



University of California,
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DIRECTIONS

CENTER FOR MUSIC EXPERIMENT and related research

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Director's Corner

When I arrived in 1972 as a Fellow in the newly created Project for Music Experiment ("Project" was changed to "Center" the following year), no one among the initiators could define clearly what it was all about; nor had anyone among the invited fellows any idea of what was expected of them. Examples of creative musicians elaborating their art in the University context, using technology as an important means, existed already in numerous forms in the United States. But somehow we had the vague impression that something far beyond the mere existence of a composition department was going to happen at the Center; something through which the musician would accede to the stature and respect enjoyed by the scientific researchers working for the happiness of humanity.

Seven years later, at a moment when we can compare our perplexity to that embedded in the existence of other similar institutions such as the Stanford University Artificial Intelligence Center, The Kitchen Center in New York, I.R.C.A.M. in Paris, as well as independent groups such as Composers Inside Electronics, we have to ask ourselves if any better understanding of our role has been achieved. This issue of DIRECTIONS attempts to answer these questions specifically through the points of view of musicians currently involved in activities at CME.

There is some misunderstanding in the profession, and often this includes the new music world too, as to why certain musicians need so pretentiously to put on a lab coat and enclose themselves in the sanctuary of a "scientific" monastery. It should be explained again and again that the realities of contemporary life are such that in the face of mass-media *by the few*, there exist only small minorities, small groups of activists participating in depth in highly esoteric activities and dealing in one way or another with the highly technological orientation of our society. Thus, it cannot even be a question of an inside and an outside, of a private and a public, of an experiment and its practical application, but of all these at the same time. That is: ANDORcomposingANDORplayingANDOReducatingANDORyakyakyakingANDORdocumentingANDORetcANDORRE.

Hardware is the obvious object of research: in this area even artists can make predictions on what a system should do and can measure the compliance of the result. In this respect, research in music has always flourished in the design of instruments by specialists. But in the new universe of computers and sound-sculptures, there is a

need for the absolute total involvement of the creative musician: the "instrument" is the object of the composition.

In their unwillingness to place their compositions into the hands of manufacturers, musicians are not well-equipped. This is because they are, with reason, very reluctant to give up their traditional role of being members of a counter-culture, (not in the sense of political action, nor in the sense of the humanities): An island of irrelevant acts in the sea of goal-oriented endeavors, mysterious smoke in the midst of hard facts.

Easy access to technology will help, but will not solve these psychological difficulties, because musicians are analog beings; their thinking lies in between this or that, inside or outside. What then should an Organized Research Unit devoted to the Arts be? It should be a reflection of these contradictions, it should include all these components at play, so that they clash in their free manifestations, and build a realistic model of late twentieth century society: Wind, Eructations, Crystal, Water, Anal-logic and Digital.

Jean-Charles Francois

The Nature of Music Research

The primary results of research are undoubtedly contributions - useful or not - to the general body of knowledge about a topic. For a given activity to qualify as, say, music research, it must include at least the intention of contributing to our knowledge of music.

Of course, an activity need not qualify as research in order to be desirable, especially from an artistic point of view. Music performance, composition, improvisation, and instrument building certainly produce music itself, or the means to make it. These activities might also contribute to our knowledge of music if, in addition to the actual music production, a statement of what has been learned is also generated. Such statements are generally in the form of written documents which explain what new information has been gained, together with sufficient description of the methods used to allow verification of the result by an independent researcher. Knowledge of a subject grows by studying, compiling, and cross-referencing (interlinking) such reports, which themselves often lead to new insights and inquiries.

The most difficult part of any research is finding the right questions to ask. Such questions have to satisfy simultaneously two important constraints: 1) they must lead to *new* knowledge, and so tend to be fairly complex - or at least very clever - since they are difficult to formulate, and 2) they must be conclusively answerable. It is much easier to find good-if-tricky questions than it is to find such questions which can be answered within the limitations of available resources, including previous knowledge and methodology as well as technological tools. Especially in music, answers to questions which are complex enough to be interesting tend to be undependable, even if they are convincing.

