HYPERSEEING

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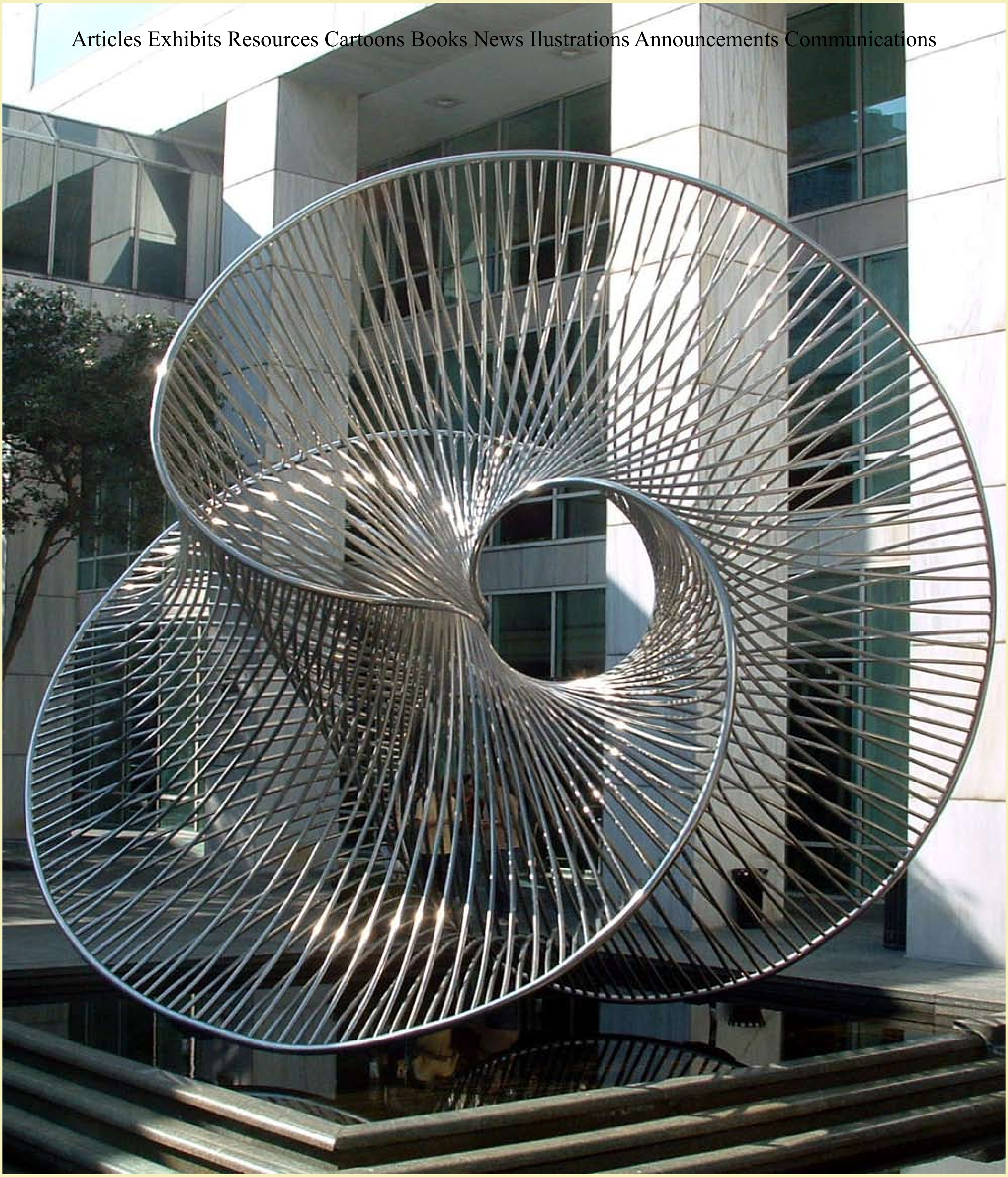


Charles Perry, Solstice, 1985, Stainless steel, 28 x 28 ft, Barnett Plaza, Tampa, Fl.

HYPERSEEING

NOVEMBER/DECEMBER, 2007

Cover Photo: Charles Perry, Solstice, 1985, Stainless Steel, 28 x 28 ft, Barnet Plaza, Tampa, Fl, photo by Carlo Séquin.

Article Submission

For inclusion in Hyperseeing, members of ISAMA are invited to email material for the preceding categories to hyperseeing@gmail.com

Note that we now accept articles up to eight pages.

CHARLES PERRY: SOLSTICE

NAT FRIEDMAN AND CHARLES PERRY

The sculpture Solstice by Charles Perry shown in Figure 1 is an example of Perry's series of ribbed sculptures that were discussed in [1]. Here we will consider Solstice in detail. We are grateful to Carlo Séquin for providing the images of Solstice in Figures 1-7. The images are ordered by starting in the position of Figure 1 and walking to the right (counter clockwise) around the sculpture. Carlo will be writing a companion article, discussing Solstice from the viewpoint of computer graphics.

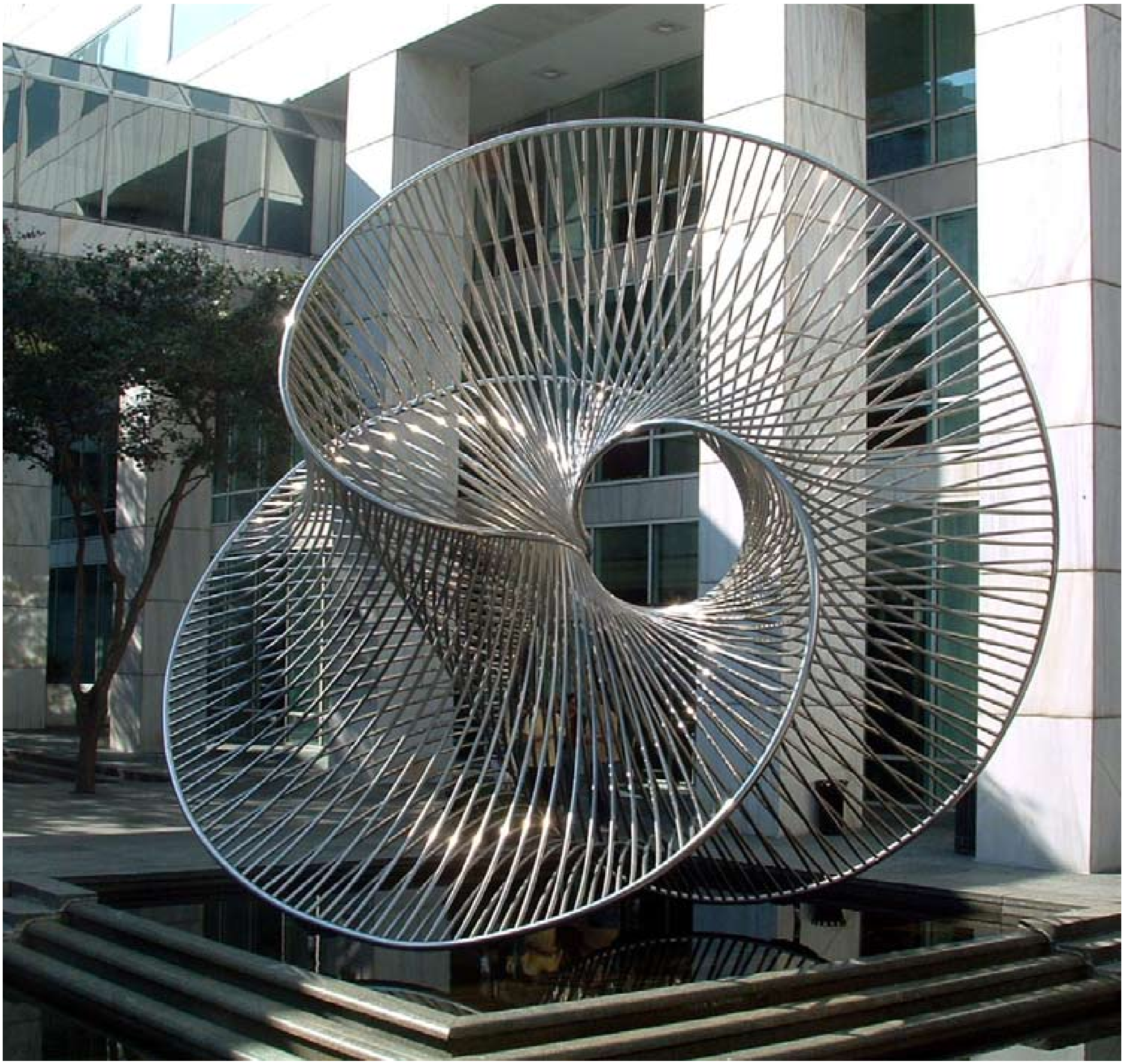


Figure 1. Charles Perry, Solstice, 1985, Stainless steel, 28 x 28 ft, Barnett Plaza, Tampa, Fl.

COMMENTS BY CHARLES PERRY

The perimeter of Solstice is created by placing an equilateral triangle on a circular ring so that the centroid of the triangle is on the ring. The triangle is rotated on the ring by 240° as it moves completely around the ring. The figure produced by the three vertices of the triangle is a two-thirds twist torus Möbius. (This is equivalent to describing the perimeter as a 3-2 torus knot, as pointed out by Carlo Séquin.)

Intuition told me the right diameter of the tubular perimeter. I made a 12 inch model and worked from that somehow. I found that there were four equal quarters going around the torus. (The 3-2 torus knot consisted of four equal pieces). I then made a full scale mockup of one-fourth of the perimeter. It looked like a section of a roller coaster in my clean new studio. It was in three dimensions. I took this template to a tube bender,

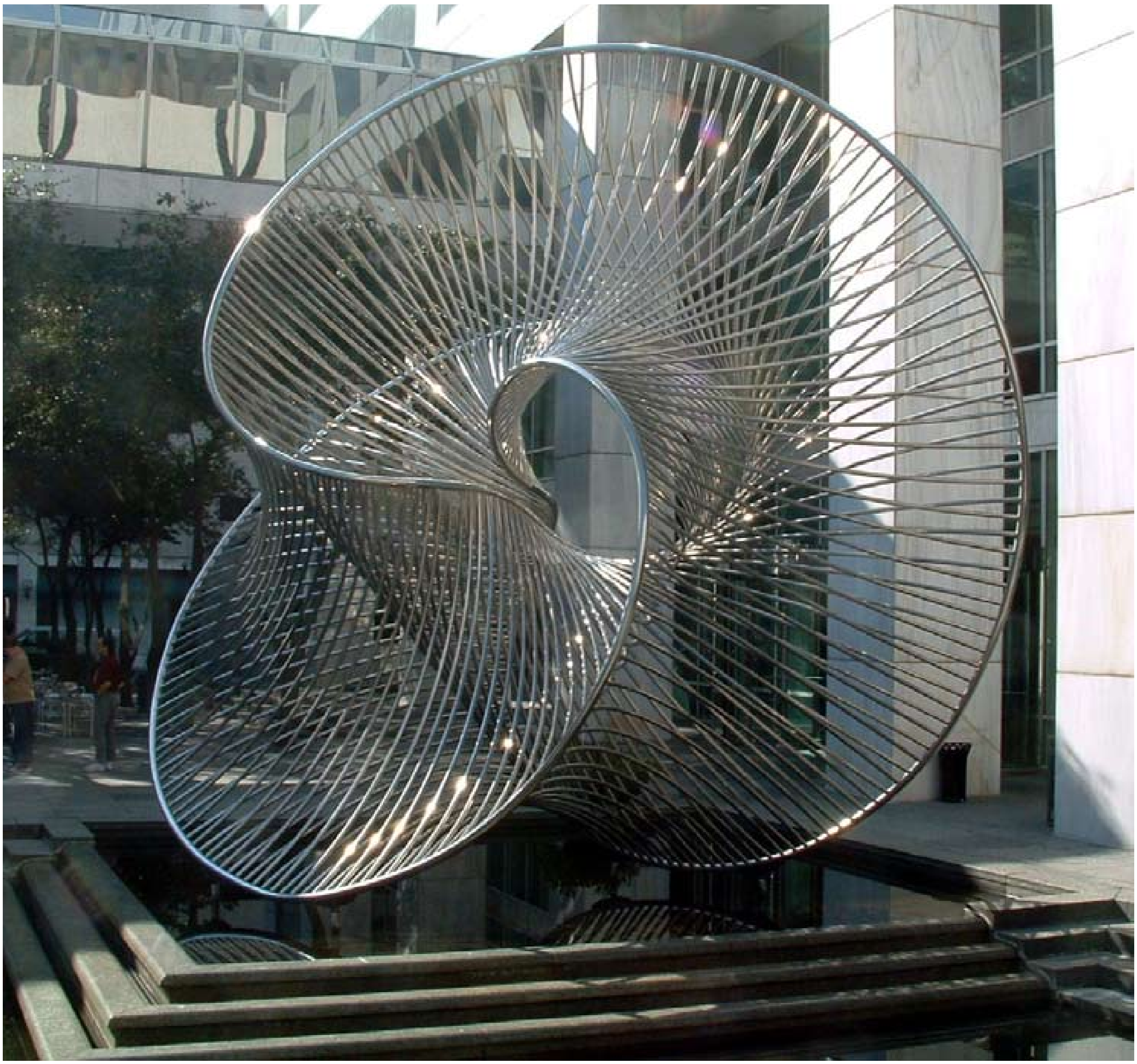


Figure 2.

where they had a skilled old man who could bend the tube in compound curves to match the template. This was done in sections. In the studio I matched and welded these pieces. I had to cut off the excess ends.

