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1-1-2007

'Stories from the Cross Disciplinary Trenches' Invited Keynote Address

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Recommended Citation

Keynote Speaker

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Stories from the Cross-disciplinary Trenches

Abstract

*Far from being a recent invention, cross-disciplinary
thinking in the arts goes back at least to ancient Greece.
The more recent history of cross-disciplinary thinking in
music is referred to, and the author's own history of
cross-disciplinary work is considered. The point is made
that music and sound works should be co-equal partners
in any collaborative relationship, and the necessity for
new venues for this work is discussed.*

Introduction

When Alistair first asked me to make this key-
note address, and talk about "Trans" - that is
trans-media, cross-media, interdisciplinary work,
I was a bit bewildered. What did this idea of
"Trans" have to do with me? Then it almost im-
mediately dawned on me - I had been living in a
cross-media, cross-genre, interdisciplinary world
for so long that it seemed completely normal to me.
Of course, as a composer, my colleagues would in-
clude chaos mathematicians, ecologists, experi-
mental poets, video artists, computer program-
mers, post-modern dancers, performance artists,
biologists, etcetera. Doesn't everyone? Oh, that's
right! They don't. Once I'd recovered from my
Homer Simpson "Doh!" moment, I began to think -
computer.....music......electronic.....music. By their
very names this discipline has cross media built
right into it. Computer or electronics - I, for one,
don't worship the digital as anything special -
when you come right down to it, all those 1s and 0s
are just low and high analog levels switched vewy
vewy fast. In any case, "computer" or "electronic"
both have a whole aura of science and technology
about them. Music seems much more humanistic,
wholistic, "soft" (even heavy metal!). On first
glance, or first sloppy thought, we've got C. P.
Snow's "two cultures" encapsulated right there, in
the name of our discipline.

However, on second glance, this seems not to
be the case. Music and technology have always
been intertwined. In ancient Greece, music was
taught as one of the quadrivium - the four essen-
tial disciplines - the others were astronomy, ge-
ometry and arithmetic. You learned your frac-
tions, ratios and proportions by the study of music.

You learned the balance of the solar system
through studying music. (And don't be too hard on
my main man Claudius Ptolemy if he got the struc-
ture of the solar system wrong - he got the maths
right - so right that only in the early 20th century
were the accuracy of his observations superceded
by modern calculation methods. And if you want
to find out what musical tunings were heard in the
market place in Alexandria in 140 AD, or read
cosmic poetry about the wonder of the universe,
well then, Claude's your man.)

Some recent history

If we leapfrog ahead about 18 centuries, even be-
fore electronics became the mainstream technol-
ogy, music was already becoming cross discipli-
nary. Hermann von Helmholtz' "On the Sensa-
tions of Tone," great classic of 19th century science
that it is, stands as a model of cross-disciplinary
thinking. His work inspired those two great cross-
disciplinary musical thinkers of the early 20th cen-
tury, Harry Partch and Edgard Varese - who both
looked to psychoacoustics and science for informa-
tion on tuning, and how sound works. And of course,
in the mid-19th century, Wagner's idea of a total
music theatre was already cross-disciplinarity
personified, incorporating not just music, but text,
lighting, stage design, acoustics, etc. And then of
course, 19th century narrative theatre merges al-
most seamlessly with the emerging technology of
motion photography to make the dominant cross-
disciplinary narrative artform of the 20th century:
cinema. Meanwhile, people like Kurt Schwitters
with his Ursonate were making works that crossed
the boundary between music and language. Com-
posers like Arnold Schoenberg, Charles Ives, and
Percy Grainger studied new developments in acous-
tics and sound technology very closely. By the 3rd
decade of the 20th century, the connection between
music and science, at least among advanced musi-
cal thinkers, was already firmly established. By
the time the young John Cage was a student, in the
1930s, studying harmony with Arnold Schoenberg
by day, and assisting Oskar Fischinger with his
experimental animations by night, it was already
possible to not only envision what kind of artistic
future might be possible with all this new tech-

would have died at the start. We started our own venues because we found that the existing worlds were not equipped to provide open minds, open contexts, and what has come to be known as an open source approach to creativity.

