

Spring 2005 MATYCONN Meeting/Workshop — *Fractal Music* *Presented by Harlan Brothers*

at Gateway CC, North Haven Campus, April 29, 2005

Miguel Garcia and Rachael Schettenhelm hosted the spring 2005 meeting and workshop at Gateway's North Haven Campus. After the business meeting and a wonderful lunch, Harlan Brothers treated MATYCONN members to a presentation on some characteristics of fractal music.



Harlan is a man of many talents. Currently serving as Director of Technology at The Country School in Madison, he holds five U.S. patents and has authored several research papers on the natural number e . He is also the founder of Brothers Technology (<http://www.brotherstechnology.com/>), a web company that creates a wide range of intellectual property for license and sale. Moreover, he is a performing composer and jazz guitarist, having studied at the Berklee College of Music in Boston.

Harlan has worked with Professors Michael Frame and Benoit Mandelbrot at Yale University, exploring the use of fractal geometry in mathematics education. He is presently involved in original research developing the field of fractal music; his latest paper is currently in submission at *Music Theory Online*.



What is fractal about music? While our minds may give music depth and dimension, even moving us emotionally, music is inherently one-dimensional, physically happening one instant at a time. In this presentation, Harlan shared some of his research and guided MATYCONN members in an exploration of some ways in which music may exhibit fractal characteristics.

Following a brief review of self-similarity (symmetry under magnification), including differences exhibited by natural and mathematically generated fractals, participants reviewed basic music theory background, including basic notation, time signatures, rests and dotted notes, and common time. Expanding upon these ideas, participants then investigated duration scaling (in which a power law relationship exists between a note's



duration and the total number of such durations) as one way to identify fractal music, working a number of exercises by hand. We went on to learn something about pitch-related scaling (in which a power law relationship exists between a note's pitch and the total number of such pitches) and structural scaling (in which patterns of notes repeat on successively larger scales); this was followed by a brief introduction to pulse trains (waves of rhythm propagating a piece of music).



The second half of the workshop provided participants the opportunity to work with Fractal Music Composer, created by Michael Frame, Ginger Booth, and Harlan Brothers (<http://www.cbc.yale.edu/courseware/fracmusic.html>, copyright Yale University 1997-2004 | CourseWare). Participants not only created our own fractal music, but then got to play our "compositions" for our colleagues.

The workshop was stimulating and a fun time for all!