Now I had four equal tubes about fifteen feet long. I then determined where the ribs would be closest to each other. This part was done by referencing the 12 inch model. Now the holes for the ribs had to be a variable distance from each other and had to rotate as one progressed around the perimeter tube. Masking tape, magic marker and a center punch for each hole was the method. Certainly I had to measure the length of each quarter edge and divide this by the number of holes.

I don't even know how I registered the four pieces when it was assembled in Tampa. I have a guess. So the brainy parts of the exercise were accomplished by pragmatism and intuition. I am dyslexic and it is difficult for me to work with calculations.

There are more then 600 ribs but they are all identical. Thus over 1200 roto broached holes each at a different angle were required. The piece was shipped with the four separate perimeter pieces and the over 600 separate ribs and then assembled in Tampa.
It confounds me that without a computer or calculator, or cross check, the piece was actually assembled by me alone. On the last night before inserting the last ribs, I was very apprehensive that the number and placement of the holes was right. Needless to say, it was right.

Figure 3.

Figure 4.

HYPERSEEING SOLSTICE

Theoretical hyperseeing is seeing in four-dimensional space. In particular, from one viewpoint, it is possible to hypersee all points on the exterior of a three-dimensional sculpture as well as all points within the sculpture. That is, all around seeing as well as x-ray seeing from one viewpoint.

In our three-dimensional world we approximate hyperseeing a sculpture by walking around it but ordinarily a sculpture is opaque so we can't see into the sculpture. However, the significant aspect of Solstice, as with all the ribbed sculptures, is that it is transparent so that one can hypersee the sculpture more completely by walking around the sculpture as well as seeing through it to relate the views. It is an interesting to keep this in mind as one considers the views of Solstice in Figures 1-6.

We would like to thank Professor Joanne C. Caniglia of the University of Eastern Michigan for organizing

Figure 5.

the conference Knotting Mathematics and Art held November 1-4, 2007 at the University of South Florida, Tampa, FL. John Sims also curated a mathematical art exhibit during the conference. In particular, Charles Perry and Carlo Séquin were invited to participate in the conference and exhibit which led to the present article.

Reference

[1] Nat Friedman, *Charles Perry: Ribbed Forms, Hyperseeing*, January, 2007.
www.isama.org/hyperseeing/

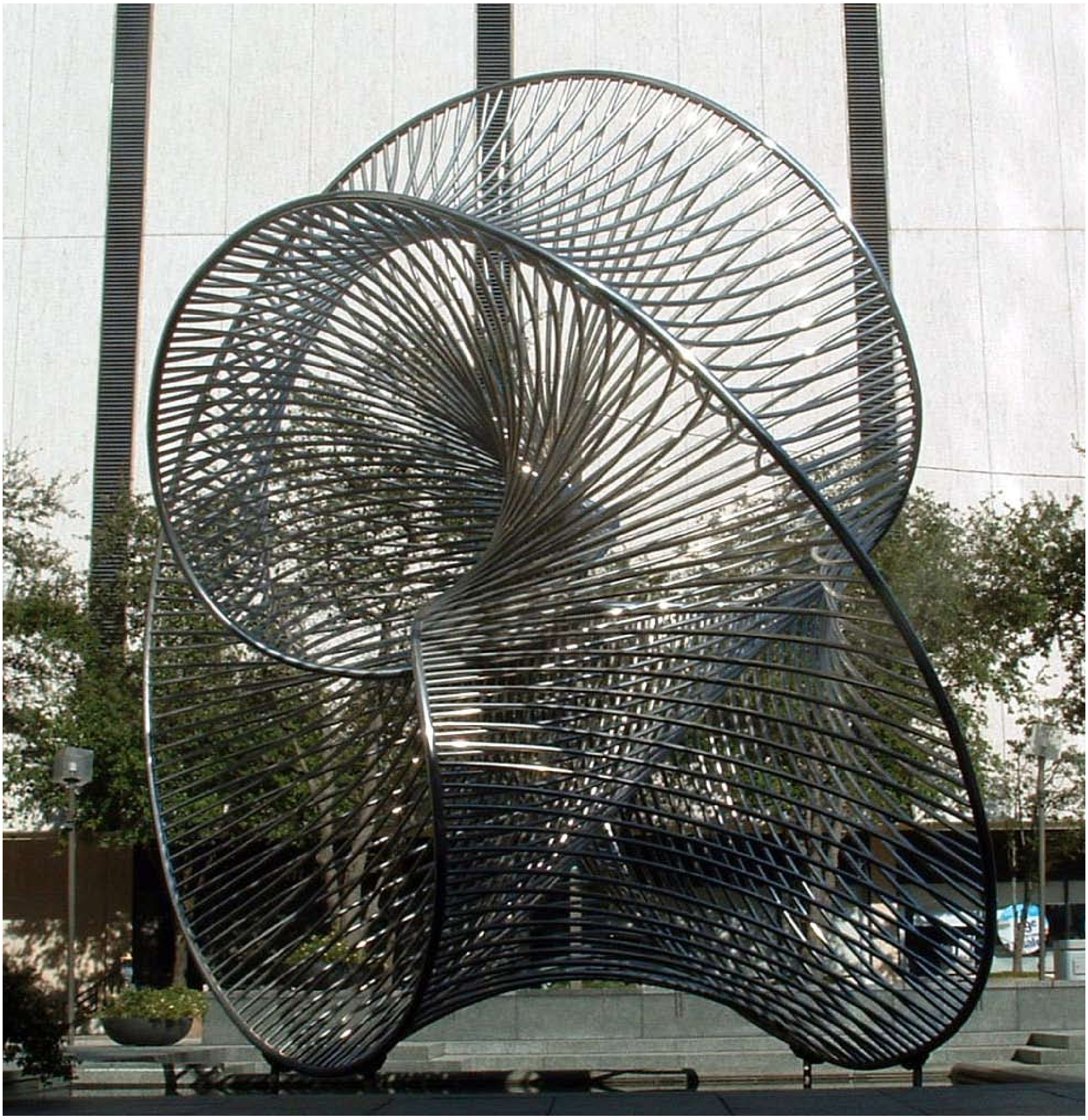


Figure 6.

Figure 7.

EDWARD MAYER: BLOCULUS PRIME

NAT FRIEDMAN

INTRODUCTION

Edward Mayer is Professor of Art and head of the Sculpture Program at the University at Albany-State University of New York (UAlbany). He began teaching sculpture in 1970 at Ohio University in Athens, Ohio and has been teaching at UAlbany since 1983. He is the recipient of numerous awards including two National Endowment for the Arts Fellowships in Sculpture and a New York Foundation for the Arts Fellowship in Sculpture.

In 2007 his student Patrick Cuffe received an Outstanding Student Achievemnet in Contemporary Sculpture Award from the International Sculpture Center. An article on his work by Corinna Ripps appeared in Sculpture Magazine [1].

In 2007 he was commissioned to create a sculpture for the atrium of the new building of the College of Nanotechnology at UAlbany. The sculpture is BLOCULUS PRIME, shown in Figure 1, suspended from the ceiling.

Figure 1. Edward Mayer, BLOCULUS PRIME, 2007, 18' x 9' x 15'.

STRUCTURE

The basic component is a conical wire frame used for growing plants. A star-shaped form is created when eight of the conical frames are wired together, radiating out from a spherical center, as shown in the computer image in Figure 2.

BLOCULUS PRIME consists of ninety of these star-shaped forms that are linked to produce a rectangular structure which moves in and out of chaos and order as one views it from different vantage points, and alternately reveals a variety of repetitive patterns-spheres, cones and diamonds-or a blur of linear confusion.

Simultaneously massive and transparent and entirely low-tech in nature and execution, BLOCULUS PRIME bears a curious relationship to the Kikuchi defraction pattern seen under the Scanning Electron Microscope, used to predict macroscopic behavior based on nanoscale parameters.

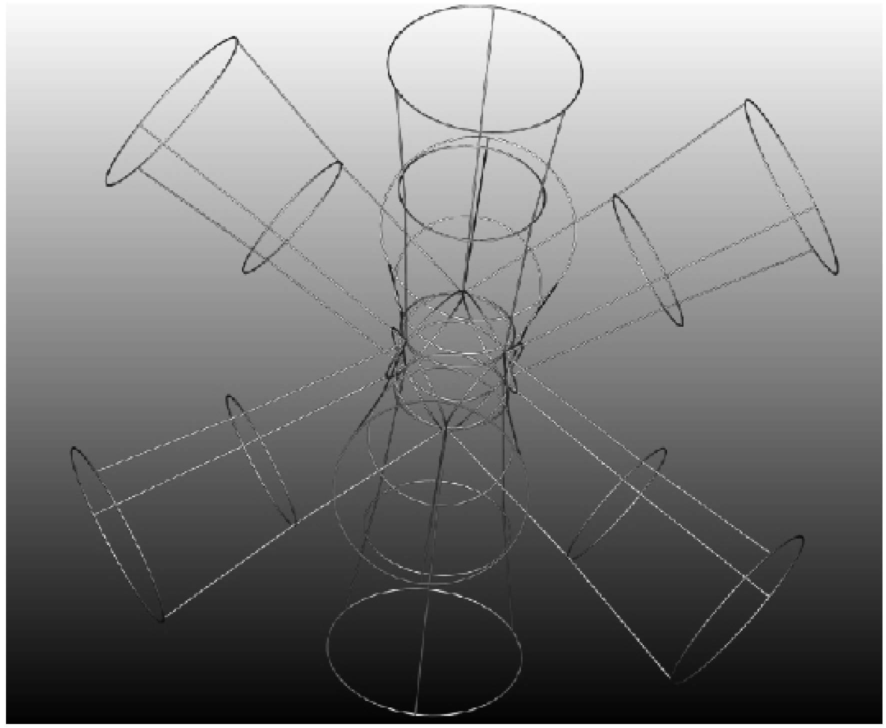


Figure 2. Eight conical frames forming a star-shaped form.

DETAIL IMAGES

A variety of detail images are shown below in Figures 4-8. Fortunately there is a staircase and balcony around one side of the atrium so that one can see various patterns in the sculpture as one walks up the stairs and along the balcony. This is shown in the view in Figure 3.

Figure 3. BLOCULUS PRIME, view from below.

