

Peter Gena (left) and John Cage at the School of the Art  
Institute of Chicago, 1984.



# The Computer as Collaborator

Peter Gena

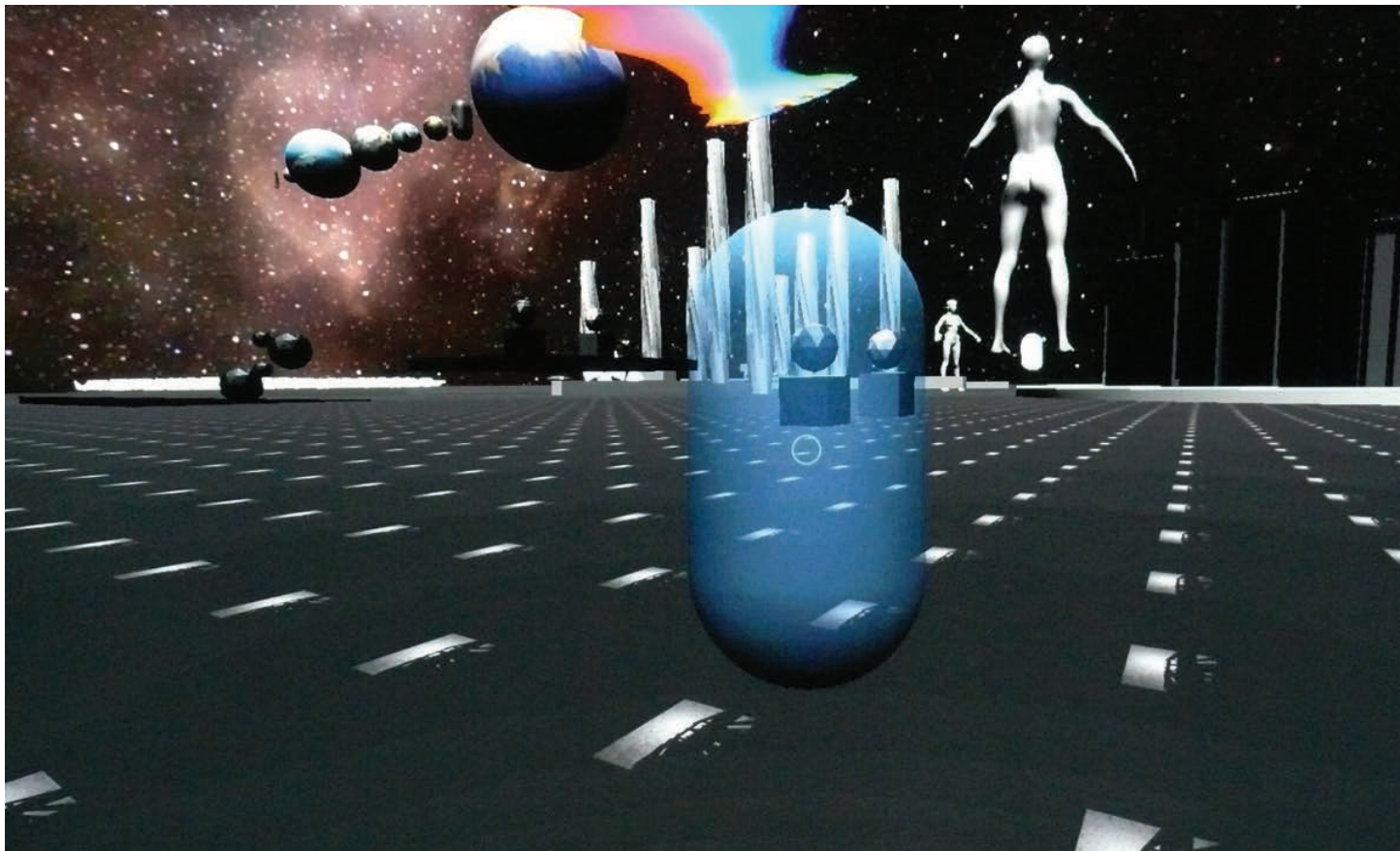
When I came to the SAIC in the early 1980s, the use of computers in the visual arts (even in ATS) was still in its nascency. Conversely, the tradition of computer music had been underway for more than a quarter-century. I began programming for music in 1969 as an undergraduate, after the first algorithmic composition was already 13 years old. In those days of punch cards and mainframes, software was non-existent—one had to write a program to execute tasks, often in the cryptic assembly language of the machine, and turnaround for debugging large routines was usually overnight. Although I had worked in both computer-aided composition and sound generation, my main interest centered around employing the computer as a collaborator in the creative process of writing music, rather than as a data-processor meant to gain more precise control of personal choice.

