

A Review of the 2007 Bridges Conference

Mathematical Connections in Art, Music, and Science

Robert Bosch
Dept. of Mathematics
Oberlin College
Oberlin, OH 44074
(bobb@cs.oberlin.edu)

When asked to explain (or justify) why they do what they do, mathematicians routinely reply, “Math is beautiful!” (if they are pure mathematicians) or “Math is useful!” (if they are applied mathematicians). Now certainly mathematics can be both beautiful and useful, it can be beautiful without being useful, it can be useful without being beautiful, and it can be (sadly) neither beautiful nor useful. And while I can supply examples, I’ll leave this easy exercise to the reader. What I *will* do is point out something that might not be clear, something that *is* clear to anyone who has attended a Bridges conference: *there can be beauty in the ways in which mathematics is used.*

Bridges conferences attract a diverse group of participants—pure and applied mathematicians, computer scientists, engineers, educators, artists—who are passionate about establishing, exploring, and publicizing connections between mathematics and the arts. The name “Bridges” is entirely appropriate; the purpose of a Bridges conference (and the Bridges organization <www.bridgesmathart.org> behind it) is to build and maintain bridges that connect pairs of disciplines viewed by the general public as disconnected or even diametrically opposed (e.g., the so-called ‘right brain’ and ‘left brain’ disciplines).

The most recent Bridges conference—the tenth one in as many years—was held 24-27 July 2007 at the School of Architecture of the University of the Basque Country in Donostia–San Sebastián, Spain, and it was a complete success in every way:

- *Location.* Donostia–San Sebastián, often referred to as “the summer capital” of Spain, is a breathtakingly beautiful resort city that rests between the shell-shaped Bay of La Concha and three green mountains. From the conference site, it was a leisurely ten-minute walk to the nearest beach; a 20-minute stroll to *Wind Comb*, the most famous work of the Donostia-born sculptor Eduardo Chillida; and a 30-minute walk to the Old Town, a web of narrow interconnected streets filled with restaurants, bars, and shops.
- *Scientific Program.* The scientific program, organized by Javier Barallo and and Reza Sarhangi, was engaging and stimulating. Morning sessions were devoted to long presentations, and afternoon sessions to short presentations and workshops. The vast majority of presentations and workshops fell into one or more of the following categories: using mathematics to create art, using mathematics to analyze art, using mathematics to understand art, and bringing together mathematics and art in the classroom. The long presentations were:

Edge-Constrained Tile Mosaics

*Poverty and Polyphony: A Connection
between Economics and Music*

*Symmetric Embeddings of Locally
Regular Hyperbolic Tilings*

Robert Bosch

Rachel Hall and
Dmitri Tymoczko

Carlo H. Séquin

<i>Journal of Mathematics and the Arts: Aims and Scope, Highlight Papers ... and More</i>	Gary R. Greenfield
<i>Two Papers: Modeling D-Forms and Inout Sculptures</i>	Ergun Akleman
<i>Addled Tangles of Sanguine Language— an Eclectic Syncretic Syntactic Taxonomy</i>	Benjamin Wells
<i>Symmetry and Structure in Twist-Hinged Dissections of Polygonal Rings and Polygonal Anti-Rings</i>	Greg N. Frederickson
<i>Entwined Circular Rings</i>	Rinus Roelofs

And here is a small sample of the short presentations and workshops:

<i>Imaginative Quilted Geometric Assemblages</i>	Elaine Krajenke Ellison
<i>Fractal Knots Created by Iterative Substitution</i>	Robert W. Fathauer
<i>Imaginary Gardens—A Model for Imitating Plant Growth</i>	Anne Burns
<i>Baskets for the Mathematics Classroom</i>	S. Louise Gould
<i>Magritte: Analogies in Mathematical Reasoning</i>	Natasha Rozhkovskaya
<i>Geometric Constructions and their Arts in Historical Perspective</i>	Reza Sarhangi
<i>Frieze Patterns of the Alhambra</i>	B. Lynn Bodner
<i>Does it Look Square? Hexagonal Bipyramids, Triangular Antiprismoids, and their Fractals</i>	Hideki Tsuiki
<i>From Folding and Cutting to Geometry and Algorithms: Integrating Islamic Arts into the Mathematics Curriculum</i>	Carol Bier
<i>Modular Kirigami</i>	George W. Hart
<i>Images of the Ammann-Beenker Tiling</i>	Edmund Harriss
<i>Patterned Polyhedra: Tiling the Platonic Solids</i>	B.G. Thomas and M.A. Hann
<i>Golden Fractal Trees</i>	T.D. Taylor
<i>The 7 Curve, Carpets, Quilts, and Other Asymmetric, Square-Filling Threaded Tile Designs</i>	Douglas McKenna

Papers for each presentation and workshop were published (both in print and on a CD) in the *Bridges 2007 Conference Proceedings* and were distributed to all participants at the start of the conference. Copies can be ordered from

<http://www.mathartfun.com>.

- **Music.** Two of the conference's morning sessions concluded with masterful performances by the great A. Borhani of the Persian National Music Ensemble, and the conference itself concluded with an evening of musical performances organized and hosted by Bridges' own Paco Gomez. Most of the performers were Bridges participants.
- **Art exhibit.** The art exhibit, coordinated by Robert Fathauer and juried by Ann Burns, Nat Friedman, and Fathauer, was one of the highlights of the conference. A total of 126 pieces from 35 artists were on display. Words can not do these beautiful pieces justice! To see pictures, go to www.bridgesmathart.org/art-exhibits/bridges2007/bridges-art-exhibit-2007.html

- *Excursion.* Another highlight was an all-day excursion to the cities of Gernika and Bilbao and a visit to the Frank Gehry-designed Guggenheim Museum.
- *Community.* Many participants had been to previous Bridges conferences and knew each other quite well, but many, like me, were newbies. I feel confident in speaking for this group and saying that all of us first timers were made to feel that the Bridges community was thrilled to have us with them, thrilled to have us join the family. (Reza Sarhangi, the energetic founder and leader of Bridges, was particularly welcoming.) So for me, the best part of the conference was the participants. I met so many wonderful, warm, supportive, interesting people, and I made friendships that I hope will last my lifetime.

I conclude this report by strongly urging anyone interested in mathematics and art to attend a Bridges conference. The 2008 Bridges conference will be held in Leeuwarden, the Netherlands (the birthplace of M.C. Escher) 24-28 July 2008. A Mathematical Art Public Activity Day will be held on 29 July. For more information, go to

www.bridgesmathart.org/2008/2008.html