Viewing BLOCULUS PRIME is truly a lesson in hyperseeing as one ordered pattern dissolves into chaos and then a totally different ordered pattern emerges as one moves around the sculpture. Also like a knot, BLOCULUS PRIME is transparent, which makes it exciting to see through the sculpture. The layered images of the components are endless.

Reference

[1] Corrina Ripps, *Edward Mayer: The Idea of Impermanence,* Sculpture Magazine, January/February 1999, Vol. 18 No.1.

Figure 4. BLOCULUS PRIME, detail.

Figure 5. BLOCULUS PRIME, detail.

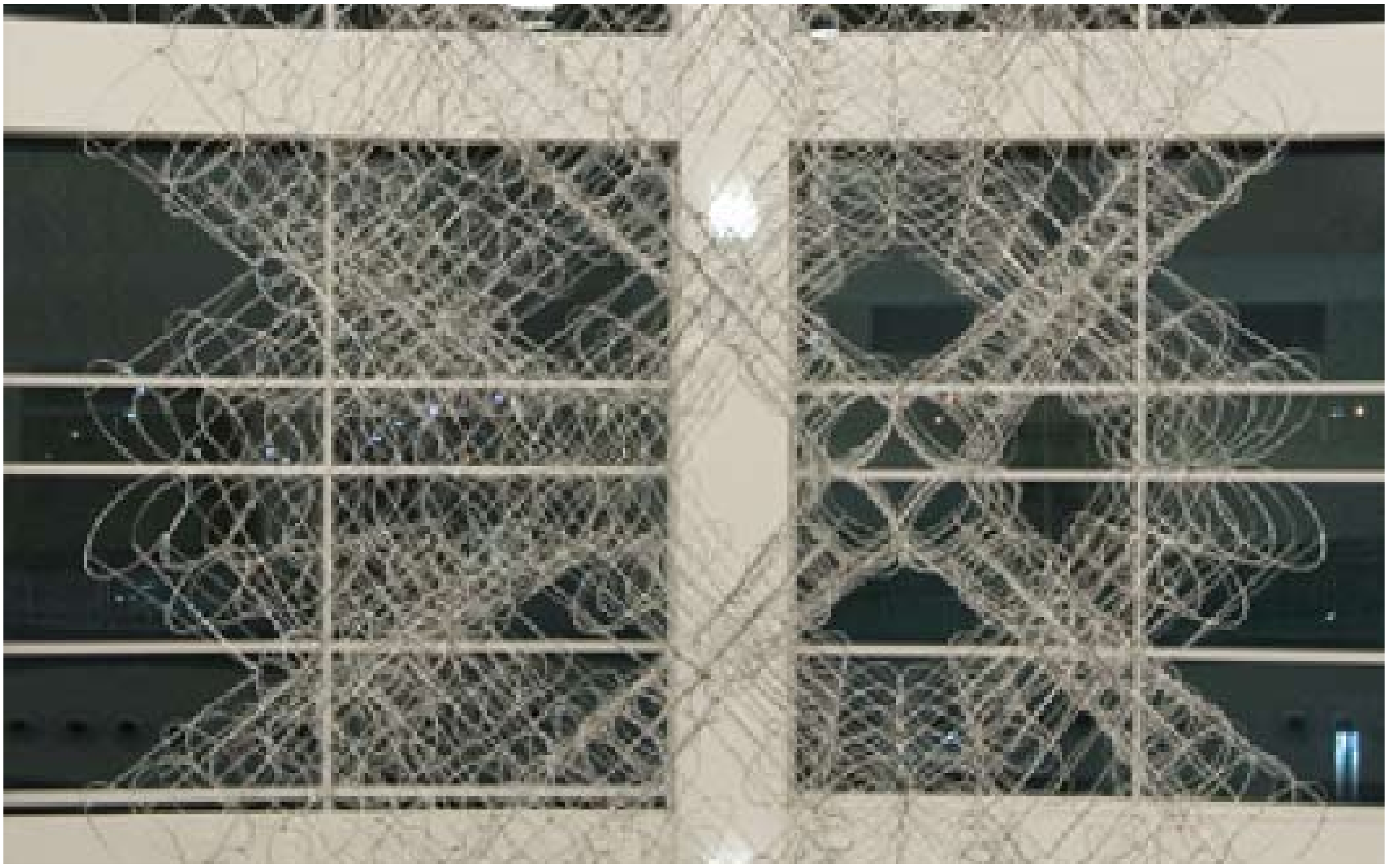


Figure 6. BLOCULUS PRIME, detail.

Figure 7. BLOCULUS PRIME, detail.

HARRIET BRISSON: FORMS IN CLAY, LIGHT, AND PLEXIGLAS

NAT FRIEDMAN

This article is based on the catalog of the Harriet Brisson retrospective 1951-2001 held at Salve Regina University in Providence, Rhode Island, November 7- December 2, 2001. We are grateful to Jay Lacouture and Gerry Williams for permission to excerpt from their contributions to the catalog. For the complete catalog, see www.number53.com/harrietbrisson/

Harriet Brisson has had a dual career of artist/teacher, designer/craftsman, mathematics/art, teacher/administrator and so on. The duality continues in her creative work, which often straddles the confluence of art and science.

Harriet was born in Wakefield, Rhode Island. She grew up on the family farm and received a liberal education with an emphasis on art at the Rocky Hill Country Day School. Her mother was a painter and encouraged Harriet in the arts. She enrolled in the Rhode Island School of Design (RISD), where she completed a BFA in ceramics. *"I would have gone into sculpture"* she admits, "*but I was terribly practical, and went into ceramics because I thought I could make a living that way. I had no intention of becoming a teacher-that was the last thing in the world I intended to do. But, of course, I ended up spending my life as a teacher".*

Figure 1. Schwarz Surfaces, 1985, porcelain, electric fired, c/6, 24"h x 24"w x 24"d.

At RISD Harriet soon discovered that the basic foundation design program was based upon Bauhaus design. The Bauhaus ("a house for building") initiated in Germany in 1919 set standards for present day industrial design, stressing good functional work based on geometric form. Their edict was "form follows function".

Harriet describes Bauhaus design and its impact upon what she learned at RISD.

``The teapot was considered basically a spherical shape. The spout, handle and cover had to balance each other in some way. It was all thought out, not spontaneous, as ceramics later became."

In Figure 3 we see the Bauhaus design in the teapot of 1951. In the teapot of 2001 we see how far she has traveled.

Figures 5-8 are a selection of cubes from 1985, 1989, 1990, and 2000. The variety of glazes is impressive.

MARRIAGE AND CAREER

Two days after graduating from RISD, Harriet married David

Brisson. They then began graduate teaching assistantships at Ohio University in Athens, Ohio, which was the beginning of her teaching career. The Kansas City Institute of Art was their next stop, where David taught drawing and foundation design. Their son Erik was born there in 1957. David then obtained a job teaching basic design in the school of Architecture at Auburn University in Alabama. Harriet was hired part time to teach a course in foundation design. David was subsequently hired at RISD. Harriet enrolled in the Master of Arts teaching program at RISD and then taught in the Providence school system. She continued to work in clay at the high school where there was a large kiln. In 1969 Harriet applied for a teaching position at Rhode Island College in Providence, where she taught until 1997.

David Brisson was a pioneer investigator of hyperspace (four-dimensional space). He constructed a variety of drawings and models of a hypercube and hypertetrahedron, referred to here as a simplex. This motivated Harriet to create an analogue of the Magic Cube using a model of a simplex.

SUMMARY

Harriet Brisson has had a long fruitful career working in a variety of directions. She has continued developing her ideas for teapots and cubes as she moved in new directions such as tilings, space filling sculptures, infinite reflective sculptures, and minimal surfaces. Here are Harriet's recent thoughts and her comments (2001) on retirement.

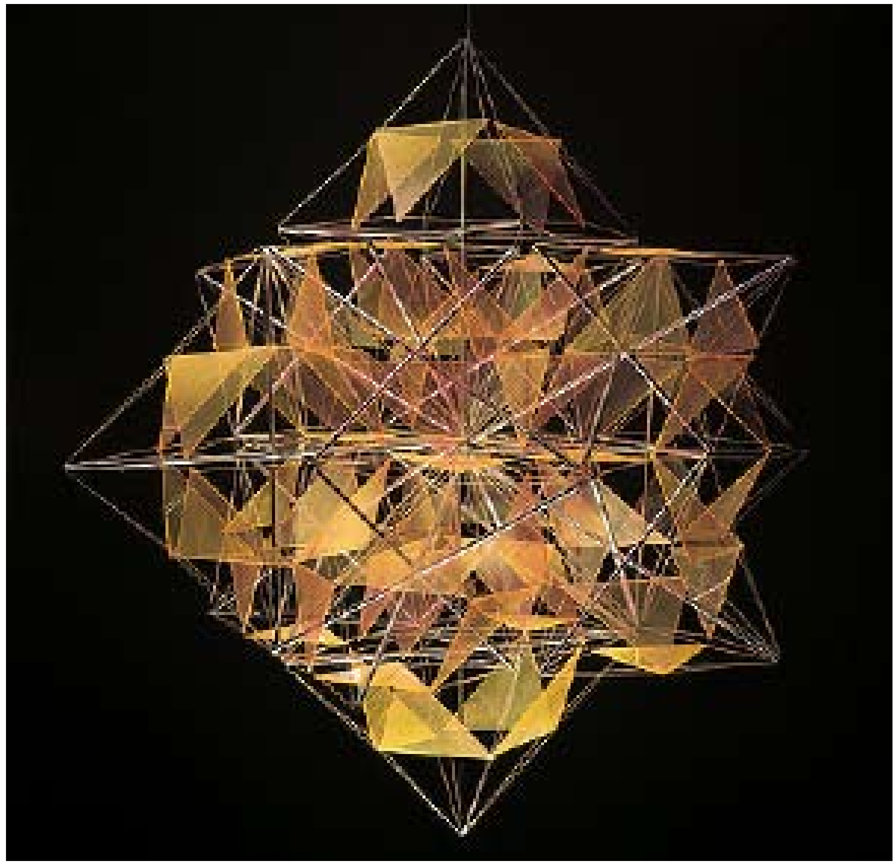


Figure 2. Close Packed Octahedra, Cubes, and Rhombic Dodecahedra, 1980, plexiglas, nylon cord, aluminum rods, 30"h x 24"w x 24"d.

Figure 3. Teapot 1951(left), stoneware,reduction fired, c/8, 5"h x 8"w x 5"d. Teapot 2001 (right), porcelain, soda vapor wood fired, c/11, 10"h x 7"w x 4"d.

HARRIET BRISSON'S COMMENTS ABOUT HER WORK AND RETIREMENT

``I still have that desire to go down new paths…..I still have the courage of risk taking…. Even though I have made cubes for thirty years, they are continually evolving and changing……I'm much more adventurous now than when I was younger.

Figure 4. Sam, 1985, stoneware, reduction fired, c/9, 7"h x 7"w x 7"d.

Figure 5. Cube Striped in Half, 1989, raku clay, raku fired, post fire reduction, 6"h x 6" x6"d, 46th Concorso Internazionale della Ceramica D' Arte, Faenza, Italy.

About Cubes

My love for clay is ever present-color-form-surface-interacting with fire and heat-leaving their marks on the surface.

Again and again I return to the cube. Change-move in new directions.

My concern is to retain the purity of the cube. Lines drawn on the surface are precise-rigid-straight. Glaze defines areas that divide the cube in half. Chance patterns made by flame licking the surface-mixing glazes-making new colors."

Tiling of the Plane

I teach foundation design in the architecture department at Auburn University for five years. I begin asking questions about the basic structure of the world around me.

A tiling or tessellation of planes fit edge to edge to extend indefinitely in two dimensions.

Figure 6. Clouds, 1990, stoneware, reduction fired, 7"h x 7"w x 7"d.