This pursuit in part was due to my mentor Lejaren Hiller, one of two great computer music pioneers, and the composer of the first computer-aided piece: the Illiac Suite for String Quartet in 1956. The other pioneer was a signal processing genius, Max Mathews of Bell Labs. As a graduate student at SUNY, Buffalo, I wrote MUSICOL, a programming language for music composition for a master's thesis (resulting in an ensemble piece as well). My goal was that the user could program in this language to create music in their own familiar style. Subsequently, a fellow student used it to realize his doctoral composition even before I used it, myself, for my own PhD orchestral piece. Two years later, as an assistant professor at the Northwestern University School of Music, I introduced MUSICOL in graduate courses, as NU fortuitously had a similar mainframe computer to Buffalo's—the CDC 6600.

While teaching at CSU, Fresno (1974-1976) and NU (1976-1983), I also continued to write idiomatic music

without computer assistance. I contributed a waltz to a publication of short waltzes, which included those of John Cage, Philip Glass, Virgil Thomson, Tom Constanten (of the Grateful Dead), and numerous others. We premiered the entire collection at none other than the Chicago Stock Exchange Trading Room in the Art Institute of Chicago in 1978! All were recorded on Nonesuch Records around the same time. A decade later, dance companies had choreographed the collection, most notably Peter Martins in 1988, which was premiered by the New York City Ballet at the three-week long, American Music Festival for the 40th anniversary of the dance company. After these events at the New York State Theater in Lincoln Center, The Waltz Project toured the country. Shortly afterwards, my wife and I hosted a large party at our home for visiting artist John Cage and numerous SAIC faculty. Cage had become a rather frequent visitor to SAIC.

Having lost access to the CDC mainframe as I transitioned into SAIC in 1983, I began a phase of writing socio-political music, first without the aid of the computer, but using a hybrid mix by the late 1980s. Although the Apple II microcomputer was already a presence in ATS, with the advent of the Macintosh in 1984 I immediately strived to convey to art students my respect for the computer as decision-maker. I looked for ways to integrate the stochastic methods that I had developed over the years into art-making. The 1980s brought a gradual surge of high-level languages, more accessible than Fortran, Pascal, or C (my first programming course for ATS involved teaching straight C on the so-called Fat Mac-512k machines in the north wing of the museum). Languages with a built-in, user-friendly front-end for the Mac were on the rise, so by the early 1990s we started working programming at all levels into the ATS curriculum courses. After I was given a beta copy of MAX in 1990 (named in honor



Peter Gena, Ben Chang, Peter Sinclair, Roland Cahen et al. *New Atlantis*, a networked multiuser virtual environment for sonic experimentation and telematic performance, 2011–ongoing).

of Max Mathews), an object-code language for music developed at IRCAM, I taught the first course using it in the Sound department. Now, of course, MAX/MSP permeates the time-arts areas, including ATS. MAX/MSP was a godsend for my own work after 1990. It satisfied my penchant for programming algorithms and added a virtual electronic music studio to boot.

The presence of composers among visual artists is well-documented throughout history, particularly in the vivid New York experimental scene of the 1950s, where those downtown had more in common with painters and art gallery venues than with academics and concert halls. Composers like John Cage, Morton Feldman, LaMonte Young, etc., explored the ontology of sound—music as sound; sound as material. Artists who lacked the traditional musical baggage, i.e. ear for teleological harmony and structure, were better suited to “get it” than musicians. At SAIC, Steve Waldeck, then a kinetic artist on the Sculpture faculty, had recognized the impact of music’s temporal role in the time-arts. From the early 70s, he promoted a presence of composers that led to the creation of the Sound department. Now, composers, sound artists, and music historians permeate the SAIC faculty. Hence, the use of sound as material became second nature to our

students. Visiting composers that I have invited to the campus—Cage, Pauline Oliveros, Philip Glass, Robert Ashley, Eliane Radigue, Harold Budd, Sal Martirano and Maryanne Amacher to name a few—tended to garner huge audiences, considerably more than in the past whenever I brought these same luminaries to music schools.

By the late 1980s, my tenure at SAIC spread across no less than four departments. I could be found teaching in ATS, Sound, Liberal Arts and Art History. Over the years I offered programming in C, Hypercard, Director, Max/MSP, etc., along with seminars for ATS; synthesis and algorithmic composition for Sound; a full-complement of music history courses for Liberal Arts; and Renaissance history of music and art, sonic art, John Cage, etc., for Art History. In addition, I team-taught several courses on contemporary music and art with faculty from the Art History Department.