Music research today uses many technological tools, especially electronic instrumentation and computers. Such tools are used only because they present new opportunities for discovery, much as the telescope presented new opportunities for sixteenth century astronomers. The computer may be viewed as a general purpose tool with the unprecedented function of extending our power of mind, as other tools extend our muscular or sensorial powers. Computers allow us to examine properties of our mental concepts by observing them outside of ourselves. Explorations even in the realm of subjective experience are possible, since we may examine hypotheses about the nature of these experiences via emulation from precise statements. Even before all answers are found, it is clear the computers provide the means to explore totally uncharted regions of the human experience.

The challenge facing music researchers is primarily due to the complexity of the new technological tools themselves, which require cooperative team efforts for their use. Musicians have traditionally worked in highly individualistic ways, according to the pronouncements of "inner voices" which must be protected from being overcome - or simply drowned out - by the din from without the individual. Using computers to study music requires simultaneous attendance to issues often including computer science, engineering, acoustics, psychoacoustics, and music, to name a few. Since it is unlikely (or at least rare) that individuals will possess all of the requisite skills and knowledge needed for effective use of computers in music making or study, new challenges arise in the arenas of communication among coworkers and cooperative ventures. It seems likely that the success or failure of music research will hinge on this issue of cooperation and pooling of resources, both at CME and at all the other music research centers.

F. Richard Moore

CME Fellows Comments

For me, music research is essentially the generation and development of musical ideas. In recent years I have been engaged in the study of the phenomenon of musical performance: inquiry concerning the performer in relation to himself, to composers, to a composer, to audiences, to a listener, to society, to music, to a musical composition, etc., etc., viewing the problems of the representation of musical ideas as essentially one of communication, and one in which the ideas themselves are of a unique, unlimited, and infinitely various nature. For many years I have been engaged in the study of the relationship between a musical instrument-machine and a human performer's body-machine, as they are brought under the control of the "mind" or "brain" in its idea-suggestive, muscular-activating, perceptual, and aesthetic judgement capacities: the process from an idea such as: "This is what I wish to hear," to: "This is the action I must make in order to produce that which I wished to hear," to: "I did, in fact,

produce that which I wished to hear," and: "I like it," or: "I do not like it," or: "I did not produce that which I wished to hear," and: "I like it," or: "I do not like it," with all the subtle steps and stages involved, and all the factors that influence and vary the process and its results.

Virginia Hommel Gaburo

I try not to be overly reverent in my use of the word "research". The term signifies activity that is very rationalistic ("careful, diligent, studious, critical, exhaustive" according to Webster). By directing our attention and approval towards rationalism, system, and analysis, this signification can easily influence us to: 1) disregard the immense value of artistic intuition and impulse, 2) disassociate the development of craft from the making of art, 3) think of ourselves more as researchers than as artists. We talk a lot about research here because UC San Diego is a high-technology, research-oriented institution. As inquisitive, modern and creative individuals, we are interested in the latest tools (both physical and conceptual) and in the disciplines which produce them (e.g. computer science, psychology, linguistics). But art is more than a body of knowledge--it is a body of work and a living process. It is the special nature of art that it preserves and communicates information in a way that language and mathematics cannot. Therefore, research includes speculation and experimentation; so must our art be speculative and experimental.

Richard Zvonar

On the Meaning(s) of Music Experiment

"Music Experiment" is a deliciously ambiguous piece of phraseology; it would appear to support at least two distinct meanings. On the one hand, "music experiment" may properly refer to the activities of *musicians*--composers and performers--attempting to structure (or restructure or even unstructure) sound in nontraditional or relatively unexplored ways. On the other hand, "music experiment" may also denote the activities of *scientists* seeking to collect more or less systematic data on some musical phenomenon and to construct a theory that accounts for such data.