Figure 7. Golden Cube, 1990, raku clay, raku fired, postfire reduction, 6"h x 6"w x 6"d, III World Exibition of Small Ceramics, Zagreb, Republic of Croatia, Honorable Mention.

Figure 8. Cubes with Circles, 2000, stoneware, wood fired, 6"h x 6"w x 6"d.

Chacoal-sawdust-wood leave their mark on the surface-flashes of color-black carbon shadows. Raku pieces glowing yellow-orange are taken from the hot kiln and put into combustibles to burn-producing new shapes on the clay and glaze surfaces.

Space Filling Structures

I construct many close packing pieces. I begin with one of cubes

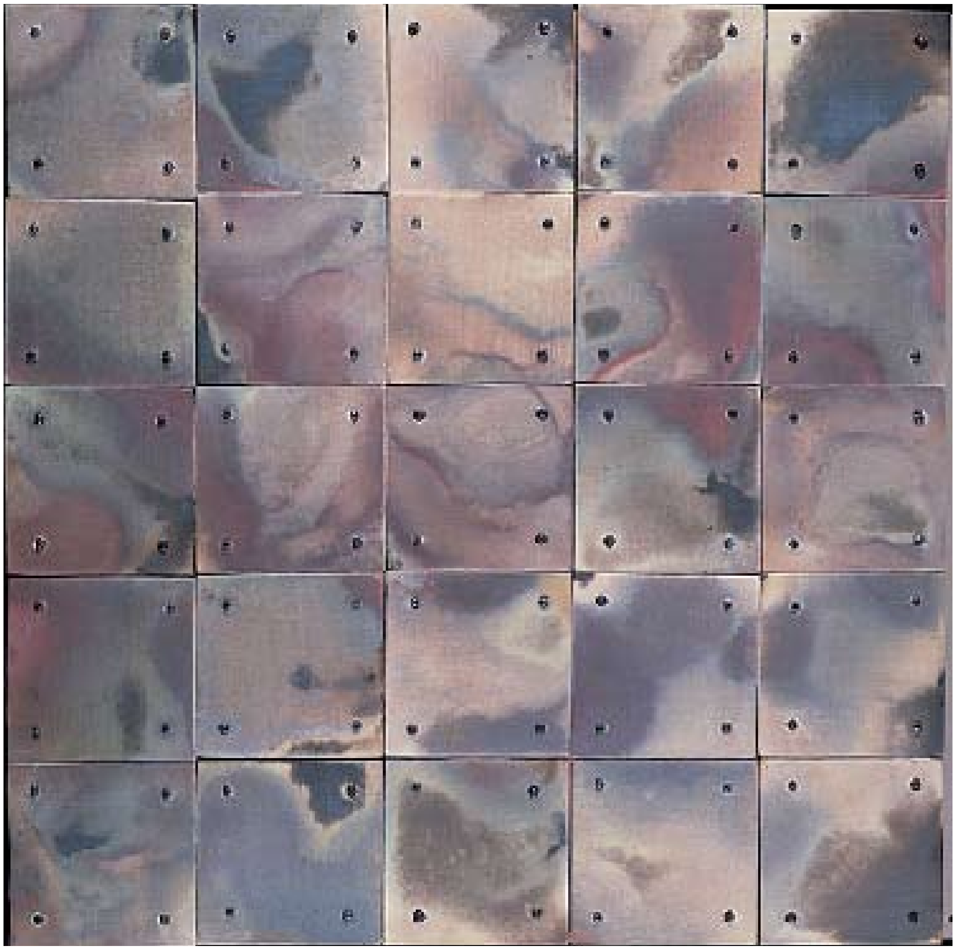


Figure 9. Hakone l, 1978, raku clay, raku fired, post fire reduction, 30"h x 30"w.

and octahedra that fill space completely.

I make a space filling tensegrity structure of close packing octahedra, cubes and rhombic dodecahedra. As it rotates its form seems to change-elusive-planes overlap-appear solid-separate-open up-turn to close again. (Figure 2).

I want to make a close packing of one polyhedron filling space complexly - moving out into space endlessly-unlimited by any sense of an exterior. How to do it?

Red neon tubes defining the edges of a truncated octahedron are placed inside a two-way mirror cube-the light of the neon illuminates the polyhedron within the cube-reflecting-filling space endlessly-an infinite form in a finite space. (Figure 10).

The magic cube is ordered-structured. Two-way mirror surfaces appear solid when the neon tubes are in front of them-dissolve when the neon light is stronger behind them-become "glass"-revealing the form stretching into space.

But chance relationships occur-ever changing-as one moves around it-seeing new views-expanding without limits-reflections disappearing in space.

Hyperspace.

I place a blue neon simplex in a two-way mirror tetrahedron. It produces beautiful reflections but does not fill space. (Figure 11)

Kaleidoscope

I make a large tetrahedron-eight feet along each edge-allowing people to go inside it. Florescent lights define an octahedron on its interior mirrored surface. Reflections move outward in all directions-beyond the confines of the tetrahedron-expanding.

I construct a tetrahedron of two-way mirror plexiglas. Entering-one is surrounded by a new space-seeing one's own reflection as though inside a kaleidoscope-experiencing a sense of unreality-multiple reflections from inexplicable and contradictory directions-the result of the unpredictable reflections inside a tetrahedral space.

Many people have never seen their reflection from angles other then those within a cube. Some are fascinated-some disoriented-some feel claustrophobic-others enjoy the feeling of endless space-a sense of the fourth dimension.

Minimal Surface

The space filling Schwarz Surface is a minimal surface-extending endlessly-dividing space in half equally. Its positive shape is the same as its negative space-curving around it continuously. Clay is the ideal medium for this form.

I make many units in clay-assemble them in different configurations-showing the way the Schwarz

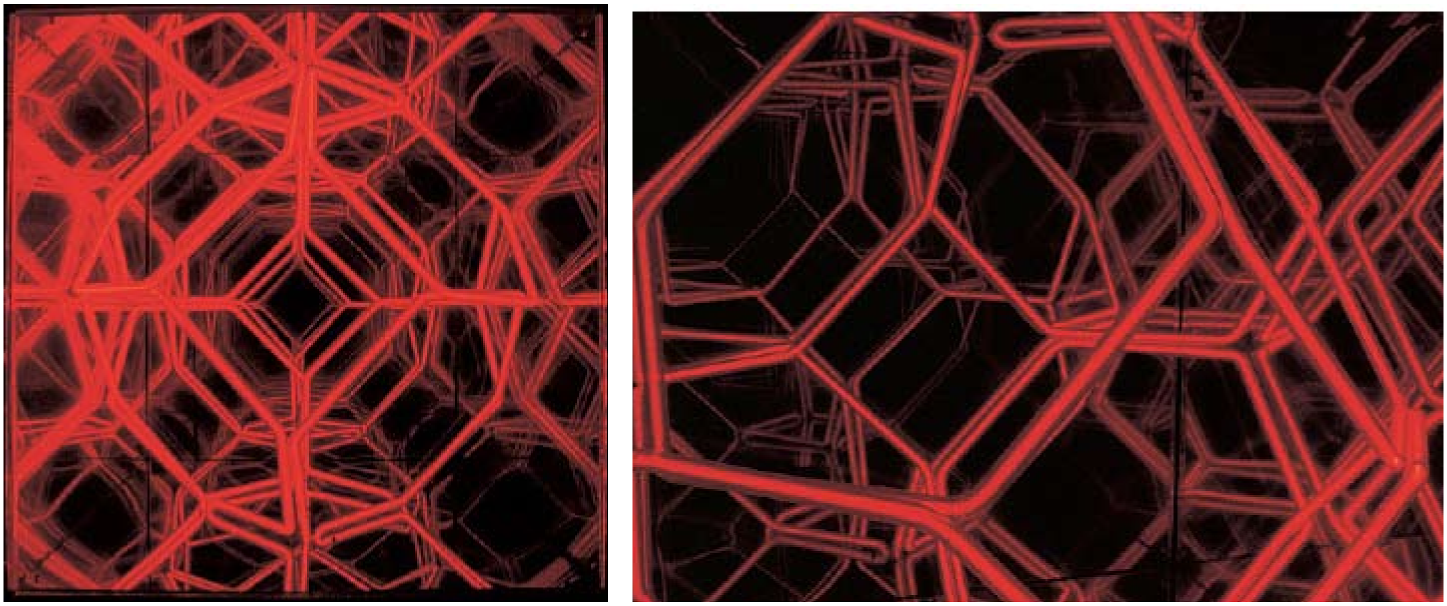


Figure 10. Magic Cube. 1977, neon, two-way mirror plexiglass, 22"h x 22"w x 22" d.

Surface divides space in half-expanding in all directions-left and right-forward and back-up and down. (Figure 1).

Recently I have been exploring the Moebius Band for it has an intrinsic beauty of form and concept. How is it possible to conceive of a surface that has only one side and only one boundary component? Constructing this form in clay is simple. Take a strip of clay, twist it once and join its two ends. Magic! It becomes the one-sided Moebius Band. The plasticity of the clay makes possible the construction of many beautiful interpretations of this mysterious geometric form. Add to this the potential of glaze and firing method and a whole new world of form development is possible. I will continue this direction, following the same path as I worked for so many years with the cube.

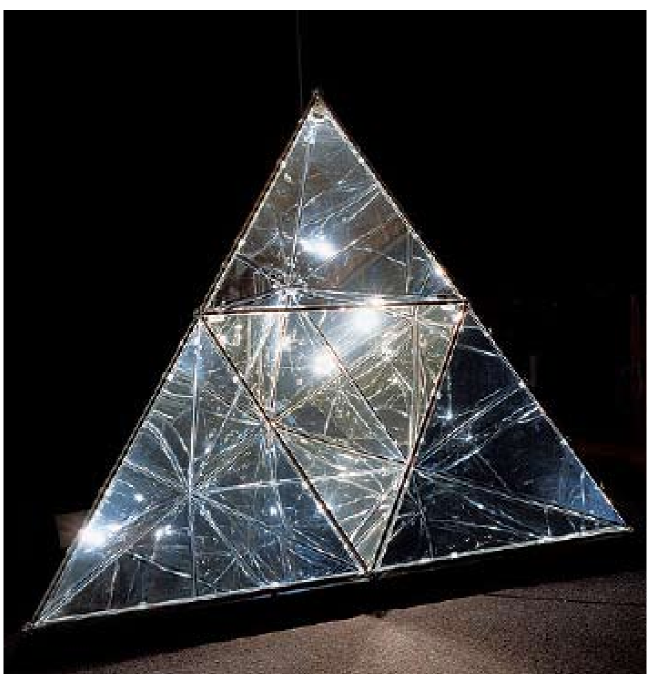


Figure 12. Kaleidescope, 2001, two-way mirror plexiglas, chrome plated steel, halogen lights, 96"h x 100"w x 96"d.

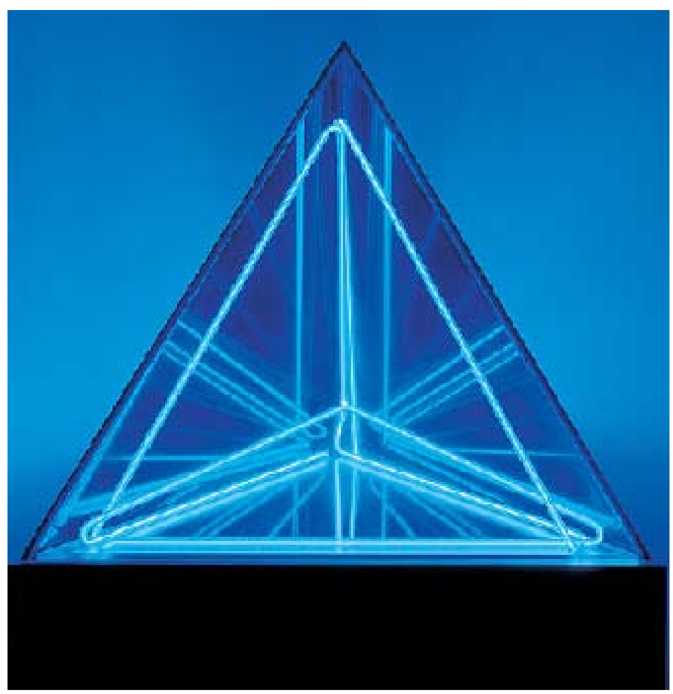


Figure 11. Simplex, 1986, neon, two-way mirror glass, 22"h x 24"w x 22"d.