Similarly, I ran ten study-trips in France and Italy. For several years I was chair of the Time Arts Program, a now-defunct collective established at a time when it was necessary for the time-arts areas, ATS, Sound, Video, Film and Performance to politically band together. These Columbus Drive “basement dwellers”

discovered the need for a stronger, unified voice in a school that was mainly defined by painting, sculpture, and the traditional arts. Time Arts accepted graduate students whose mixed-media work appeared to slip through the cracks amid fixed departments. In addition, they received study space, unlike their peers in the basement departments.

By the mid-1990s, after the Sculpture department began to look at videos of kinetic art, Film and Video merged and Sound later started a graduate program. Now, Time Arts Grads could find homes in these departments, particularly ATS, as students in the “basement areas” were finally given studio spaces. Incidentally, we benefited at that time because Steve Waldeck had moved out of Sculpture’s facility, bringing kinetics, electronics, neon, light, and holography to ATS. After Time Arts, my career as chair was further developed during a few stretches with ATS. Equally gratifying, I had the pleasure of interviewing and hiring most of the faculty teaching music history and have either chaired or sat on search committees, and/or reviewed as Graduate Chair many distinguished new faculty members.

Programming my way through 50 years of composing (also lecturing and performing), I put together a catalog of works in various media from instrumental, electro-acoustic, computer synthesized music, to installations and VR worlds. My work with biomusic began quite unexpectedly in 1974 when I was a new faculty member and Director of the Electronic Music Studio at CSU, Fresno. A young bio-physicist knocked on my door asking if I was interested in making music from brainwaves. I consented, being aware of several brainwave pieces made by composers from 1965 onwards. The next day he rolled in a WWII EMG and several newer machines for monitoring biofeedback (with electrodes). Soon we were producing four-note chords by control oscillators from our own diadic alpha-waves (each head generated stereo). We proceeded to present our music at two meetings of the International Biofeedback Society—*Logos I (tape)*, and *Biomusic and (live) Piano*. I encountered much difficulty after moving to Chicago in finding another like-minded scientist for collaboration who could not get past the expectation that brainwave music should sound classical.

Jumping ahead to 1994, I happened on another unexpected encounter. My wife taught violin at home, and the father of a student (living a block away) began to hang out during his son’s lessons. He turned out to be a distinguished, internationally-known geneticist (PhD and MD in pediatrics). No sooner had

I settled in on our once-a-week chat, than Dr. Charles Strom proposed that we pursue realizing DNA with music. He rekindled interest in biomusic from my biofeedback days. Our symbiosis was perfect. He knew everything about science and genetics, and I was the programmer/composer.

DNA music was not new, but my algorithmic formulas attempted to make a logical physio-musical connection, and Dr. Strom knew everything about the chemistry of DNA. This led to a catalog of pieces named after DNA sequences of human tissue, diseases, etc., first by way of digital synthesis, and more recently transcribed for piano. The DNA pieces for digital sound, or instrument with digital sound, have been performed internationally. I programmed a “DNA Mixer” that can play in real-time up to six simultaneous sequences. Each is chosen from a drop-down menu of over 30 different sequences. The DNA Mixer installation has enjoyed gallery stints, etc., in the US, France, Italy, Germany and in the National Gallery of China (Beijing). In addition, Dr. Strom produced unique sequences for a bioart installation consisting of a projection of actual living bacteria, and I realized its real-time sound in Eduardo Kac’s *Genesis* (1999). The installation, with interactive internet streaming, was commissioned by the prestigious Ars Electronica festival, and has since been presented at some forty-one venues worldwide.

The many festivals, concerts, and conferences that I directed, co-directed and produced perhaps peaked with the week-long Mayor Byrne’s *New Music America* 1982 in Chicago. John Cage was the guest of honor in observance of his 70th birthday. I had already co-edited and contributed to a publication of essays in *A John Cage Reader* for *TriQuarterly* (NU) and C.F. Peters (NYC, extended hardbound) earlier that year. The presenter/curatorial involvement nurtured my subsequent affiliation with several European consulates. In the mid 1980s, I facilitated concerts and festivals involving European visitors—many in the SAIC ballroom.

A working relationship with the French consulate inspired the cultural attaché to sponsor me for fact-finding trips to France in the pursuit of cultural exchanges with Chicago. These missions led to two consecutive grants from the Franco-American Cultural Exchange Program that I received in collaboration with art schools in Nice and Aix-en-Provence. The initial plan was for semester-long graduate student exchanges, and indeed we sent five ATS students from 2005-2007 and hosted five from Aix. We discovered immediately that this program was unsustainable, largely because the French semesters were



# Mensuration Botox à 5

[Clostridium Botulinum (Botulism) for disklavier]

Peter Gena

Piano

$\text{♩} = 58$

(dynamic changes and pedal indications are numerous, and are not notated here)

1

3

5

7

9

uncoordinated with our own. We quickly discovered that the most efficient and productive means of maintaining a relationship was through joint-research via regular workshops.

