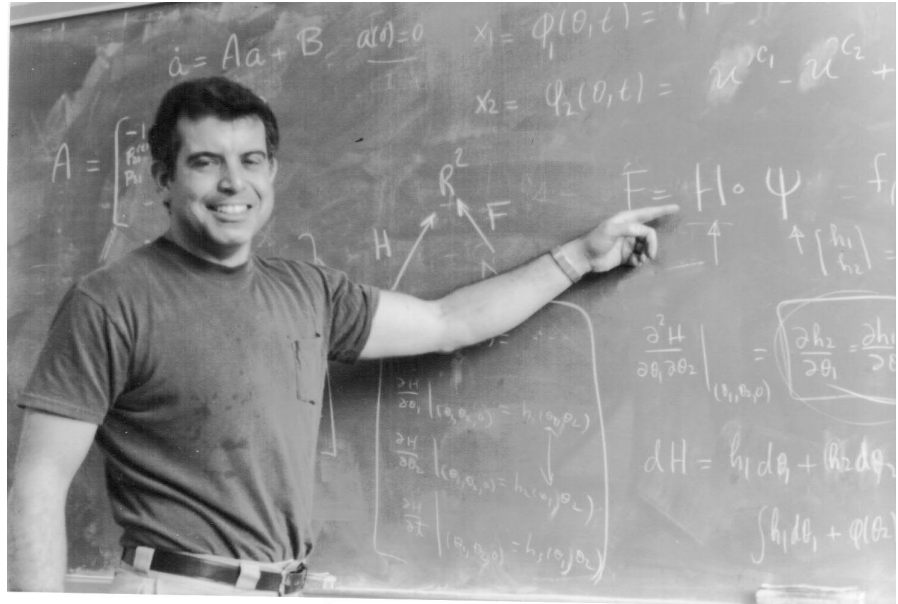


A Tribute to Nat Friedman

15 March 1938 (Chicago, Illinois) - 2 May 2020 (Gloversville, New York)

Milena Chilla-Markhoff

Nat Friedman received his B.A. and M.A. in Mathematics from U Michigan and his PhD in Mathematics from Brown University in 1964. He was Professor of Mathematics at SUNY Albany 1968-2000. He made an enormous impact in the early years of ergodic theory and measurable dynamics. Nat took his first sculpture course in 1971 with my father, Alex Markhoff, and began carving works in wood and stone,



later also working with ceramics and metals. Concurrently, he began collecting works by artists that appealed to his interest in mathematics, surface structures, and “seeing relationships.” In 1992, while teaching at SUNY Albany, Nat Friedman founded the international and interdisciplinary Art and Mathematics Conference. The conference convened annually at SUNY Albany for six years and in 1998 Nat founded ISAMA (The International Society for the Arts, Mathematics, and Architecture) which held annual conferences at academic institutions in the USA and Europe and published HYPERSEEING regularly since 2006. Nat was always excited to hear about [art math community]. He so treasured the art/math connections that he fostered both locally and later globally through ISAMA. This photo is one of the pictures we have looked at together in October 2019 and it made him smile.

Steve Luecking

**Emeritus Professor, Applied Computer Science & Digital Media
DePaul University**

I first met Nat at a math-art conference in Granada, Spain. I was unfamiliar with the math-art scene and had been corresponding with him prior to the conference. I came prepared to complement him on one of his sculpture, which, it turned out, was a piece by Helaman Ferguson. He accepted my faux pas graciously and we became fast friends. I was lucky to live in Chicago where Nat was raised and was able to see him when he visited his mother. I have never met anyone with his love of learning and gift for discovery. On one visit he joined me in a workshop I held for elementary school math teachers. It involved crafting polyhedral from rubber modules, which among other concepts demonstrated the notion of duals. In the space of a few breaths, Nat was gleefully lost in experimenting on the sculptural possibilities of rubber geometry. On two occasions, we co-hosted ISAMA conferences at DePaul University. Nat saw to it that the conferences were informal and great fun. He was a joy to work with and I shall miss that joy.

