Reza Sarhangi

*Bridges 2000:
Mathematical Connections in Art, Music and
Science*

28 July – 31 July 2000 Winfield, Kansas, USA

The third annual conference, “Bridges 2000: Mathematical Connections in Art, Music, and Science” was a gathering of artists and educators from around fifty colleges and universities in the US as well as several participants from England, Yugoslavia, Canada, Mexico, Spain and Italy. The conference was held at Southwestern College, Winfield, Kansas (USA) during a three day period, July 28-July 31, 2000. It included three General Sessions in the mornings, eleven Special Sessions, and three Workshop Sessions in the afternoons.

In addition to the three-day conference, there were two special events, a workshop and an activity day. The one-day workshop was designed on Monday July 31, 2000. This workshop covered part of the pedagogical materials, research and courseware developed by faculty and students from the University of Wisconsin-Madison (the Center for the Mathematical Sciences), UC Berkeley (Center of Cognitive Studies) and Montana State University at Bozeman (the Center for Computational Biology). This workshop was partially supported by a grant from The National Science Foundation (EHR-DUE-CCD Interdisciplinary Program). The activity day was structured for high school students and was titled “Bridges for the Next Generation”. On this day, some of the invited extramural speakers joined presenters from Southwestern College to work with these public school students.

The conference exhibited artwork by some of its participants. Among these was Brent Collins, a sculptor from Kansas City, Missouri, USA, who brought wooden and bronze casts of his work. Robert Fathauer, the founder of Tessellations Company in Tempe, Arizona, exhibited his fractal and post-Escher tilings. In addition, Jonathan Bowers and George Hart exhibited their polyhedra. Other exhibits included John Sullivan’s “Optiverse and other Sphere Inversions”, Carlo Sequin’s “Twisted Bridges”, and Kenneth E. Landary’s prints and tessellations.

The *Proceedings* of the 2000 Bridges Conference, a 420-page book with approximately 300 illustrations, included peer-reviewed papers by presenters and was distributed during the conference.

The conference started with an official welcome from President Dick Merriman of Southwestern College. Michael Field from University of Houston in Texas chaired the first general session. The first speaker was Slavik Jablan from the Mathematical Institute at Belgrade, Yugoslavia and editor of *VisMath*, who talked about symmetry and ornament. The other speakers of the first session were Benigna Chilla from Pittsfield, Massachusetts, who talked about an integrative set design for dance, and violinist Corey Cerovsek, who concluded the morning session with a talk about mathematics and music. He illustrated his presentation with music performed on his Guenari violin.

The afternoon sessions included talks such as “Sections Beyond Golden” by Peter Steinbach from Albuquerque Technical Institute, New Mexico; “Spiral Tilings” by Paul Gailiuns,

Newcastle, England; "From the Circle to the Icosahedron" by Eva Knoll, Montreal, Canada; "Musical Composition as Applied Mathematics" by Ronald Squibbs from Georgia State University, Atlanta, Georgia. The first day also included workshops such as "Biological Applications of Symmetry for the Classroom" by Patrick Ross and "Exploring Technology in the Classroom" by Terry Quiett, both from the faculty of Southwestern College.

The general session of the second day, chaired by Dan Daniel from Southwestern College, featured John Sharp from Watford, England, with a talk on "Beyond the Golden Section: the Golden tip of the iceberg". Michael Field, from the University of Houston in Texas offered a commentary on "The Art and Science of Symmetric Design". These comments were supported with stunning two-color patterns and other symmetry icons created by his own software named PRISM. Carlo Sequin from the University of California, Berkeley, spoke on "To Build a Twisted Bridge" and presented various models that he constructed based on the idea of a symbolic bridge to represent the Bridges Conference.