In the ensuing years I have sent over forty ATS faculty and staff on international trips along with 15 graduate students. Along the way we added collaborators from organizations and art schools in Paris, Nantes, Bourges, Troy, NY (RPI) and Montreal. In the midst of these Franco-American collaborations, I was decorated by the French government at the rank of Chevalier dans l'Ordre des Palmes Académiques.

Our most fruitful collaboration has been *New Atlantis*, a VR project inspired by Francis Bacon's utopian novel of the same name. I act as one of the project coordinators along with Peter Sinclair (École Supérieure d'Art d'Aix-en-Provence), Roland Cahen (École Nationale Supérieure de Création Industrielle, Paris), Benjamin Chang (Rensselaer Polytechnic Institute) and Jonathan Tanant (JonLab, Paris). *New Atlantis* provides an online environment for new-media artists to showcase research projects that investigate relationships between sound, virtual 3D image and interactivity. It offers a pedagogical platform for audio-graphic animation, real-time sound synthesis, object sonification and acoustic simulation. It is a place to organize virtual sound installations, online concerts, soundwalks and other audiovisual art experiences. Participants join each other online, guiding their avatars through numerous virtual spaces. Anyone can initiate a performance, using their own computer as a server. We are currently planning our third iteration—version 1 (2009-2013) used Panda3D and PureData for its engine; version 2 (2014-2018) Unity 4-5; version 3 (2019-) will employ Unity plus others. In retrospect, I was fortunate to obtain the grant, but an award is only as good as the follow-up provided by its team. Needless to say, the success of SAIC's contributions to this ongoing project would have been impossible without the eager engagement of the many talented ATS faculty and students throughout the years.

I looked on with pride as several of these students transitioned into SAIC faculty and followed admirable art pursuits. Four who have been involved with *New Atlantis* come to mind. I mentioned Ben Chang above, now at RPI, who came to SAIC as a post-baccalaureate student and stayed on for his MFA. He joined us immediately as part-time faculty, and progressed into a tenured professor in ATS. Two others, Brett Balogh and Robb Drinkwater, were similarly elevated from graduate students to adjunct associate professors. Brett, who maintains an active career in kinetics and

electronics, was the very first student that I sent to Aix during the first year of the grant. He adapted so well that he became involved in the fledgling *New Atlantis* project and returned with us several times. Robb, a sound artist who was already a student when I arrived at SAIC, has participated in seven trips to France as a *New Atlantis* contributor—nearly as many as me. While a graduate student in ATS, Margarita Benitez specialized in interactive wearable objects via the use of sensors and circuits imbedded in textiles. Subsequently, she taught courses in wearable objects for ATS before joining the faculty at Kent State. Margarita participated in several NA workshops in France, where she joined the 3D programming group.

*New Atlantis* has enjoyed many live and virtual performances and installations. A typical presentation entails a host venue with a live audience, plus several live participants, with or without audiences, who participate from their own locales. Several have emanated from France, including at the Fondation Vasarely and Second Nature (Aix), Le Cube, the Palais de Tokyo (Paris). In addition, others were led from The Ear Taxi Music Festival (SAIC, Chicago), the Villa Bombrini, (Genoa, Italy), the CMMR (São Paulo, Brazil) and the Black Box Space (SAIC). *New Atlantis* in installation form was exhibited at the Sullivan Galleries (SAIC), and the Cité internationale des Arts (Paris). All productions involved participants in situ at ENSCI (Paris), ESAA (Aix), RPI (Troy) and SAIC (Chicago).

I began as a student positioned to wade through the murky waters of a career as a composer. By chance, I would find myself among many renowned experimental musicians and thinkers of the 20th century: influential composers like John Cage, and teacher/mentors Morton Feldman and Lejaren Hiller who piqued my early interest in interdisciplinarity. Cage and Feldman were informed by New York visual artists, Hiller by science (he held a PhD in Chemistry). That I should end up spending the bulk of my career at a progressive art school would appear to be divine intervention. Nonetheless, it is my good fortune to have taught, worked, and collaborated with many distinguished faculty and students, particularly those in Art and Technology Studies where I found countless kindred spirits as colleagues and collaborators.

Opposite: Peter Gena, *Mensuration Botox à 5 [Clostridium Botulinum (Botulism) for disklavier]*, from the DNA-PNO series, 2005.