George Hart
President of Bridges Organization
Research Professor, Stony Brook University

Nat Friedman was the initial impetus for many of us to take on an academic art/math direction. I have wonderful memories of attending several of his Art and Math conferences at SUNY Albany in the 1990's and then some of the ISAMA and other conferences that followed. The Bridges community grew from the seed Nat planted. The Hyperseeing Magazine is a wonderful resource and archive. Nat wrote a page about the Art and Math meetings he organized, which can be seen here: <http://www.isama.org/> To this I'll add the following notes which Nat emailed me in 2003 when I asked him about the early history of his Art and Math Meetings in Albany. He told me the 1992 meeting was basically a small gathering of friends but that he was excited that the community really began to grow in 1993:

"Back in 91, I phoned Helaman [Ferguson] and suggested we contact other mathematician-stone carvers and have a meeting. At that time sculpture was my therapy from math research. Turned out there were no other math-stone carvers we knew of. So I decided to organize a general AM conference in 92. Then AM 93 was great---there were 25 sculptors there, 40 main talks in 5 days, and 175 people attended."

On a personal note, I will add that Nat and I arranged to meet and spend a fun touristic week together in Belgium in September, 2000 before the Colloquium on Math and Arts that was held in Maubeuge, France. We did a lot of sightseeing together in Brussels, Bruges, and Antwerp before heading to Mons. I vividly remember Nat's great fondness for the mussels in Brussels and similarly his great gusto for bringing people together to share their mathematical art.

My most colorful memory of Nat illustrates both his passionate action-approach to life and what was no doubt a side-benefit skill from his ballroom-dancing physicality. Something inappropriate was said in small crowd at the back of a room and Nat effortlessly did a one-two that sent the offender sprawling. (I will not name the perpetrator and just assure you that Nat was in the right to feel that honor had to be defended.) I have been to a good many math conferences in my life, but that was the only one I have ever heard of in which two mathematicians came to fisticuffs at the rear of the auditorium!

Carlo Sequin
Professor of Computer Science
University of California, Berkeley

Many of us art-math-lovers owe a lot to Nat. He brought us into the fold, and through his ArtMath workshops in Albany created the community that flourished because of ISAMA and Bridges! Among the (somewhat fuzzy) memories I have of the crucial 1997 ArtMath gathering in Albany relates to Nat doing experiments with prints made from broken stone slabs.



Keizo Ushio
Japanese Sculptor

I [would like to offer] my condolences to [all art math community] with this sad news. It has been 20 years since I [first met] Nat Friedman, and he has given me great courage. He analyzed my sculpture, found its value, and introduced it to the world. He is a great benefactor. He wrote papers about my sculptures. He is also a collector of my sculpture. This time I would like to [provide] you photos of my encounter with him from my album. Please sleep peacefully with best regards.



Doug Dunham
Chair SIGMAA-ART
Professor Emeritus,
Computer Science
University of Minnesota, Duluth

I am sad to report that one of our founding members, Nat Friedman, passed away earlier this month from COVID-19. Nat was the first Chair of SIGMAA-ARTS, serving from its inception in fall, 2006 until summer, 2012. I will miss Nat's art and his enthusiastic leadership in the mathematics and art community.

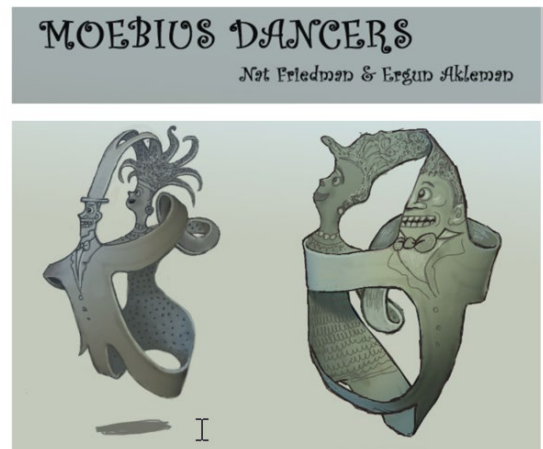
Nat also had a great interest in dance. In particular, there was a Bridges conference in Granada and an excursion to a



flamenco dance hall late one night. It

did not take much to get Nat to get up with the other dancers to show his stuff.

It was also a privilege to visit Nat at his home. I have never seen so many art-math objects in one place. I purchased one of Nat's ceramics, which unfortunately has broken (see picture).