What is the rationale, the *raison d'etre*, of music experiment in either sense? It might be thought that the first type of music experiment is mainly concerned with *extending the scope* of musical experience, and the second with *finding out something* about the nature of musical experience. I would like to suggest instead that the best kind of music experiment--whether carried out by a musician or a scientist--does both. Musicians and scientists, when working in their respective capacities, have their own "scripts" that they follow, molds that dictate something of the form in which ideas are to be realized. Because the resulting forms of musical composition and a scientific journal article are themselves so different, we may have been led to believe that they are incommensurable, even incompatible ways of studying music. But I see them more as ends of a continuum. Just as a musical composition or performance may help us to *find out* something about music and musical experience that we did not know before--something that might then be subjected to scientific test--so can the results of a scientific article or laboratory experiment extend the scope of potential musical experience which might then be realized in a performance or composition.

Several years ago, Robert Erickson came out with a piece called "Loops", which, he said, should be thought of not as a composition, but as "an informal experiment".

The piece involved a constant interplay and competition between organization by melodic or pitch-based continuity and organization by timbral continuity. Among the questions eloquently posed by "Loops" are: "Can there be—and if so, under what circumstances can there be—musical organization that is specifically timbral?", and "Along what dimensions will there form separable (melodic?) lines or *streams*, and how many such streams may be formed?" But a large part of what made this piece an "experiment" was Erickson's explicit interest in asking the question "What do you hear?", surely a question that has been guiding students of auditory perception for many years. Composers have not generally concerned themselves directly with this last question, perhaps out of a not unreasonable fear that an uninformed or unwilling listener might answer "Nothing." But if Erickson had *not* been asking the "What do you hear" question, and instead a *scientist* had played "Loops" for you at CME and asked the same question, would this have changed the potential value, to musicians and scientists alike, of the answers listeners would give?

Let us consider the other side of the coin: I, a scientist, am interested in multiple division of the octave and associated "microtonal scales". Following the lead of number of music theorists, I have come up with a formalization of pitch systems and the scales they support, based on group theory. Some of the conclusions this inquiry has suggested are that structural algebraic properties of pitch sets and systems are at least as perceptually important—if not more important—as the "goodness of fit" of the intervals of a pitch system to certain desirable whole number frequency ratios. This conclusion, and the preferred microtonal scales to which it leads, contrasts with many prevailing views of the nature of microtonal resources and the nature of the "next step" toward microtonal composition. If I am correct, even partially correct, then the specific microtonal systems and scales I am proposing offer considerable promise for expanding the scope of potential musical experiences. But just as the intervention of a scientist would be necessary to put some of Erickson's "Loops" results to more formal test, so the skilled hand of a composer would be necessary to "test" the validity of my arguments about microtonal scales.

This essay has been necessarily brief, but I hope I have put some meat on the bones of the thesis that the endeavors of musicians and scientists are not inherently incommensurable and incompatible, but potentially reciprocal and complementary. Let us admit that some science has nothing to do with music, and that some music has nothing to do with science. But let us also agree that this is not *necessarily* the case, and that by working together, forward-looking musicians and scientists may both do "music experiment" and learn much from one another.

Gerald J. Balzano

Three Tangents

Research within the context of a Center for Music Experiment and Related Research is a many-flowered thorn for it encompasses everything from traditional creative arts to the push of larger ideas on expression itself. Within such a scope lies marvelous weddings and strange symbiotic events for in that paradox of Arts and Sciences (the one asking clean interpretations and unambiguous demands; the other, like the poems of Robert Frost, "moving through the fields with burrs attached") an uneasy yet fruitful truce exists. In that context I would like to invoke that larger view in order that the reader might at least be introduced to some of the "other than

itself" musical concerns which tangentially impinge on the arts at CME (all compactly put).