The afternoon sessions of the second day of the conference included talks from participants such as Alberto Lopez-Santoyo from Mexico City, Mexico, who presented "Exploring Art with Mathematics and Computer Programming". Raymond Tennant from Eastern Kentucky University offered a commentary on polyhedral models in group theory and graph theory. Gary Greenfield of the University of Richmond, Virginia, spoke on the quest for "Mathematical Building Blocks for Evolving Expressions". In addition, Catharine Nolan from the University of Western Ontario, Canada presented a paper titled "On Musical Space and Combinatorics: Historical and Conceptual Perspectives in Music Theory". "The Development of Integrated Curricula: Connections between Mathematics and the Arts" was the title of a workshop that was presented by Virginia Usnick from the University of Nevada, Las Vegas. At the end of the second day, Eva Knoll and Simon Morgan of Rice University in Houston, Texas, offered a barn raising using an Endo-Pentakis-Icosi-Dodecahedron. This workshop benefited from the presence and labor of several Winfield public school teachers and students.

The second day of the conference concluded with a special staged reading for the Bridges Conference of Tom Stoppard's "Arcadia". It was directed by Julie Voelker of the Southwestern College Theatre Department.

The last day of the conference, chaired by Carlo Sequin of the University of California, Berkeley, opened with Brent Collins who talked about "Visualization: From Biology to Culture". Michele Emmer from the University of Rome "The Sapienza", Italy, spoke on "Mathematics and Art: Bill and Escher". Emmer is one of the first in the recent years to call for a gathering of mathematicians and artists to search for connections in mathematics and art. The final speaker during a General Session was Douglas Dunham from the University of Minnesota at Duluth. His talk was on "Hyperbolic Celtic Knot Patterns".

The afternoon session for day three included a talk on "A Fresh Look at Number" by Jay Kappraff from New Jersey Institute of Technology. Reza Sarhangi presented a commentary on "Persian Arts: A Brief Study". Steven Eberhart from California State University at Northridge spoke on growth and form in nature and art, "The Projective Geometry of Plant Buds and Greek Vases". Hamid Eghbalian, University of Wisconsin in Madison, presented a paper titled "Saccades and Perceptual Geometry: Symmetry Detection through Entropy Minimization". Robert Krawczyk from Illinois Institute of Technology, Chicago, spoke on the evolutionary development of mathematically-defined forms. Maria Antonia Frias Sagardoy from the University of Navarra - Pamplona, Spain presented "The Generation of the Cube and the Cube

as Generator”. The conference concluded with a banquet and a final violin concert by Corey Cervosek.

Other speakers were Cheri Shakiban of the University of St. Thomas, Minnesota; Alvin Swimmer, Arizona State University, Tempe; John Sullivan, University of Illinois, Urbana; Hana Bizek, Westmont, Illinois; Robert Fathauer, Tessellations Company, Tempe, Arizona; Janusz Kapusta, Brooklyn, New York; Julie Scrivener, Kalamazoo, Michigan; Travis Ethridge, Southwestern College, Kansas; Richard Krantz, Metropolitan State College of Denver, Colorado; Jack Douthett, TVI Community College, Albuquerque, New Mexico; John Clough, SUNY - Buffalo, New York; Jin-Ho Park, University of Hawaii at Manoa-Honolulu; Helmut Cerovsek, Bloomington, Indiana; Jason Barnett, St. Paul, Minnesota; Taylor Hollist, State University of New York, Oneonta; Charles Pinter, Buknell University, Pennsylvania; Sarah Stengle, Brooklyn, New York; Thaddeus Cowan, Kansas State University; Mara Alagic, Wichita State University, Kansas.

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About the reporter

Reza Sarhangi is the conference director and the proceedings editor of “Bridges: Mathematical Connections an Art, Music, and Science”. He was a high school math teacher, teacher trainer, drama teacher, play writer, play director and scene designer before coming to US from Iran in 1986. After obtaining a Ph.D. in applied mathematics (Control Theory-Distributed Parameter Systems) from Wichita State University, Kansas, he joined the faculty of Southwestern College. Besides teaching mathematics courses, he teaches courses such as Math and Art, Chaos and Fractals, and Mathematical Bridges to Science. These courses are offered through the Integrative Studies Program – the general studies component – at Southwestern College. Recently he and a group of his students wrote and directed a play.