Elizabeth (Beth) Whiteley
Sculptor

We all knew him as a sculptor, a mathematician, a visionary/executor for an international Math-Art community, an impresario, and a person who just liked to ballroom dance. In 2006, Nat was our houseguest for a few days. We traipsed to every museum in Washington to look at sculpture and to discuss, in depth, the pieces he favored. Nat's aesthetic judgement was equal to his math/geometric observations, which was rare ability I appreciate deeply. I am attaching a photo of him during that happy visit when he was in my studio. You can see that he had drawn a teaching point about knots on the paper and was tying a knot. I recall suggesting that he use two colors of rope and he constructed an eight crossings knot, which I photographed as well. I pray that he is at peace.

It is also ironic that Doug Dunham will be piecing the shards from Nat's sculpture together. I am attaching a photo of a sculpture I own, that Nat made in the 1990's, for which I exchanged one of my paintings. He told me the piece is made of discards from a place near Albany that made gravestones. Moreover, he titled it "Putting the Pieces Back Together Again." I believe that it had deep personal meaning for him.



Nat Friedman's construction of Eight Crossing Knot using two color rope



David A Reimann
Professor, Mathematics & Computer Science
Albion College

Nat's passion for math, architecture, and the arts was very inspirational to me. I was fortunate to get to know him through the ISAMA conferences he organized in Chicago. Those were great meetings with excellent talks from interesting people.

Recollections of Nathaniel Friedman
Alex Feingold
Professor, Department of Mathematics
Binghamton University (SUNY)

I was invited by a colleague to give a talk in the Department of Mathematics of the University at Albany, SUNY, in Spring 2009. While visiting, I met Nat Friedman and discovered that we had a common interest in mathematical art. When I heard about the ISAMA (International Society of the Arts, Mathematics and Architecture) conference being planned for June, I wrote to Nat asking about a one-day participation. He kindly responded with an offer to give me a one-day \$50 fee, discounted from the \$200 full fee. I was particularly interested in hearing the talk by Kenneth Snelson scheduled for June 23.

I made the 2-hour drive from Binghamton to Albany on June 23, and was very pleased to hear many interesting talks about mathematical art. I got the chance to meet and speak with Kenneth Snelson, bought a copy of his book, and got his autograph. I also spoke with Nat at the end of the day, and got invited to see the art collection at his house.

When we entered his house, there was a narrow path to walk in among the artwork. It seemed that every possible surface was full of art that he had either bought from other artists or had made himself. I could not imagine how he actually lived in the house, which was more like an art warehouse than a home! He explained that one way he had discovered to make knot sculptures was using a ceramic material which could be shaped and then hardened by baking. I bought one of his ceramic trefoil knots, whose picture I am attaching to this note. You can clearly see his initials, NF, signed on the surface. The cross-section is a narrow rectangle, but he had not twisted it to make a one-sided Moebius surface as I did later when I made my own cast bronze Moebius trefoil knot sculpture.

Nat was happy that I bought one of his sculptures, so he made me another one on the spot, a Moebius strip made from a 6" wide strip of aluminum sheet metal. It took him only a few minutes to cut the strip



from a roll of sheet metal, bend it into shape, and rivet it together in two places. I have attached two pictures, showing it from two sides.

I was quite jealous of his art collection, which included a beautiful piece by Bathsheba Grossman. I wish I had kept in closer touch with Nat over the years. I know that he was an organizer for many conferences

Nat Friedman Sculptures – Alex Feingold Collection

such as the SMI (Shape Modeling International) and the FASE (Fabrication & Sculpting Event), whose proceedings he edited with Ergun Akleman into the HYPERSEEING magazine for many years. Sometimes I tried to be helpful as a referee for submitted articles, but I know the hard work was done by the editors.

Art Math Gatherings
Gary Greenfield
Emeritus Professor of Mathematics & Computer Science
University of Richmond

This is Art and Math (AM) group photo from Albany in June 24-26, 1995. This was the third gathering of Art Math group. The first Art Math gathering was in 1992. Art Math gatherings organized by Nat Friedman continued until 1998 in Albany and morphed into ISAMA and the locations started to vary. Reza Sarhangi (1952-2016), the founder and president of the Bridges Organization, is also in this picture, next to Nat Friedman. Bridges conference started three years later in 1998.



Famous mathematician John H. Conway, who also died from complications of COVID-19 on April 11, 2020 at age 82, is also in this picture. Nat Friedman and Reza Serhangi are in the front row. Elizabeth Whiteley and John Conway can be spotted at upper middle left. Gary Greenfield in second row sort of peeking out from behind a woman in a black dress, who could be Eva Knoll. The reason almost none of the people look familiar is because more than half were local area high school teachers who were getting professional development credit for attending morning plenaries and afternoon workshops.