In fact, today I would go even further. I would maintain that if you think that making a different kind of music in the same places you made music before constitutes a revolution, then you don't understand the nature of revolution. This seems to be a mistake that everyone from Schoenberg to the Sex Pistols made. They tried to make revolutionary music, but in the same venues that older music had been made. Schoenberg's "Society for Private Musical Performances" was a start in the direction of trying to remake a new social space for a new music. The alternative spaces of the 70s-90s, such as Melbourne's Clifton Hill or Sydney's Performance Space were also a start. But they didn't go far enough. The free improv scene has continually tried to make new spaces for their work, as have the experimental dancers, and we quickly found that the nature of the space determined the work made in it. For example, the Make It Up Club from 1998 -2002 took place in a smoky, boozy place where people talked during the music. This encouraged a higher-faster-louder aesthetic. On the other block (literally 2 blocks away), the Theatre of the Ordinary had a non-smoking light and airy venue with a good quality sound system and a large dance space. The tradition here was one of sitting quietly, paying exquisite attention to the work. The work made here was much quieter, more subtle, and more oriented to interaction with the audience. It IS hard work, but it seems to me that we really do need to keep searching for homes for our work, and in maintaining those homes, as well as making the work itself.

It's not for nothing that I continually joke with students that the role of the composer in Australia is to invent the instrument, build the instrument, write music for the instrument, train performers to play the instrument, organize the gig, find a venue for the gig, advertise the gig, sell tickets for the gig, perform the gig, record the gig, edit the recording for the CD of the gig, maintain the website about the gig, post the recording of the gig on the website, and then write up the documentation about the gig and disseminate that documentation in both print and electronic media.

New tools are not enough

I have read a lot of writing in which the author enthuses about the current abundance of free and sophisticated digital tools for art-making. While I, too, am wildly enthusiastic about this, I would suggest that the mythology that the availability of radical tools will automatically produce a pro-

liferation of radical art is indeed just that - a myth. It could be that our tools don't transform us *enough.* That is, the radically transformative implications of new computer music tools can be blithely ignored even by its practitioners. A tough aesthetic stance – one that pushes beyond the known - must be developed, cultivated, and sustained - it won't simply be produced by the availability of tools.

The need for musicality

If we, as musicians, have anything to offer all of our colleagues in the other arts, the sciences, the humanities, I would suggest that what we have to offer is our musicality. And I would further suggest that we need to make them aware of this quality, and how this quality can be of benefit to them. Rather than conforming to the norms of another artform, or discipline, I think we need to ask: to what extent does our musicality affect our non-musical work? To what extent does our sense of phrasing, of density, of swing, of structure pervade our writing, visual work, dance work, dramatic work, etc? One can speak of a very musical writing style, or a very musical way of moving. Can we, in intermedia works, bring a different sensitivity to the table - one that might make critics or commentators on those artforms change their terms of reference in writing about the work, acknowledging an influence of musicality on those other artforms? Even more, could we make work that would, in some way, convince word-oriented critics and writers of the absolutely equal importance of those OTHER non-verbal forms of human intelligence - the sonic, the kinesthetic, the tactile, the visual?

A reality check

A bit of a reality check might be in order. Just so we don't think that our revolution (or whatever it is) is won, consider this incident that happened to me just a couple of weeks ago. I mentioned to a high-school music teacher the absolutely non-controversial fact that music is based on numbers - notes being vibrations at certain numbers of cycles per second, and intervals being constant ratios between two different vibrating frequencies. She was not only amazed at this news, she was scandalized, feeling that this kind of information had no place in a high school curriculum, much less in the minds of her students. This, it might be mentioned was a young teacher about 2 years out of music school! All of us need to have experiences like this continually, I think, to keep reminding us that we are, indeed, a tiny minority not only in the society at large, but also in the arts as well. There is, still, a very long way to go, but the work needed to get there is exciting, and filled with possibility. At

times, in an era of diminishing funding opportunities, calcifying educational institutions, and incompetent administration, it may seem that cross-disciplinary work was a brave idea that never quite caught on. However, I would maintain that it is indeed not only the "way of the future" which institutions will eventually need to adopt for their own survival, it is, and for over a century and a half, already has been, the absolutely normal way that art has been made - and is the basis for any new understandings that the arts will be able to give us.

nology, it was also possible to be critically evaluative about what kind of future this might be, and what these new tools might mean.