About seven years ago there was generated at CME an interest in neuroscience research as it has to do with cognition and the creative process; in that endeavor certain studies were opportuned dealing with neurolateralization and EEG's. The principle informant for the former was Dr. Joseph Bogen at the Ross Loos Clinic and a neurosurgeon fellow researcher with R.W. Sperry at Cal Tech; the latter, EEG's, was Dr. Reginald Bickford of the UC San Diego School of Medicine and a major researcher as EEG's have to do with computer graphics and concomitant diagnoses. From the former, the following was patent:

... there can be no doubt that man has two minds that those two minds have specialized intellects
 ... are discrepant ... have different access systems
 ... and work from different retrieval/language forms including music. . .

Within that dichotomy it was evident too that in dichotic listening neurolateralizations made us selective as to what we (attend) latter, Reginald Bickford, it was clear that as a monitoring device EEG's were a remarkable means of gaining insight into brain hemisphere response.

The second area of Related Research was in phonology and linguistics. In the former, the principle informant was Dr. Reiner Plomp of the Institute of Perception, Soesterberg, The Netherlands, and the latter through the direct interest of music faculty in speech synthesis and more recently in the "new orality" as examined by linguists, musicians, poets, anthropologists, and philologists at UC San Diego and the Salk Institute. Like the neurosciences before, certain factors impinging upon perception, creativity and thought itself, became manifest in the literature: Within the comparative anatomy of language as semantics, Benjamin Whorf was one of the first American linguists (see also Hamann, Humboldt, Sapir) to question the influence of language upon thought. It appeared that rather than a benign tool of reason, language entered into the very structure of cognition itself. The language/cognition problem became further densified when contemporary communication forms were added (McLuhan); we no longer simply address diversified world tongues but other more complete modes of thought. . . the bicameral mind, conscious substrates, sensory absolutes, a priori rights . . . sound, light, movement, dot for dot . . . the new oral tradition . . . sensorium replete . . . intuitionist's logic, stored archetypes, the apocalyptic purse, way as thought, universe within.

In this, old lingua corridors no longer work and new finitudes have to be esthetized out. That this more hypostatic pre-cognate fix has to be explored is without doubt . . . not only are human sentience and cognition being swayed but we have entered a different dimension of time . . . multiple modes, co-existing states, extensible borders, randomly arranged space, depth grammar cryptotypes, the antimony of birth and decay which objects seek to emulate . . .

to relate the universe
 and what it means
 when it descends
 in values restored

The third area of research, emerging from extended art media forms, was in the use of simple technology . . . to get at sound in a very fundamental way . . . and then to explode outward to more complex modelings and instrumentations rather than the other way around. A case in point was the simple microphone. That simplest of devices has allowed the inner dimensions of sound to well up in mattered address more distinctly than ever before . . .

vocal harmonics . . . overtone math . . . particed lips . . .
 new oral universes . . . electro verbs . . . pure means
 brought forth . . . acoustical syntax . . . ontologies . . . inner
 voice hazarded curves . . . new drills . . . new verse . . .
 metaphors of the abstract . . . *influencing not only what we
 hear but the meanings attached* . . . all become part of the
 art form load, for technology not only served but invaded
 the nature of the models produced.

What occurs in research tangents, such as the above,
 is that both arts and science, technology and form, gener-
 ate new cognitions, new art modes, new vocabularies
 and skills for dealing with sound in abstract ways. . . all
 blend into what it means to understand not only the work-
 ings of music in a technological society but the game
 being played.

John Silber

CME Computer Music Project - Initial Status Report: 15 November 1979

The new computer music system envisioned for CME is
 slowly becoming a reality. Renovation of the computer
 system site, a space in the south section of the CME
 building, should be completed by late January, 1980,
 when the VAX computer itself is expected to be shipped
 from the Digital Equipment Corporation in Maynard, Mas-
 sachusetts.