Dick Termes
Sculptor

Nat certainly got me involved in the art /math movement in Albany and by doing this I met all kinds of wonderful math/art people so I will very much miss Nat. He did a great job with his life.

Robert Fathauer Sculptor & Artist

My first math/art conference was Nat's get-together in Albany in 1995. In 2004, Nat, Reza, and I organized the first art exhibition at the Joint Mathematics Meetings. There's been one every year since, and it's become an important feature of the meeting. Starting around 2008 I got into hiking and exploring slot canyons in northern Arizona and southern Utah. Nat loved some of the photos I took, and we ended up collaborating on a couple of articles for Hyperseeing that were basically a collection of these photos with some commentary from Nat.

Nat had friends in Tucson and started spending several weeks in Arizona every winter sometime in the 2010's, if not earlier. He took to spending quite a bit of that time in Sedona, where he loved the rock formations. In 2014 we met up in Phoenix, and I drove us to Antelope Canyon, in the northern part of the state. It was Nat's first visit there, and it would be hard to overstate how much he loved that place. To him it was one giant walk-through stone sculpture. We went again in 2015 and on up into southern Utah to check out some slot canyons there. It was during these trips that I really got to know Nat, as we spent many hours together in the car. I enjoyed the long discussions we had about art and sculpture. I was sorry he had to discontinue those trips when his health started deteriorating and will miss him.



In Lower Antelope Canyon (2015).



Descending stairs into the lower end of the canyon



Emerging at the top end.

Robert Longhurst, Sculptor, Chestertown, NY

I first met Nat when he invited me to participate in an art/math conference at SUNY Albany in the early 90s. I was not quite sure what it was all about but am glad that I agreed. Nat lived and breathed art/math. As time went by Nat and I kept in touch and he frequently visited the Chestertown studio as he always wanted to see what I was working on and it was enjoyable for me to hear what he had been working on as well. We made numerous trips to Vermont to scrounge marble cut offs which I could cut down, polish and make into sculpture bases and he would mostly just collect interesting shaped pieces which piled up in his back yard in Albany. Aside from the topics of art and math my most memorable thoughts of Nat are just that of a good friend and getting together for lunch or dinner to catch up.

Ergun Akleman
Professor, Departments of Visualization &
Computer Science and Engineering
Texas A&M University

I knew Nat Friedman for a while; however, I met with him relatively late, just 14 years ago. We had a workshop in August 2006 in Bridges, London on developable surfaces based on methods of Sculptor Ilhan Koman. Nat was one of the participants. He enjoyed the workshop and wanted to meet with me. I found workshop photos that demonstrate how intensely he worked with paper models. The first photo also shows both of us in the same frame during workshop.



After the workshop, Nat wanted to meet with me to discuss. He asked me to help him to start Hyperseeing. I do not know how he knew that I had experience with publication. Once we returned from London, he send me his initial newsletter idea. After a few iterations, we started to publish Hyperseeing in September 2006. We had book reviews, articles, and cartoons (see the cartoon from September 2006 issue in Doug Dunham's tribute). I worked on to turn it into a magazine format. He liked the new design a lot. We moved the new format in November 2006 and continue.

He suggested having ISAMA conference in College Station in May 2007. He came a few days before the conference to help me organizing the conference. It was my first conference organization and I was a little worried. He told me that *"A conference is a like a wedding. Everybody knows what to do when you put everything in place."* I observed that he was right. We had a successful conference with no problem.

He came to College Station for one more time to present in the first FASE conference as a part of Shape Modeling International 2012. It was hard for him to continue to organize the ISAMA conferences. After SMI'2012, he suggested to continue ISAMA conference as an Event in Shape Modeling International (SMI). I proposed it to SMI steering committee and everybody agrees.

The last Hyperseeing issue he involved as an editor was summer 2014. He also wrote several articles about upcoming sculptors. Unfortunately, his health deteriorated quickly after that point. Not to be able to work and dance anymore made him very sad. Without his energy and support, it was hard for me to have additional issues every year. Hyperseeing, as a result, practically became "Proceedings of SMI Fabrication and Sculpting Event".

Nat was always very proud of Hyperseeing. He always said that he did not invent Hyperseeing, but he coined the word "Hyperseeing." It is really a great word to explain the complexity of sculpting. I hope we can turn Hyperseeing into a quarterly journal again in the future as his legacy.