

737 k

Motherboard

NEWSLETTER ([HTTPS://CONFIRMSUBSCRIPTION.COM/H/1/62B347AD88B7A90A](https://confirmsubscription.com/h/1/62B347AD88B7A90A))

Mohr had a long-standing interest in electronics. As a child, he had built amplifiers and short-wave radios. So learning to program a computer "came naturally" to him. To this day, he always develops his own software and never uses off-the-shelf programmes. "The artist always has to find or invent his own tools," he explains. "Early on I understood that I have to teach myself to program in order to realize and understand directly my ideas."

His first experiments with computers involved analysing his own earlier works, trying to discern by mathematical analysis his own “rules of composition.” But very quickly he came to understand that he would “need a different kind of logical thinking.” The model for that thinking would finally come to him in the shape of the cube.

(/EN_US?TRK_SOURCE=HEAD|



P1682_1866 (2014). Image: Manfred Mohr/Carroll/Fletcher

Like Share 661K

Follow 148K followers

YouTube 737 k

Motherboard

NEWSLETTER ([HTTPS://CONFIRMSUBSCRIPTION.COM/H/1/62B347AD88B7A90A](https://confirmsubscription.com/h/1/62B347AD88B7A90A))

“As a musician, I had an instrument,” he explains, “and whatever I did, people could tell it was a saxophone. I thought, would it be possible to find a graphical instrument? Eventually I came to the idea of the cube: the basic cartesian system of coordinates. That could be my instrument. I started with the cube, dissecting this and that, playing with the elements—the 12 lines of a cube. Slowly I expanded this alphabet into four, five, six dimensions. With each dimension I found something else that I could do with it.”

Forty years later, he's still eking out the possibilities from transposing this most basic shape into the most complex theoretical zones. "Think of it like a writer," he shrugs. "For 50 years he writes using the same letters. But there's always new words, new sentences."

For a long time, Mohr struggled to gain acceptance for his work. "People threw eggs at me," he recalls of his first attempts to display his computer-generated artworks in the 1970s. "They yelled at me that I was using military equipment to destroy art!"

But, with his works now held in major private collections like the Centre Pompidou in Paris and London's V&A and featured in the Whitechapel Gallery's major new history of digital art, *Electronic Superhighway*, plus the new London show dedicated to his latest experiments just opened, it seems as though the world is finally catching up with Manfred Mohr.

The artist remains philosophical about his newfound acceptance. "You've got three computers in your pocket," he says. "You're not afraid anymore!"

--

TOPICS: digital art (/tag/digital+art), Manfred Mohr (/tag/Manfred+Mohr), hypercubes (/tag/hypercubes), algorithms (/tag/algorithms), Carroll/Fletcher gallery (/tag/Carroll%2FFletcher+gallery), Mathematics (/tag/Mathematics), geometry (/tag/geometry), computers (/tag/computers), art (/tag/art), culture (/tag/culture), artists (/tag/artists), Charles Howard Hinton (/tag/Charles+Howard+Hinton), Max Bense (/tag/Max+Bense), Futures (/tag/Futures)

Like . Share 661K

Follow 148K followers

YouTube 737 k

Motherboard

NEWSLETTER ([HTTPS://CONFIRMSUBSCRIPTION.COM/H/1/62B347AD88B7A90A](https://confirmsubscription.com/h/1/62B347AD88B7A90A))

Contact Motherboard by email (<mailto:editor@motherboard.tv>).

You can reach us at letters@motherboard.tv (<mailto:letters@motherboard.tv>). Letters may be published. Want to see other people talking about Motherboard? Check out our letters to the editor (<http://motherboard.vice.com/tag/letters+to+the+editor>).