DRAWING WITH THE LOGICAL SIDE OF THE BRAIN: STEREO PAINTINGS

ERGUN AKLEMAN

Stereo images have fascinated artists for most of the 20th century. For instance, photographers have been creating stereo images nearly a hundred years, and anaglyph (red & blue/green) stereo comics have been popular on and off again in the same period of time. With the recent development of computer graphics, stereo images of 3D scenes has gained popularity among digital artists. However, despite the interest in stereo techniques hand-painted stereo images have not yet been generated. In this work, I introduce the concept of Stereo Painting and present a computer aided method to generate hand-painted stereo images. As a proof of the concept, I have created stereo caricatures of Jimmy Carter, Ronald Reagan, George Bush and Bill Clinton by using this method. An anaglyph version of these caricatures is shown in Figure 1. If you have anaglyph glass, you can see this image in stereo.

Making Stereo Paintings by directly painting on paper is almost impossible. However, it is possible to make painted stereo pairs by using paint programs. In Stereo painting, the goal will be to paint two images that will give a comprehensible 3D feeling when viewed with stereo viewing devices. Of the two images, the one seen by the left eye will be called the left image. Accordingly, the image seen by the right eye will be called the right image. In order to provide a simple procedure to produce Stereo Paintings, we will presume that the left image is given. The right image is then generated by making a collage from the left image via cutting, moving and pasting.

Figure 1. An anaglyph of stereo caricatures of Jimmy Carter, Ronald Reagan, George Bush and Bill Clinton.

PROCEDURE TO CREATE STEREO PAINTINGS

In order to describe the collage procedure, we need to first introduce the simple mathematical framework needed for Stereo Paintings. Let e denote the distance between the left and right eyes; d denotes the distance from which the stereo image is expected to be viewed; z is the distance perceived by the viewer, and x is the signed distance a region in the left image has to move either left or right in order to be perceived at z. By using simple mathematics one can show that the relationship between z and x will be $z=ed/(e+x)$. We can use this equation to show that in order to make Stereo Paintings we do not have to be precise. The following observations summarize the fundamental nature of the stereo equation and provide enough information to make decisions for moving a region.

1.In the stereo equation x can be either positive or negative. Positive x means that the region is shifted to the left, negative x means the region goes to the right. If x is positive then $z<d$, if x is negative then $z>d$. In other words, any region that moves to the left will be perceived as being in front of its actual position in the stereo image plane, or closer to the eye. On the other hand, any region that moves to the right will be perceived as being behind the stereo image plane, or farther away from the eye.

2.There is no limit for moving a region to the left. However, we must not move any region to the right more than the distance between two eyes . This is because $x<-e$ is meaningless according to the equation.

3.If $x=e$ then the distance perceived by the viewer will be $z=d/2$. Moving the same amount to the left again, i.e. making $x=2e$, will only slightly affect perceived distance to $z=d/3$. In other words, when we move a region to the left, even if we are not precise, we will not make a significant mistake.

Based on the observations above, I have developed the following procedure for making Stereo Caricature.

1.Copy the left image and move it to the right less than the amount e. From here on all the operations will act on this new right image, and will be towards the left.

2.Choose an entire subregion of the right image that should appear to be closer to the eye.

3.Copy and move this subregion to the left.

4.Clean the boundaries of the resulting collage.

5.Choose a subregion of the previous subregion that should appear to be closer to the eye.

6.Go to 3 and repeat the process until the subregions become extremely small.

By using the procedure above I have created stereo caricatures of four presidents of the United States shown in Figure 1. One example of the left and right images are shown in Figure 2.

The procedure that is used to create the original left image caricatures is a subject of another piece.

left image ***Right image***

Figure 2. A stereo-pair caricature of Jimmy Carter.

EVA HILD AT NANCY MARGOLIS GALLERY

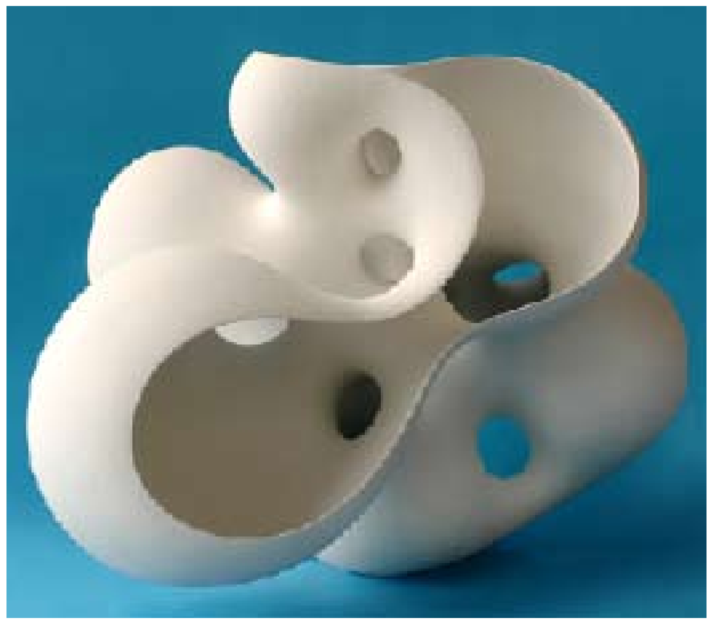
NAT FRIEDMAN

The Nancy Margolis Gallery, 523 W 25th St, NY, NY 1001, is pleased to announce the second solo exhibit In Between featuring the Swedish artist Eva Hild, opening October 25 and extending through November 24. Hild, one of Sweden's most talented young artists has had a meteoric career. Since her first exhibit two years ago, Hild's work has become increasingly sought after, and has received attention and acclaim from collectors and museums in the US and Scandinavia.

The rare ability to mesh an elegant aesthetic, dynamic energy, and mastery of her clay material is the secret to her success. The sculptures, taking four to six months to make, are hand constructed with clay coils followed by a painstaking sanding process. Before firing, the sculpture is sprayed with white kaolin slip, which gives it a porcelaineous appearance. Regardless of scale, the sculpture radiates a monumentality and sheer beauty.

It is the acknowledgement of space as a main component to Hild's work, which lends to its visual impact.

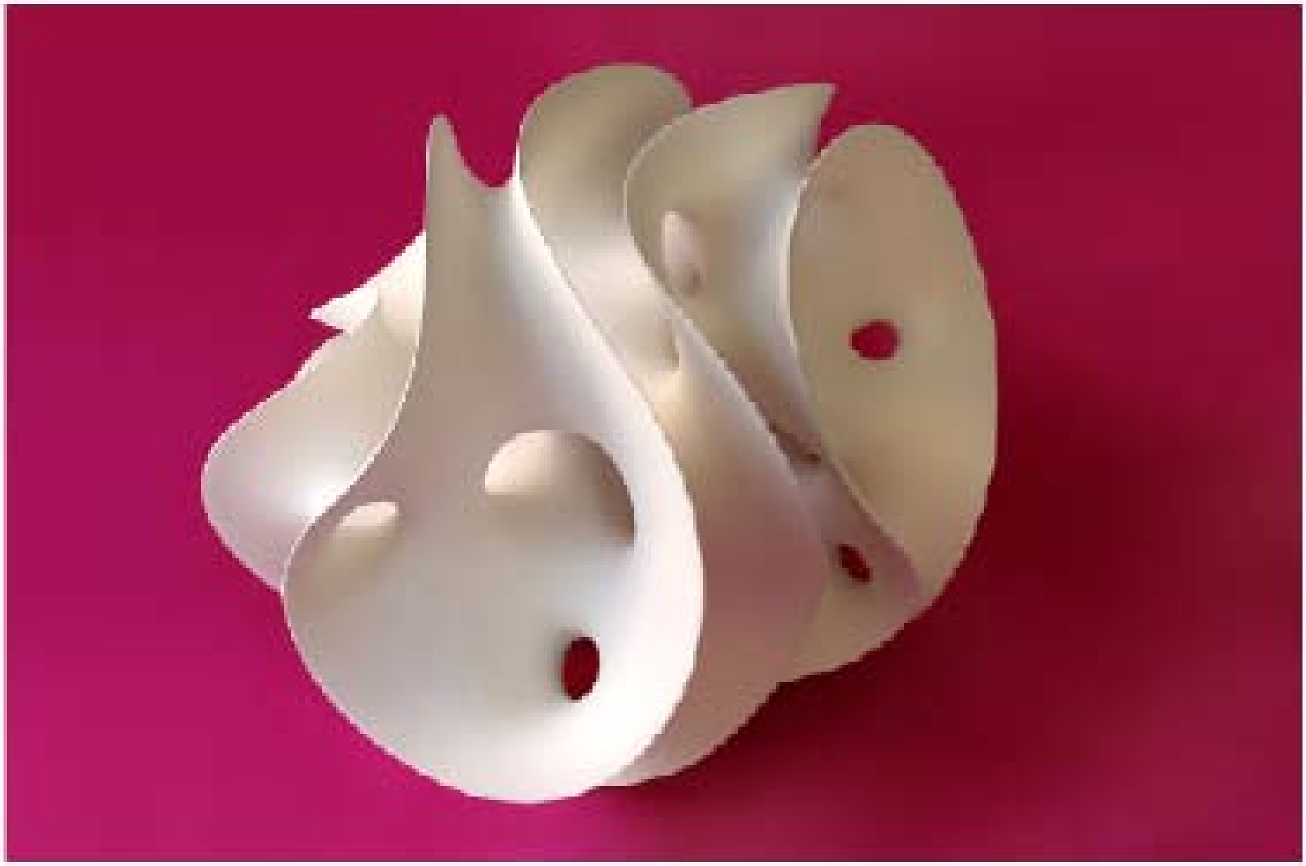
"Loop 441" 2007 stoneware, 14" x 21"x 17"



"Loop Through 648"2007 stoneware, 24" x 35" x 28"

"Loop 396" 2007 stoneware, 15" x 20" x 12"

"Extension Loop 1079" 2007 stoneware, 26" x 36" x 28"



“Loop Around 1038” 2007 stoneware, 24.5” x 30.5” x 25”

“Loop 414” 2007 stoneware, 18” x 18” x 15”

Each piece is a continuous contour of clay, at once compressed and supported by the space around it. Her work is the mixing of space and mass, creating a whole, which is no longer of two forms. Hild expresses space and mass, light and shade, construction and destruction and the constant tension between them in her work.

Hild lives and works in Sweden where she received her MFA from the University of Gothenburg. She is the recipient of numerous grants and awards, namely the 2007 Visual Arts Fund grant, 2005 Special Prize at the World Ceramic Biennale, Korea, and the 2003 Sten A Olsson Fund for Science and Culture. Her work can be found in public and private collections including the Museum of Arts and Design, New York, The Museum of Modern Ceramic Art, Japan, The National Museum, Stockholm and the Boras Art Museum.

Please feel free to contact the gallery if you have any questions or wish to receive more information on the artist.

We are grateful to the Nancy Margolis Gallery for allowing this announcement to be placed in Hyperseeing. The website is www.nancymargolisgallery.com

References.

[1] Nat Friedman, *Eva Hild: Topological Sculpture from Life Experience*, Proceedings of Bridges London 2006, editors Reza Sarhangi and John Sharp. Also appears in Vismath at www.mi.sanu.ac.yu/vismath/friedman1/index.html

[2] Nat Friedman, *Eva Hild: Sculpture and Light,* Hyperseeing, August, 2007, www.isama.org/hyperseeing/

"Wall Piece 2" 2007 stoneware, 7" x 35.5" x 26.5"

"Funnel Loop 1081" 2007 stoneware, 22.5" x 34.5" x 27"

"Wall Piece 1" 2007 stoneware, 6" x 27" x 16.5"

KEIZO USHIO: 2007 SCULPTURES **NAT FRIEDMAN**

Figure 1. Oushi Zokei Bondi 2007, Japanese black granite, H 170 x W 130 x D 80 cm, Bondi Beach, Sydney, Austalia.