Since the VAX is both the first and the largest com-
 ponent in the planned system, it will require the most
 effort to install and bring up. This computer, the UNIX
 timesharing system, and a small complement of terminals
 should be installed by the end of February, 1980; work

can then begin on the attachment of the most important
 peripheral in the system: the digital-to-analog converters
 and associated hardware and software. It is expected
 that a reasonably useful software analysis and synthesis
 facility should be attained during late spring or summer,
 1980, after which work can begin on the realtime com-
 ponents of the system.

Funding for the system has been relatively stable if
 somewhat slow. For example, at the time of this writing,
 contributions of UC San Diego and the Rockefeller Foun-
 dation have been used to obtain the initial parts of the
 timesharing system. The NEA has contributed to the
 technical support for the system, but a major grant from
 that agency has been delayed since the U.S. Congress
 has not yet passed its appropriations bill for the fiscal
 year beginning on October 1, 1979. Some additional
 funds have been made available by the California Arts
 Council for this project, and other funds are being sought
 from these and other sources to cover both remaining
 equipment and operating costs.

A full time staff position has been created for a com-
 puter facilities manager. Applicants for this position have
 already been interviewed, and the hiring decision will be
 announced in the next CME newsletter. Other UC San
 Diego personnel currently involved with the computer
 music project include: Jean-Charles Francois, present
 director of CME, Monica Polowy, CME's new administra-
 tive head, Ann Hankinson and Richard Zvonar, graduate
 research assistants and professors Gerald Balzano and
 Roger Reynolds of the UC San Diego Music Department.
 In charge of the computer music project itself is F.
 Richard Moore, also a professor in the Music Department.

F. Richard Moore

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CME Activities: Fall and Winter 1979-80

Scheduled concerts and colloquia from September through December of this
 year included:

- September 28 Concert: Paul Drescher, Composer "Liquid & Stellar Music"
- October 16 Lecture: Lilly Greenham, Sound Poet/Composer
- October 25 *Colloquia Series: J.C. Francois, "Percussion Notation"
- November 8 *Colloquia Series: J. Rothenberg, "Translations from an Oral Tradition"
- November 9 Concert: Javanese Gamelan Performance by I.M. Harjito and San Diego students
- November 15 *Colloquia Series: M. Meeker, "Awareness of the Past in the Hikajat Potjoet Moehawat"
- November 29 Lecture/Discussion: V. Globokar, Trombonist/Composer, "The Musician in Europe"
- December 3 Concert: Shakuhachi (Japanese Flute) Performance by Watazumi Doso
- December 6 *Colloquia Series: U. Bellugi, "Sign Language"

*The series of colloquia on "Orality and Writing" continues into the winter
 quarter. Participants are: Ursula Belugi, Director of the Laboratory of Language

Studies at the Salk Institute; Michael Davidson, Poet and Director of the UC San
 Diego Poetry Archive; Michel De Certeau, Professor of Literature; Jean-Charles
 Francois, Associate Professor of Music, Director of CME, and member of KIVA;
 Michael Meeker, Associate Professor of Anthropology; Jerome Rothenberg, Poet
 and Editor of "The New Wilderness Letter"; John Silber, Professor of Music and
 member of KIVA, and Donald Wessling, Associate Professor of Literature.

KIVA and EVTE, performing ensembles, in residence at CME, have been joined
 this year by Mr. I.M. Harjito, visiting Lecturer in the Department of Music, who
 teaches traditional Javanese music. A one hundred year-old Javanese Gamelan on
 loan from Dr. Robert Brown, Chairman of the Music Department at San Diego State
 University, is a welcome addition to CME's musical resources.

"What's Cooking? III," CME's third interdisciplinary performance art con-
 ference, will be centered around the visit of John Cage, who will visit UC San Diego
 as Regents Lecturer from January 27 to February 9. The most recent work of area
 and visiting performing artists, poets, composers, and dancers, will be presented
 in this loosely structured "event" to be held at CME Friday through Sunday,
 February 1-3.

Articles and comments on the question "What is Music Research" are invited.
 To be included on the CME Newsletter mailing list, write or call:

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