A personal history

My own involvement with multi-disciplinary thinking began almost as soon as I started my undergraduate degree at the State University of New York at Albany in 1967. There was a course called something like "The Arts: 1600-1950," which all young composers were encouraged to take - it was taught by a composer, a sculptor and a writer. In it works of art, music and literature from each 50 year period were compared - structural commonalities were pointed out - for example, the rise of tonality, perspective, and narrative novels all about the same time, and conversely, the breakdown of all of those elements around the start of the 20th century. So very early on, we learned that connections between disciplines were not just fortuitous, they were there, and were important. As well, my undergraduate degree was what called at the time a "liberal arts" education. As well as a full load of music subjects, I took courses in mathematics, literature, history, politics, biology, comparative religion, geography, and studio arts. We were actively encouraged by our teachers to look at connections between the sciences, the arts, and the humanities. As well, this was the hippie era, and many of the institutions of that era, such as Stewart Brand's "Whole Earth Catalogue," as clear a predecessor to the world wide web as can be seen anywhere, actively promoted wholistic modes of thought.

On finishing my BA, I moved to California, and began studying at the University of California, San Diego, which was another place that was embued with the cross-disciplinary spirit. My composition teachers were two composers who were cross disciplinary themselves: Kenneth Gaburo, who not only worked with instrumental, vocal, and electronic music, but also with dance, video, extended vocal techniques, linguistics, and performance art; and Robert Erickson, who built instruments and conducted psychoacoustic research as well as composing music. At UCSD, while I was there, they even set up an institution called the Centre for Music Experiment, which had among its workers not only Erickson and Gaburo, but also Pauline Oliveros, whose work between music, meditation, karate and contemporary physics she described as "The Study of Attention," Roger Reynolds work with interactive electronics, and Jean-Charles Francois, John Silber and Keith Humble who explored improvisation, instrument building, and cross-media collaboration in the group KIVA, among many others. Also in other departments

were a host of interesting artists and scientists, such as performance poet David Antin, Duchamp scholar Moira Roth, computer artist Harold Cohen, computer scientist Don Norman, philosophers Herbert Marcuse and Angela Davis, brain-researcher Manfred Clynes, and a host of people from such places as the Salk and Scripps Institutes. As well, my friends outside of the UCSD orbit were similarly oriented towards explorations among and between the arts and sciences. My two best friends were David Dunn, whose work, even at this early period, was drawing connections between ecology, advanced art, and music (he was already writing about "music's insufficiency as a self-contained discipline"); and Ronald Al Robboy, who combined Yiddish scholarship and music performance research with an almost 'pataphysical sense of connection between seemingly unrelated phenomena. Not coincidentally, both of them were assistants to Harry Partch, who was still alive and living in San Diego. It was in this heady intellectual climate that composers such as myself and Ron Nagorcka lived and thrived. And although I would like to wave the old school t-shirt in praise of my alma mater, it should be mentioned that of course UCSD was not the only cross-disciplinary music institution at this time. Other places that were similarly oriented included Stanford University, Mills College, and California Institute of the Arts in the US, York University in the UK; York University in Toronto; and eventually, IRCAM in Paris, which was consciously set up on the model of CME and Stanford, but with official government support, and no academic affiliation. (I was there at CME when Boulez, Globokar and Risset came to pick Roger, Pauline, Bob and Kenneth's brains.)

On moving to Melbourne in 1975, to help with the setup of the Music Department at La Trobe University, it seemed completely natural to both me and Keith Humble that the electronic music studio would also have video synthesis capabilities, and that the course would be designed to encourage cross-disciplinary collaborations. And in working with Ron Nagorcka, we quickly realized another "trans" - a social one - music had to leave its academic nest, and live in the community - Clifton Hill Community Music Centre was set up precisely to provide a home for experimental work that was outside the academy, and which encouraged artists to not only control their own means of production, but also their own means of artistic performance and dissemination as well. Interdisciplinary work was not just encouraged, it was regarded as the norm.