Keizo had a very busy year in 2007. He completed four major sculptures as well as working on small and medium size sculptures in preparation for an exhibit to be held in 2008 at the Robert Steele gallery, New York City.

Figure 3. Oushi-Zokei Infinity, 2007, Japanese blue granite, H 220 x W 160 x D 160 cm, Merida, Yucatan, Mexico.

Figure 2. Oushi-Zokei Triangle, 2007, Japanese blue granite, H 120 x W 150 x D 80 cm, Cottesloe Beach, Perth, West Australia.

Figure 4. Oushi- Zokei Nagano 2007, Japanese blue granite, H 170 x W 220 x D 160 cm, Nagano, Japan.

OUSHI-ZOKEI BONDI

At Bondi Beach in Sydney, Australia, he exhibited Oushi-Zokei Bondi 2007 shown in Figure 1, which is a divided triple twist Mobius band in Japanese black granite. This strikingly beautiful sculpture is a new configuration of a triple twist Mobius band. The surface treatment combines a polished surface with a contrasting bush hammer treatment in the lower portion. The narrow drilled space is a triple twist space Mobius band with refined drill marks. The divided band is not knotted since there are two right half twists and one left half twist. An alternate view is shown in Figure 5.

Figure 5. Oushi-Zokei Bondi 2007.

It is interesting to compare this view with Figure 1, where the sculpture has a torso appearance that is wider at the top. In Figure 5 the middle is wider and we can better appreciate the twist at the top. The shape of the center space is also quite different. As one walks around the sculpture, the center space will take a range of interesting shapes.

A preliminary drawing of Oushi-Zokei Bondi 2007, as shown in Figure 6. This gives some insight into the role of drawing in his creative process.

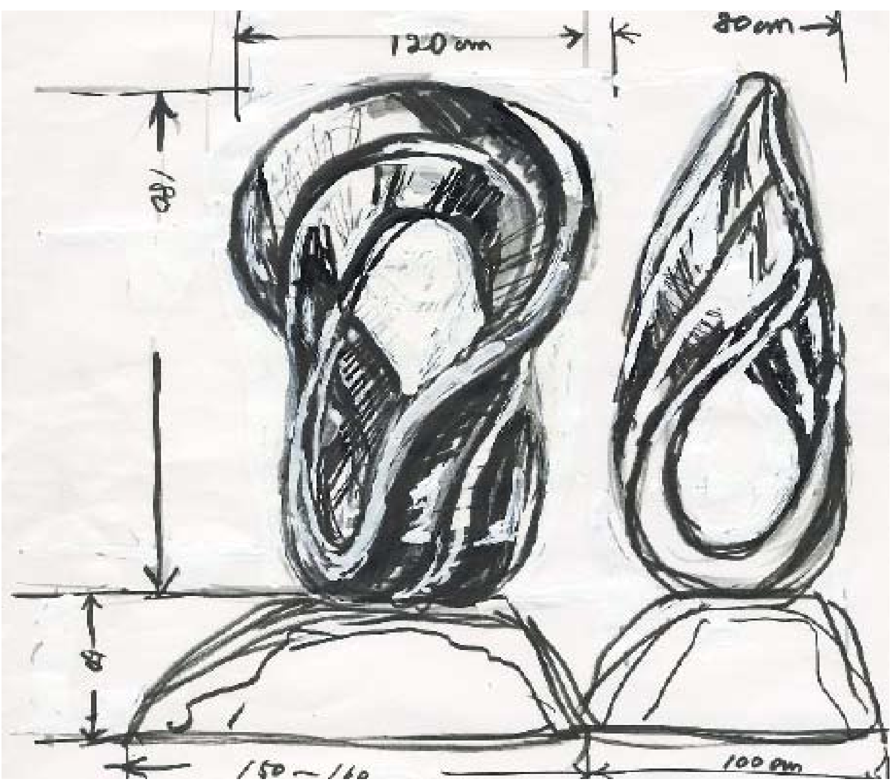


Figure 6. Drawing for Oushi-Zokei Bondi 2007.

OUSHI-ZOKEI TRIANGLE

At Cottesloe Beach in Perth, West Australia he exhibited Oushi-Zokei Triangle shown in Figure 2, which is a completely different configuration of a divided single twist Mobius band in Japanese blue granite. The surface treatment also combines a polished surface with a contrasting bush hammer treatment in the lower portion. Here the narrow space is a single twist space Mobius band with refined drill marks. Alternate views are shown in Figures 7 and 8.

Figure 7. Oushi-Zokei Triangle.

In Figure 7 we can appreciate the width of the opening in and the curvature of Oushi-Zokei Triangle. It always makes Keizo happy to see children enjoying his sculptures, as in Figure 8.

Figure 8. Oushi-Zokei Triangle.

OUSHI-ZOKEI INFINITY

Oushi-Zokei Infinity is shown in Figure 3 at an exhibit of Japanese sculptors held in Merida, Mexico, curated by Keizo Ushio. The two alternate views of Oushi-Zokei Infinity in Figures 9 (a) and (b) show how the sculpture is completely three-dimensional. The interaction of the refined drill marks with sunlight is quite distinctive, as also seen in Figures 3 and 4.

Figure 9. Two views of Oushi-Zokei Infinity.

OUSHI-ZOKEI NAGANO

The highlight of Keizo's year was winning the Nagano Sculpture Prize and he completed the corresponding commission Oushi Zokei Nagano 2007 shown in Figure 4. Nagano was the site of the winter Olympics. As is the case in the two-piece interlocking divided tori, there are several ways to position the two interlocking forms. This configuration is different then the previous similar sculpture configuration at the International Congress of Mathematics in Madrid, as Keizo points out as follows.

(1)The surface combines polished and rough bush hammered treatment.

(2) The perpendicular aperture is delayed 30 degrees. (That is, the vertical part is rotated 30 degrees less then in the Madrid sculpture)

(3) There are no sharp edges

Figure 10. Oushi-Zokei Nagano 2007.

so children can safely touch the polished, rough, and drill mark surfaces for a tactile experience.

With regard to (3), Keizo always encourages people to touch his sculptures as he feels a complete sculptural experience combines the visual and tactile senses.

The alternate view of Oushi-Zokei Nagano 2007 in Figure 10 allows us to appreciate the polished surface of the Japanese blue granite in the vertical part. This is a special blue granite that is named “Seiryu-seki” which means “stone is like a pure clear stream”. The blue pattern is reminiscent of a Japanese watercolor painting. Keizo has also again emphasized the drilling process for dividing the torus by carefully refining the drill marks resulting in a dramatic visual feature of the sculpture.

Images of a work in progress in Keizo's studio are shown in Figures 11-13.

The work in progress in Figures 11-13 is a completely new exciting configuration that opens up a whole range of possibilities for future sculptures. The image in Figure 12 shows that the upper semi-circular arc is perpendicular to the lower semi-circular arc, which gives the sculpture a more all-around three-dimensional presence. This is a strong form-space configuration consisting of two semi-circular arcs growing out of a central core. A two-way 3D-rotational symmetry results.

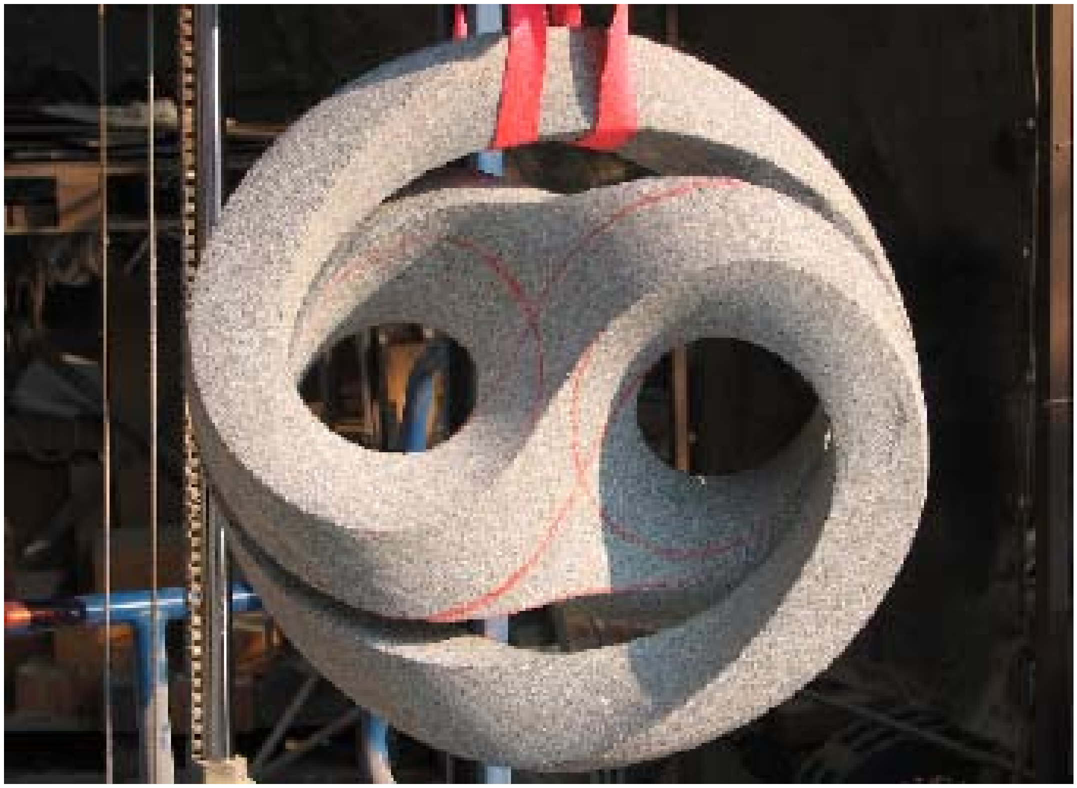


Figure 11. Work in progress.

Figure 12. Work in progress.

A drawing for a related future work is shown in Figure 14. This work appears to have a three-way 3D-rotational symmetry.

Figure 13. Work in progress.

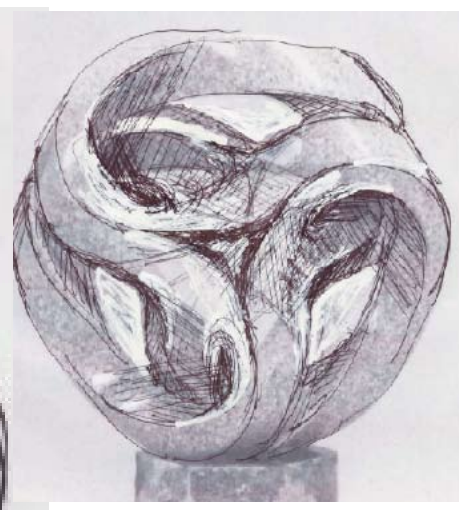


Figure 14. Drawing for a future work and its detail.

LINEAR/LANDSCAPE PERIOD (1965-1970)

DOUGLAS PEDEN

Having discussed my Organic Period in the September issue of Hyperseeing, relating painting to mathematics, music, and science, this is my next installment in my evolution as a painter.

