The Indexical show, program notes

In the evening of June 16, 2023, Ben Neill and I performed a piece of improvised music and chaotic imagery at the Indexical gallery in the Tannery Arts Center in Santa Cruz, CA. This was our world premiere performance, culminating 14 years of collaboration. For me, this realized a dream of almost 50 years. This is a brief chronology of that dream.

The beginning, summer of 1974.

In academic year (AY) 1973-74, I returned from two years in Holland and India to my teaching duties at UC Santa Cruz. I was shown a paper by a French chaos theorist, Christian Mira, on discrete chaos in two dimensions. It included a computer graphic black-and-white image that was distinctly artistic. This was very early in the development of chaos theory, and was the first experimental result of its sort coming to my attention.

Soon thereafter, I was hailed in a UCSC parking lot by Evan Schafer, a staff computer scientist. He informed me that the computer center had acquired a computer graphic terminal, one of the first to be generally available. We decided to offer a course in computational calculus to undergraduates. And thus I was converted, by the graphics terminal, from pure to computational math.

In the Summer of 1974 I offered an undergraduate course based on the work of Christian Mira. Students adapted software I provided and competed to create the most aesthetic chaotic image, Their results were printed on paper and pinned to the classroom wall for a vote for the winner.

From this experience I developed a dream that graphics from the research frontier of chaos theory might be used in performances of visual music or abstract animation. In this time I met Peter Broadwell, then a student but later a pioneer of computer graphics, who shared my dream.

Discovering abstract animation, AY 1980-81.

It was a tremendous serendip, in the context of a research grant on the role of visual imagery in math education, to meet the abstract animation artist Larry Cuba, in Venice, CA. Through him I learned the early history of this computer- aided art genre, which gave me a context in which to locate my dreams of chaos in the arts.

In addition to this historical context, Larry has been a crucial resource for the computer software available to visual artists. Such software has been in rapid evolution up to the present time, and the development of my own research and presentations has followed this evolution. The immediate result has been an extensive and still-growing website of images and short videos, www.visual-chaos.org, which I hoped might be utilized by animation composers and performers.

Discovering computer music, Summer of 1991.

As a frequent writer and speaker on the application of chaos theory in various fields, I was

invited to a conference on mathematical economics in Siena, Italy, in June, 1991. There I finally met my hero, Christian Mira, and a younger professor also working on discrete dynamical systems, Laura Gardini, of the University of Urbino. I became their student, and together we wrote a book on this subject. The book contained lots of aesthetic images, including a spectacular example which graced the cover of the book.

At the same conference, I met Ami Radunskaya, who was not only a mathematician specializing in dynamical systems, but also an accomplished performer of electronic music.

First performances, AY 1992-1993.

The meeting with Ami Radunskaya led to the formation of a trio with me and Peter Broadwell, called MIMI and the Illuminati. Peter by this time was working with state-of-the-art graphics hardware and software at Silicon Graphics, a leading manufacturer of graphics workstations. His firm supported our proposal to perform improvised chaos graphics and music. With custom Max patches by Ami, original C programs by Peter, and my exemplary chaotic systems, we created some primitive pieces and performed them live at the Silicon Graphics headquarters, and eventually, thanks to William Irwin Thompson and the Lindisfarne Fellowship, at the Cathedral Church of Saint John the Divine in Manhattan. We enjoyed crucial support from Don Buchla, and were able to use his invented instruments, Lightning and Thunder, to control parameters and thus the images during the events. Financial support from Lawrence Rockefeller made it possible to rent a powerful projector to illuminate the gigantic cathedral space.

Meeting Ben Neill, 2009.

Ben and I were both friends of Terence McKenna, who died in 2000. Terence, perhaps due to his extensive psychedelic experience, was a fan of computer music and graphics. This coincidence led to my first meetup with Ben. Instant friends, the possibility of collaboration for audiovisual performance was inevitable. Since MIMI and the Illuminati, computer graphics and music tech had evolved hugely, and Ben was very deft with his tools, including Max, Live, Resolume, and of course his amazing Mutantrumpet. And chaotic system simulation had come a long way with new languages such as Python and NetLogo, with hundreds of exemplary images and short videos just waiting to use. But the incubation of our new joint ideas had to wait years before we had the right opportunity.

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