A real impetus for my own cross-disciplinary work came after I was given the heave-ho from academia in 1981. Suddenly thrown out into the

so-called "real-world," being denied both the financial and technological support the academy had provided, I had to find ways of both making a living, and making my art. Fortunately, I was able to do so, and many of my projects that people now look on as models of cross-disciplinary work were actually a product of simple economic necessity. My work with the CSIRO in 1985-86, building microtonal musical instruments was one such example. I had returned from overseas in late 1984, and some friends told me about a new Australia Council program called "Artists and New Technologies." I applied for the program with the idea of doing computer graphics research at the CSIRO in Sydney. To my delight, I got the grant (no need to worry about making a living for *those* six months), and went off to Sydney to meet the CSIRO staff I would be working with, only to find that the computer graphics person I would have been working with had died, suddenly and unpredictably, a few days before my arrival. On being informed that they wouldn't be able to replace this person for some months, I asked what other CSIRO facilities were available, preferably in Melbourne. I was informed that the National Measurement Lab was at Monash University, and they had machine shop facilities. I quickly changed my project to one of instrument building and acoustic research, contacted the Melbourne lab, and was informed that the project could go ahead. That was the origin of my tuning forks - a product of economic necessity and quick thinking on my feet when the circumstances of the grant changed radically.

Some of the interesting cross-disciplinary projects I was involved in were the Serge Synthesizer project in California between 1973 and 1984; building my own electronics and small computer systems at both UCSD and LaTrobe in the late 70s and early 80s; working with Simon Veitch, and Perceptive Systems on the 3DIS system on several large scale projects in the late 1980s and early 1990s, several of which involved additional collaborations with dancers; working on a large scale video synthesis and sound project at the Los Angeles based art-science think tank International Synergy in the mid 1980s; collaborating with poet Chris Mann, and post-modern dancer Eva Karczag on a series of performances over a 30 year period from the late 70s to the present; collaborating with the actors, dancers, and performance artists at the Theatre of the Ordinary in Melbourne from 1992-2002, most notably with choreographer Al Wunder, and actor/director John Britton; and working with mathematician Henry Hunter on a series of pieces involving the application of chaos mathematics to music from the mid-80s until Hunter's death in 1992, and then continuing on

that work and making it available as software resources for composers in collaboration with software designer John Dunn, a project which continues to the present day. A number of other projects could also be mentioned, but mentioning these should suffice to give the idea of the kind of projects I was involved in.

Lateral financial thinking

Some of the ways I found to fund these projects were quite bizarre - even the act of finding support for the work involved both cross-disciplinary and lateral thinking. As an example, consider my working at the Advanced Computer Graphics Centre at RMIT, Melbourne in 1994.

In 1993, I was getting frustrated because I didn't have access to video synthesis equipment. I knew that computer graphics was making great strides, but not being institutionalized, I didn't have access to the expensive equipment then used. I heard that RMIT had a place called the Advanced Computer Graphics Centre, with a room full of Silicon Graphics machines running SoftImage, which was at the time, one of the state-of-the-art computer animation systems. I went to see the head of the ACGC to find out about getting access to the equipment as some kind of artist-in-residence. He told me that they would like to have me, but they couldn't apply for funding for me, nor could they sponsor me. If I wanted to work there, I would have to get an external source of funding in RMIT. I went to see Robert Owen, in the Visual Arts department, who taught sculpture. I told him about the ACGC, and offered to swap him a series of lectures on sound sculpture for his students in exchange for them sponsoring me as Artist-in-Residence, so they could second me to ACGC, so I could get access to the SGI machines. He thought this was a good idea, if I could do all the application work myself. So I applied to the Music Board of the Australia Council to be Artist-in-Residence with Visual Arts / Sculpture at RMIT, in order to work with computer graphics. Amazingly, we got the grant - $5000. This would enable me to live for 5 months while I worked at ACGC. During 1994, I made three ninety second animations - which provided me with about 600 useable still images, which became the basis for the visual part of my installation "Dense Room", which played in Auckland, Louisiana, and Melbourne. The images were also recycled into "moving costumes" for the dancers in my 2000 opera "Lost and Abducted." That is, the dancers were dressed in all white, dancing in near darkness. The images were projected at an oblique angle onto the floor of the dance space. When the audience saw part of an image, it was because a dancer had

moved between the projector and the floor. Fragments of abstract computer imagery were shaped by moving dancers' bodies.