Perhaps because of my inherent love of the outdoors and landscape, and the feeling that the expressive potential of the radiating imagery of the previous period was limited, my style evolved to an open ended, horizontally layered format of line and color sections, as exemplified in this essay. The lines and edges (edges defined by two contiguous colors and/or tones) were designed to represent some basic landscape symbols such as water, mountains, clouds, trees, shrubs, i.e., general vegetation and architecture, as seen in Figure 1. The symbols themselves were positioned upright or inverted — reflective translation, if you wish. One could also postulate the inverted images as negative spaces or shadows; thereby, adding to a sense of interest and mystery. The separate images were also thought of as symbols of musical sounds or notes composed in some intuitive rhythmic sequence; however, the images themselves had no direct relationship to any specific note or musical pitch or mathematically conceived rhythmic pattern. The symbols illustrated in Figure 1 are some of those I more commonly used. These were sometimes varied in shape, depending on what I wanted to express, which will be demonstrated in some of the following examples. Also, it should be noticed that where I have an edge defined by two sections of different colors or a line superimposed on a specific color, I sometimes resort to the optical devise described in my September article; that is, an added "visual sound" quality of optical

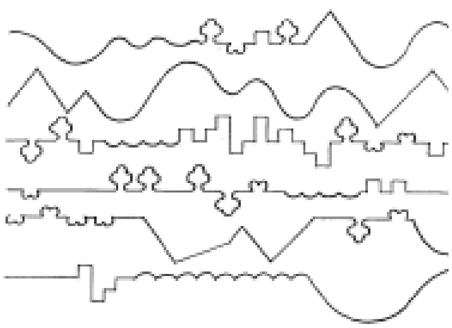


Figure1: Symbolic Linear Landscape

Figure 2: Two Cities (1969) 50X49"

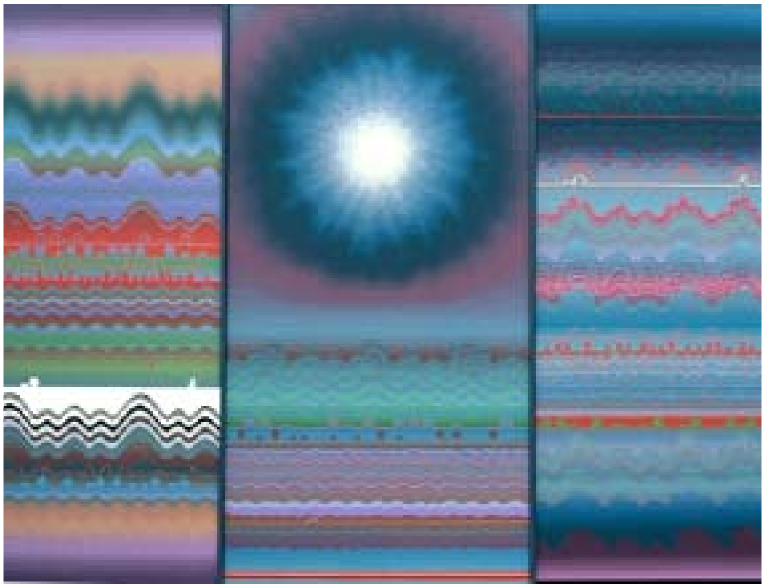


Figure 3: Homage III (1969) 55X73"

Figure 4: Ecce Homo (1967) 51X68"

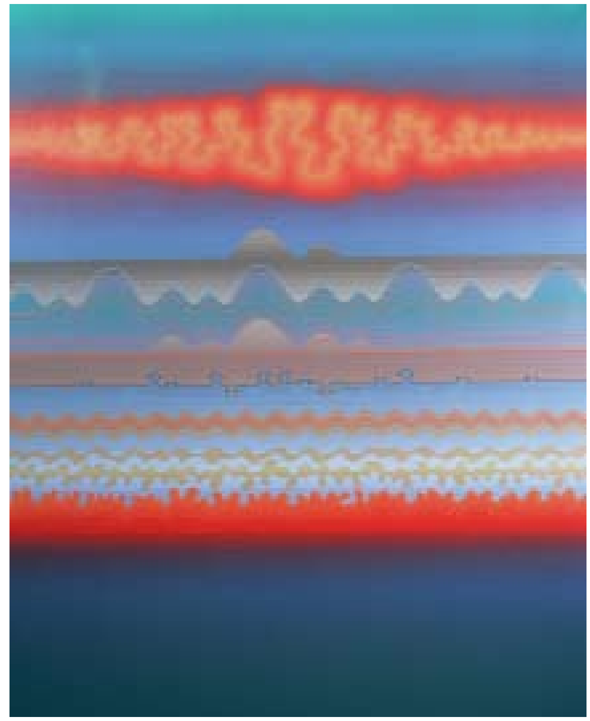


Figure 5: Landscape #22 (1969) 69X49"

vibration induced in the edges and lines to act in concert and contrast with the more "stable" edges and lines in the composition. Also note, that the layered sections of land, sky, and water are placed in any order as I feel necessary; that is, the order does not follow the normally perceived landscape sequence such as land and sea being placed below the sky. Also note that the water and sky are not necessarily blue, or the vegetation green. I choose a free and varied choice of such symbolism depending on my mood and intent. Let me also point out that the overall layered effect in these paintings has a visual similarity suggestive of an orchestral score with its own horizontal instrumentally layered note patterns. Now for a closer look at some of the paintings themselves.

Two Cities, Figure 2, could be described as composed of a gentle, certainly in color, landscape and small city scene contrasted with a 'harder" expression of a larger, dominant cityscape surrounded by a rather tedious suburban conclave. Also note that, though this painting is a good example of the use of the symbols as described in Figure 1, it includes some variations, such as seen in the mountains which are portrayed with a mixture of rolling and jagged contours and the water as a mixture of sinusoidal and cusped wave figuration. My three panel (triptych) painting Homage III, Figure 3, could simply be viewed as a homage to nature expressed in an overall rather cool "color key" (to borrow an expression from musical terminology) of blue, which is somewhat counterbalanced by a "warmer," rhythmically contrasting left panel. The middle section with its radiating image, reminiscent of my previous period, might be viewed as a cool sun or a moon image. However, let me remind the reader, any interpretation, depending on the mood of the viewer, is certainly valid — my purpose here is merely to point out some details, personal or otherwise, that might not be observed but may be of interest. Figure 4, Ecce Homo, the title? Don't ask! However, the jagged terrain and three pronged pointed trees, included in a somewhat chaotic design expressed in the fiery key of red would indicate a rather uncomfortable environment. It's not the kind of painting one would hang in a hospital room. But however you interpret it, I would argue it is not a comfortable piece; and, as a musical metaphor, not gentle or soothing— more expressive of violence or cacophony perhaps. With Figure 5, titled Landscape #22, I'll leave the interpretation to the discretion of the viewer to study, judge, and title. However, let me say that the #22 in the title is thought of as an opus number equivalent to that used in music literature; that is, a way to record the sequence of my paintings — later to be detached from the landscape idea.

In my next article, I will discuss my third period: Grid Geometry/ Euclidean Space Period.

MAGNUS WENNINGER OSB: MATHEMATICAL MODELS

NAT FRIEDMAN

Father Magnus Wenninger OSB with models.

LIFE JOURNEY

Father Magnus Wenninger OSB is a Priest, monk, mathematician, philosopher, and builder of polyhedra and polytopes (3D models of 4D polyhedra). He was born in Park Falls, Wisconsin on October 31,1919 and attended St. Anthony Elementary School in Park Falls, 1925-1933. He then attended Saint John's Preparatory School, Collegeville, Minnesota, 1933-1937, and Saint John's University, Collegeville, 1937-1942, where he received a B.A. in Philosophy with a minor in Education.

He entered Saint John's Abbey and professed monastic vows on July 11, 1940. He attended Saint John's Seminary and was ordained a Roman Catholic priest on September 2, 1945. Father Wenninger also obtained an M.A. in Philosophy in 1946 at the University of Ottawa, Canada and an M.A. in Mathematics in 1961 at Columbia University Teachers College, New York City.

Actually Father Wenninger became interested in mathematics when he was assigned to teach at St. Augustine's College, Nassau, The Bahamas, 1946-1971, where he became Math Department Head. He became interested in polyhedra when he was at Columbia Teachers College. It was there that he saw

Father Magnus Wenninger OSB with models.

the polyhedron models made by Colonel Robert Beard in a display case in a hallway of the Mathematics Department in 1961. By 1966 his booklet Polyhedron Models for the Classroom was published by the National Council of Teachers of Mathematics. Later he was Accountant and Comptroller at St. Augustines, 1971-1981 and then Accountant in Liturgical Press, Order of Saint Benedict, Collegeville, Minnesota, 1981-1984, where he is now retired at St. John's Abbey.

MAGNUS

In the world of mathematics, Father Wenninger is known simply as Magnus. I first met Magnus when he attended the Art and Mathematics (AM) conferences held at the University at Albany, 1992-1997, (AM92-AM97). Magnus really loves constructing paper models of polyhedra and polytopes. He would spend each day happily sitting at a table constructing models and conversing with anyone who happened to sit down to watch him work. Magnus is considered an icon in the world of mathematical art. In particular, at AM 93 I clearly recall Chaim Goodman Strauss, who was then a very enthusiastic graduate student attending the conference, absolutely flipping out when I told him Magnus would be at the conference. Chaim had brought a whole box of books including Magnus' books and couldn't wait to have him autograph them. Chaim is now a well-known mathematician and is collaborating with John Horton Conway, whom he met in Albany. This is just one of many successful partnerships that grew out of the AM conferences.

Magnus' books [1-5] are classics in the field of mathematical models. Countless teachers and students have been introduced to polyhedra through his books. In fact, by introducing color, he created attractive examples of geometric art. Thus he can be considered a pioneer in the field of mathematical art. His polyhedron models are for sale at http://employees.csbsju.edu/mwenninger/. Examples are shown in the following figures.

Star Polyhedra

Stellation and Spherical Models

Polytope Models

This year the Exhibit of Mathematical Art at the Joint Mathematics Meeting in San Diego, California, January 6-9, 2008, curated by Robert Fathauer and Anne Burns, will be in honor of Magnus. The exhibit will include a display of his models and there will be a full-color catalog of the exhibit. Furthermore, the Special Interest Group on Mathematics and the Arts of the Mathematical Association of America (SIGMAA-ARTS) will present a Lifetime Achievement Award to Magnus.

References

[1] Magnus J. Wenninger, *Polyhedron Models for the Classroom.* National Council of Teachers of Mathematics, 1966, 2nd Edition, 1975. Spanish language edition: Olsina, Spain, 1975.

[2] Magnus J. Wenninger, P*olyhedron Models.* Cambridge University Press, London and New York, 1971.Paperback Edition, 1974. Reprinted 1975, 1976,1978, 1979, 1981,1984, 1985, 1987, 1989, 1990, 1996. Russian language edition: Mir, Moscow, 1974; Japanese language edition:Dainppon, Tokyo, 1979.

[3] Magnus J. Wenninger, S*pherical Models,* Cambridge University Press, London and New York, 1979; Paperback Edition, 1979. Dover Publication, 1999.

[4] Magnus J. Wenninger, *Polyhedra Posters,* Palo Alto, CA: Dale Seymour Publications, 1983.

[5] Magnus J. Wenninger, *Dual Models.* Cambridge University Press, London and New York, 1983. Paperback edition, 2003.

