*Bridges 2004: Mathematical Connections
in Art, Music, and Science*

Another Bridges Conference has come and gone. This year's gathering (July 30-August 1 2004) featured a return to our origins at Southwestern College in Winfield, Kansas. There, we were embraced by old friends while welcoming newcomers to the conference. Under the direction of Reza Sarhangi, Towson University, the conference has continued to grow with participants arriving from across the United States and from several European countries. On each of three days we enjoyed three plenary sessions, each one capped by Corey Cerovsek commenting on the intersection of music and math. This year he interrupted a tour of Europe to visit us with his newest violin, a Stradivarius which had been loaned to him by a Swiss physician. Cerovsek talked through the pleasures and frustrations of learning a new instrument. He had completed doctoral studies in both music and mathematics at Indiana University. Mathematical implications of the music followed each demonstration.

In the afternoons we had break out sessions which featured everything from the detailed chronicle of the unfolding of a bud as it responded to local and planetary influences to the construction of snowflake-like polygons with dihedral symmetry; from an overview of Frank Gehry's architectural spaces to the examination of "Moorish Fretwork"; and from a glance over our collective shoulders at last year's conference in Granada, Spain with Lynn Bodner's presentation of "Star Polygon Designs of La Alhambra's Wooden Ceilings" to George Hart's "Salamander Structure Barn Raising."

On Friday evening we were invited to a read around of a new symposium in one act by Carol Bier: *Arabesque-Time in Space*. Casting several performers on the spot, she walked us through a reading of a play which featured a confrontation and an integration of ideas from classical Middle Eastern and European philosophies, updated in the second half with extrapolations of some of those ideas which provide the structure of much of modern thought. Bier is currently a Research Associate with the Textile Museum in Washington, D.C.

Some of the many highlights from among the plenary sessions included the initial presentation by Arthur Benjamin. Named both outstanding educator in California and later in the United States, Benjamin offered "Mathematical Magic." He easily handled awkward multipliers and challenged audience members to follow his work on their calculators. After each display, he provided instructions for the uninitiated about handling with such ease seven, eight and nine place multipliers. Brent Collins, a sculptor who has collaborated with board member Carlo Sequin, presented his "Geometries of Curvature." Often he has intuited sculpture and then sent an image of the model to Sequin, a member of the computer faculty at the University of California at Berkeley. Again this year Sequin presented versions of a few of the sculptures produced by stereo lithography. Sequin offered in a major session his work in snow. This was an enormous snow sculpture that he and several colleagues teamed to do for a Colorado celebration of winter. Based in work on the eversion of a sphere, developed by John Sullivan and presented at the 2000 Bridges Conference, Sequin, Sullivan, and a team of three more mathematicians collaborated to design in snow an enormous snowbound, illustration of spherical math. Not long after its completion and just after it had been judged, the sphere split and crashed. The presentation was titled "Turning a Snowball Inside Out: Mathematical Visualization at the 12-foot Scale."

Between morning sessions, conferees were invited to wander through a dazzling array of mathematical instantiations in paper, plastic, glass, wood, stone, and metal. The addition of exhibit space has become an annual feature of the conference and has featured everything from origami, to quilts, to polygons in a variety of styles and sizes. This year's exhibit was large and enormously varied. Collins's sculptures were available in several production stages which would lead to the final casting. Southwestern College owns two of Collins' pieces, *Pax Mundi* and *Genesis*.

Two other Saturday morning presentations featured three-dimensional work by Rinus Roelofs. From the Netherlands, Roelofs has developed a PowerPoint program which demonstrates the construction of forms as it folds and unfolds its subjects. In a paper titled "Glide Reflections and other Combined Transformations" Roelofs presented physically realized work as well as theoretical or abstract work done on the computer only.

Another colleague from the Granada experience teamed up with colleagues to comment on domes. Jay Bonner, Mac Pelletier, and Chris Palmer demonstrated a variety of approaches to dome construction. Palmer had lived in the mountains above the Alhambra and daily visited the structure's architectural wonders. While we were there, Chris provided much appreciated guidance through the Moorish structure for conferees. And as always, "way leads on to way."

On Saturday evening we traveled to Wichita and the CyberDome Theater located at Exploration Place. Based on a work by Pink Floyd, the creators provided a striking visual feast for those interested in tessellations, fractals, and abstract transformations used in current cinematic and television technologies. Because the conference's art and mathematics subject features issues which interest the CyberDome staff, we had a brief discussion with members of the staff of recent technology used in the production we had witnessed.

After a Sunday evening banquet, we gathered at the College Hill Coffee House for a variety of libations accompanied by our own entertainment. In one corner Chris Palmer was teaching origami and elsewhere a variety of musical instruments were enlisted in the fray.

Remember that next year's Bridges Conference is at Banff in Alberta, Canada. Thanks again to the Bridges staff for an extraordinary sentimental return to Kansas. One participant from the Bronx sent the observation that "the week there was great. I thought the Bridges Conference was A+!!"

The Proceedings of the 2004 Bridges Conference, a 350-page book with a large number of illustrations, included reviewed papers by presenters and was distributed during the conference. The proceedings was edited by Reza Sarhangi, Mathematics Department, Towson University, and Carlo Séquin, Computer Science Division, University of California, Berkeley. The book is distributed by the online store MATHARTFUN.COM.

About the Author

Daniel F. Daniel received his BA in English Literature from Berea College in Kentucky, his MA in literature from the University of Chicago, and his Ph.D. in literature and philosophy from the University of Wisconsin-Madison. He has done post doctoral work in Semiotics at Kansas University and in Prosaics at Northwestern University in Evanston, Illinois. He currently serves on the Board of Environmental Ethics at Dade County Community College in Miami, Florida. He is a professor of English Literature and a member of the Integrative Studies faculty at Southwestern College in Winfield, Kansas.