I want to go over the funding of this again:
1) I was paid by the Music Board
2) To be in residence with a Sculpture department
3) In order to work with Computer Graphics
4) While living on a salary that was well below the poverty line.

This, I feel, encapsulates quite neatly the nature of trans-disciplinary work in Australia. Not only does the artist work between disciplines, they have to be clever enough to figure out how to manage funding sources between the disciplines!

A few stories from the world of cross-disciplinary arts as I experienced them might be revelatory of both the advantages of this way of working, and of its problems.

Catherine's story

An example of what happens to a trans-disciplinary artist in terms of the economic structure of society is shown by the career of my wife, Catherine Schieve. After getting a PhD in experimental music from the University of California, San Diego, she held a two year post-doctoral fellowship at the University of Melbourne, where she developed her interest in large scale graphic scores (33 meters long, for example). On returning to the US after that, she worked for a while as a book-binder in the library at the University of Texas, before getting a job in the Theatre Department at the University of Iowa. While working in the Theatre Department, she also got an MFA in Visual Art, specializing in video and multimedia art from the Art Dept at Iowa. She then moved to Bard College, where she taught in the experimental music course Music Program Zero, and also taught writing in the Bard Institute for Writing and Thinking. On leaving Bard, she became head of the digital arts program in the Visual Arts Department at South Eastern Lousiana University, specializing in digital printmaking. After that, she became the coordinator of media arts at a private high school, Escuola Graduada in Sao Paolo, Brazil, and then became digital arts coordinator at Vail Mountain School, in Vail, Colorado, while also teaching ethnomusicology at Colorado Mountain College, before moving to Australia in 2002. In one career, she's taught music composition, improvisation and history, theatre, visual art, writing, and technology. As she says, this cross-disciplinary approach has been necessary as much from economic necessity as it has been for any idea of a truly cross-disciplinary practice. Inter-disciplinary artists, especially women, are often

the last hired, and the first fired, and when the 3 years of the contract are up, or your department head gets the axe, it's on to the next institution or discipline. Notice that this is a Western Hemisphere story, mostly. In Australia, I suggest, her story would have also involved frequent stretches on the dole, and long stretches working for a variety of non-educational institutions, as academia here seems to be more and more calcifying into departments which teach traditional disciplines in a more and more structured manner.

Kenneth's scatter

Kenneth Gaburo's "scatter" technique is worth mentioning as an example of cross-disciplinary thinking, as much for its challenge to "rational" methods of making work as for the works of art produced by it. This process frequently involved him placing himself into a state of sensory deprivation, and then making some kind of physical gesture which would leave a trace. For example, for his orchestra, children, and electronics piece "Antiphony IX", he sat in a totally darkened room, in front of a drawing table, on which were taped multiple pads of graph paper. He began placing dots on the table, in total darkness, and did this until he felt every point on a particular page was visited. He then removed the page, and kept placing dots on the pages. He did this for several hours, until he felt he had reached a state of total exhaustion. At the end of that time he collected the sheets and placed them on the walls of his studio. For about a year, he lived with those drawings, occasionally circling particularly interesting constellations in coloured pencil. At the end of the year, with the drawings filled with interesting shapes circled by multiple coloured pencils, he drew a vertical axis for pitch on each drawing, and a horizontal axis for time, and these pages became the score for the orchestra. It's important to note that he did NOT transcribe the parts into some music notation program, but gave the graphic notation to the orchestra - learning to read the graphic notation was an essential part of the process. And for those who say that this was an impractical gesture, it might be noted that this piece had two performances in his lifetime, and has since been performed at least twice since his death in 1993.