MAX BILL CENTENNIAL

January 20-May 12, 2008
Museum of Fine Arts
Winterhur, Switzerland

Information: www.maxbill08.ch

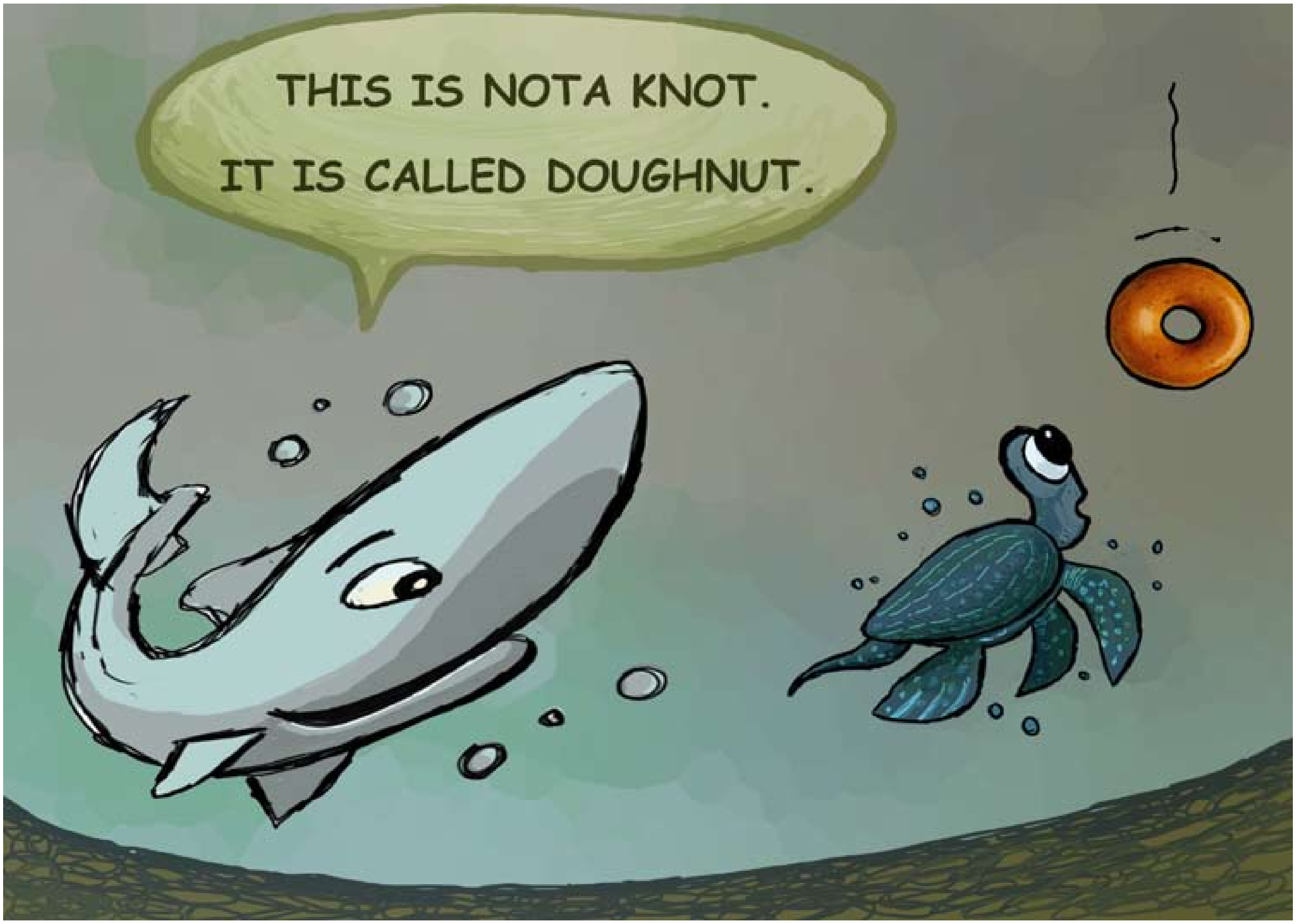
I am of the opinion that it is possible to develop an art largely on the basis of mathematical thinking.

Max Bill

The image: Max Bill, Moebius Band, 150 x 100 x 120 cm, granite, Pompidou Center, Paris, France

ILLUSTRATIONS BY ROBERT KAUFFMAN

KNOT THEORY - CARTOONS BY ERGUN AKLEMAN



BRIDGES LEEUWARDEN 2008

Celebrate the 110th Birth Year of M.C. Escher in His Birthplace during the 11th Annual Bridges Conference
July 24-28, 2008 (Excursion on Saturday July 26)
July 29 Mathematical Art Public Activity Day
Five days of Bridges Conference activities (July 24-28)
including an Escher Day on July 28, are followed by a Family Math/Art Day (July 29).

Bridges 2008 will be held July 24-28 in Leeuwarden, The Netherlands, the birthplace of M.C. Escher. It includes presentations, workshops, a visual art exhibit, a musical event, an excursion, and a special Escher day. Detailed information is available at http://www.bridgesmathart.org

The Bridges Conferences, running annually since 1998, brings together practicing mathematicians, scientists, artists, educators, musicians, writers, computer scientists, sculptors, dancers, weavers, model builders in a lively atmosphere of exchange and mutual encouragement. Important components of these conferences, in addition to formal presentations, are hands-on workshops, gallery displays of visual art, working sessions with artists who are crossing the mathematics-arts boundaries, and musical/theatrical events in the evening.

AN ILLUSTRATION BY DANIEL WYLLIE

ALL BARK AND NO BITE

JOURNAL OF MATHEMATICS AND THE ARTS

The Journal of Mathematics and the Arts is a peer reviewed journal that focuses on connections between mathematics and the arts. It publishes articles of interest for readers who are engaged in using mathematics in the creation of works of art, who seek to understand art arising from mathematical or scientific endeavors, or who strive to explore the mathematical implications of artistic works. The term "art" is intended to include, but not be limited to, two and three dimensional visual art, architecture, drama (stage, screen, or television), prose, poetry, and music. The Journal welcomes mathematics and arts contributions where technology or electronic media serve as a primary means of expression or are integral in the analysis or synthesis of artistic works. The following list, while not exhaustive, indicates a range of topics that fall within the scope of the Journal:

• Artist's descriptions providing mathematical context, analysis, or insight about their work.
• The exposition of mathematics intended for interdisciplinary mathematics and arts educators and classroom use.
• Mathematical techniques and methodologies of interest to practice-based artists.
• Critical analysis or insight concerning mathematics and art in historical and cultural settings.

The Journal also features exhibition reviews, book reviews, and correspondence relevant to mathematics and the arts.
Papers for consideration should be sent to the Editor at the address below:

Gary Greenfield - Mathematics & Computer Science, University of Richmond, Richmond VA 23173, USA; Email: ggreenfi@richmond.edu.

For information, see www.tandf.co.uk/journals/titles/17513472.asp

A SAMPLE OF WEB RESOURCES

[1] www.kimwilliamsbooks.com : Kim Williams website for previous Nexus publications on architecture and mathematics.
[2] www.mathartfun.com : Robert Fathauer's website for art-math products including previous issues of Bridges.
[3] www.mi.sanu.ac.yu/vismath/: The electronic journal Vismath, edited by Slavik Jablan, is a rich source of interesting articles, exhibits, and information.
[4] www.isama.org : A rich source of links to a variety of works. For inclusion in Hyperseeing, members of ISAMA are invited to email material for the categories outlined in the contents above to Nat Friedman at artmath@math.albany.edu
[5] www.kennethsnelson.com: Kenneth Snelson's website which is rich in information. In particular, the discussion in the section Structure and Tensegrity is excellent.
[6] www.wholemovement.com/
Bradfrod Hansen-Smith's webpage on circle folding.
[7] http://www.bridgesmathart.org/
The new webpage of Bridges.
{8} www.topmod3d.org (You can download Topological Modeler, Topmod 3D)
[9] www.georgehart.com: George Hart's Webpage. One of the best resources.
[10] www.cs.berkeley.edu/: Carlo Sequin's webpage on various subjects related to Art, Geometry ans Sculpture.
[11] www.ics.uci.edu/~eppstein/junkyard/: Geometry Junkyard: David Eppstein's webpage anything about geometry.
[12] www.npar.org/ Web Site for the International Symposium on Non-Photorealistic Animation and Rendering
[13] www.siggraph.org/: Website of ACM Siggraph.

BOOK REVIEWS

[1] Constructing Modernity: The Art and Career of Naum Gabo by Martin Hammer and Christina Lodder, 528 pages, Yale University Press (June, 2000).
ISBN-10: 0300076886, ISBN-13: 978-0300076882.

Wall Street Journal
"A superb and much-needed book sure to be the standard reference work on this artist for some time to come."

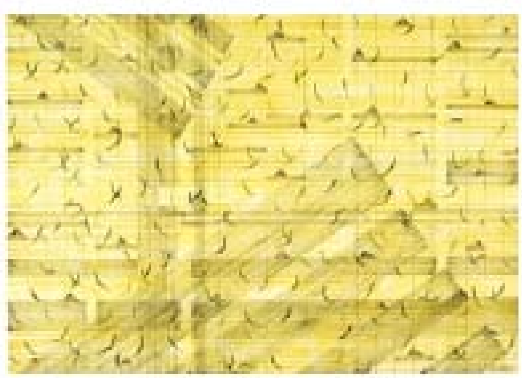
[2] Barbara Hepworth Reconsidered, edited by David Thistlewood, 272 pages, Liverpool University Press, (June, 1996). ISBN-10: 0853237709, ISBN-13: 978-0853237709.

Editorial Reviews
"This is the first large-scale critical appraisal of this artist for more then twenty years. This volume presents a range of interpretations of her work, together with the most comprehensive bibliographic survey of Hepworth literature to date."

There are discussions in both [1] and [2] concerning the working relationship between Gabo and Hepworth, as well as their ideas based on mathematical models.

COMMUNICATIONS

Elizabeth Whiteley is in the group exhibit: Hand-Made: A Washington Sculptors GroupExhibition of Sculpture and Drawings, January 5-February 16, 2008, at Mansion at Strathmore, 10701 Rockville Pike, North Bethesda, Maryland, www.strathmore.org
Beth is exhibiting her drawing "Geometric Screen 2" shown here.



Beth Whiteley, Geometric Screen 2.

This section is for short communications such as recommendations for artist's websites, links to articles, queries, answers, etc. For inclusion in HYPERSEEING, members of ISAMA are invited to email material for the categories outlined on the cover to hyperseeing@gmail.com or Nat Friedman at artmath@math.albnay.edu.

ISAMA VALENCIA 2008

JUNE 16-20, 2008, UNIVERSIDAD POLITÉCNICA DE VALENCIA

CONFERENCE

ISAMA'08 will be held at **Universidad Politécnica de Valencia**, in Valencia, Spain. The purpose of ISAMA'08 is to provide a forum for the dissemination of new mathematical ideas related to the arts and architecture. We welcome teachers, artists, mathematicians, architects, scientists, and engineers, as well as all other interested persons. As in previous conferences, the objective is to share information and discuss common interests. We have seen that new ideas and partnerships emerge which can enrich interdisciplinary research and education.

IMPORTANT DATES

Jan.15, 2008 Submission system open
Mar. 1, 2008 Paper and short paper submission deadline
Apr. 1, 2008 Notification of acceptance or rejection
May. 1, 2008 Deadline for camera-ready copies

SUBMISSION

Authors are requested to submit papers in PDF format, not exceeding 10 MB. Papers should be set in ISAMA Conference Paper Format and should not exceed 10 pages. LaTeX and Word style files will be available. The papers will be published as the Proceedings of ISAMA'08.

RELATED EVENTS

Exhibition: There will be an exhibit whose general objective is to show the usage of mathematics in creating art and architecture. Instructions on how to participate will be posted on the conference website.
Workshops: There will be workshops. Instructions on how to participate will be posted on the conference website.

CALL FOR PAPERS

Paper submissions are encouraged in arts, mathematics and architecture. In particular, we specify the following and related topics that either explicitly or implicitly refer to mathematics: Painting, Drawing, Animation, Sculpture, Storytelling, Musical Analysis and Synthesis, Photography, Knitting and Weaving, Garment Design, Film Making, Dance and Visualization. Art forms may relate to topology, dynamical systems, algebra, differential equations, approximation theory, statistics, probability, graph theory, discrete math, fractals, chaos, algorithmic methods, and visualization.

The Hemispheric by Santiago Calatrava at the Ciutat de les Arts i les Ciències in Valencia, Spain.
Photograph taken by **David Iliff** with a Canon 5D and 85mm f/1.8 lens. This is a 2x6 segment panorama created by **David Iliff**. From http://commons.wikimedia.org/wiki/Image:Hemispheric_-_Valencia%2C_Spain_-_Jan_2007.jpg

Details of ISAMA VALENCIA 2008 are at www.isama.org.