In "scatter," then, a physical process leaves a trace. This trace is then analyzed, and results in a score for other people to perform. The interesting thing for those interested in algorithmic composition is that Gaburo was here using his body as a "random" information generator. By going through the sensory deprivation process, he tried to remove "surface" habits and "licks" of his, in

order to reveal deeper underlying patterns. He frequently found surprising things - he made an electronic music piece "Re-Run" using a similar process with a Buchla synthesizer, which was not connected to the sound system - it was a silent instrument. At the edge of exhaustion, and the threshold of consciousness, he performed four tracks, not listening to anything during the process, but simply allowing his sense of physical gesture to dominate. After recovering from this work session, he listened to the tape, and found it had some of the most interesting counterpoint that he'd ever heard in any of his works. Having been involved in contrapuntal thinking all his life, he found it was now indeed firmly embedded in his bones.

And the idea of art as a tracing left by a process seems to me to be at the heart of one kind of transdisciplinary thinking. If a process can be applied to any kind of art (or other) material, then an artist such as Gaburo, or Schieve, or myself, can easily make verbal, sonic, visual, movement, or theatrical works. The viewpoint that art is about exploration of the results of the process, rather than primarily being the expression of personal emotions, can lead the artist into many different areas of science, art, sociology, etc.

Bob's stinging wisecrack – wisdom!

In computer music, we sometimes feel we are halfway between art and science. However, I remember an incident during one of Robert Erickson's psychoacoustics seminars that is indeed cautionary. Sometime around 1973, Erickson had arranged for Rainer Plomp, the reknowned Dutch psychoacoustician, to visit his seminar. In preparation for this, we all critically read Plomp's research, and during his presentation, we grilled him about this research, and its applicability to our experimental sound work. I remember my sense of cosmic disappointment with Plomp: he was being so careful, in the scientific sense of claiming nothing but what his result could empirically show, that for us as composers, his work became interesting but not useful. That is, he told us how people listened to older or pre-existing music, but his work did not lead to the "not yet existent." Perhaps that was a good revelation - science can show us things about sound, but it often can't provide guidance for us - it can't show us how to make choices - in fact, it might be said that unless, as composers, we're ahead of the development of new scientific ideas - that is - *they* have to study *our* work as much as *we* study *theirs*, then we're not doing our job, but are annexing ourselves to another church. Just as medieval musicians subordinated their work to the demands of the church, and commercial musicians

of the 20th century subordinated their work to the demands of the market - so we have to beware of subordinating our work to the demands of science - OR it's evaluatory mechanisms. In fact, I remember a meeting with Erickson in the late 1980s. I showed him my work with making scores for my tuning forks based on transcriptions of Mandelbrot Matrices. His scathing put-down resonates with me still. He said "Are you still making that "Scientific American" music? I thought you would have outgrown that stuff by now." Wise words - are we, in computer music, simply composing demo pieces for the latest psychoacoustic theory? Do we really think the way to artistic salvation (and job security) lies in looking more and more like scientists, or in couching our work in terms inimical to its very nature? If we do, I would maintain, we are failing in our jobs.

A literary style?

One area of great failing for me in the field of computer music is the peer reviewed paper, the journal article, the conference paper. The paper is a great way of disseminating practical knowledge, but as a way of living with words (that is, what is known in the most profound sense as "writing") it stinks. I can't think of one ACMA paper in all the proceedings of the past decade or more, including my own, that I can read with pleasure. Many I have found very useful, but inspiring enjoyable uses of language, they were not. If we are creative people in sound, why can't we also be creative people in language? Why can't our means of communicating with each other be imbued with as much sense of fantasy and exploration as our music? Because we're afraid of losing DEST points? Because we feel we have to conform to the norms of scientific discourse? I hope my esteemed colleagues will forgive me if I say that if those are the reasons for our choice of modes of discourse, then we aren't the creative revolutionaries or explorers we fancy ourselves to be - we're wimps, and not particularly gracious wimps, either. When I see conference papers that are as fantastic in their imagery as the pieces they purport to describe, I will then rejoice.

The need for new contexts

One of the great areas of change that I think we, need to consider as cross-disciplinary thinkers and makers, is that of context. The question of where we place our work is, I think, paramount. This became very obvious to both me and Ron Nagorcka as soon as we arrived in Melbourne in 1975. If we would have had to rely on say, the world of classical music performance, or the world of pub rock for the basis for our explorations, our work probably