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The Military-Arts Nexus: Two cases in the United States, c. 1970

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Abstract: Resistance to the Vietnam War and the military-industrialism of the United States had a direct impact on the development of the arts as they intersected with technology and science. A common case in point is the controversy surrounding the Art & Technology program at the Los Angeles County Museum of Art. Instead of drawing broad historical representation from a high-profile institution in the visual arts, the present paper will examine another case, the low-key collaboration between the theoretical physicist Edmond Dewan and the experimental music composer Alvin Lucier, where resistance against the Vietnam War had discernible effect. The perspective will be from the side of the scientist.

Keywords: Art and technology, art and science, music and science, art and Vietnam War, experimental music, Mansfield Amendment

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The intersection of the arts, science and technology in the United States did not evolve smoothly. It flourished during the 1960s in the wake of the resources and imperatives set loose during the Cold War, culminating in a number of important exhibitions, publications and performances, but then faltered in the early-1970s due most noticeably to an association of technology and science with the military-industrial complex and the conduct of the war in Vietnam.

I stress the plural *arts* as a way to remember that major developments in the arts and technology, arts and science, cannot be easily sequestered into music, theatre, dance, cinema, literature, etc., let alone the “visual arts” with which the singular *art* is often confused. Exceedingly important, in this respect, was the 1966 series *9 Evenings: Theatre and Engineering* held at the Armory in New York City in collaboration with engineers from Bell Telephone Laboratories, precursor to the organization *Experiments in Art and Technology* (E.A.T.).

This historical juncture of the arts and technology/science has most often been discussed through deracinated forms of experience and knowledge generated within disciplinary or professional fields, not battlefields; lines of conflict are commonly drawn more quickly between C. P. Snow’s two cultures than lineages of material culture generated from actual military conflict. The vitality with which they developed through the 1960s seems to have contradicted Snow’s 1959 lecture. In contrast, Dwight Eisenhower’s farewell speech in 1961, famously warning against the *military-industrial complex* that had grown stronger during his presidency, is more relevant.¹

Where once there were military mobilizations and demobilizations, where, as Eisenhower said, “American makers of plowshares could, with time and as required, make swords as well,” there had developed a permanent military mobilization with a permanent war economy permeating every sector of society. Accompanying the military-industrial complex, public policy was threatened by a *scientific-technological elite* tied to the dependence of intellectual inquiry and scientific research to Federal contracts with many military strings attached. Apart from medicine and agriculture, in 1958 the Department of Defense and Atomic Energy Commission (which had evolved from the Manhattan District Project) funded 84% of research conducted at universities.² Unlike Snow, Eisenhower’s pronouncements at the beginning of the 1960s described both certain reasons for the waxing of the arts and technology/science during the 1960s and the waning at the end of the decade.

In what follows, I would like to present two contrasting events at the cusp of the 1970s that demonstrate what happened when the Vietnam War came crashing into domestic labs, studios and exhibition spaces. The first event is the Los Angeles County Museum of Art (LACMA) *Art and Technology* project from 1967 to 1971, under the direction of Maurice Tuchman, a well-funded and highly publicized event on one flank of the market-driven world of visual art. The publicity it would eventually receive at the time, as well as its historical legacy, would not be highly regarded for a number of reasons: there were no female artists involved and, for our purposes here, many of the corporations it paired with the artists were actively profiting from the War and other military pursuits.

The second event is the casual, self-funded collaboration between the Air Force physicist Edmond Dewan and the experimental music composer Alvin Lucier during the latter-half of the 1960s. The Vietnam War would weigh down upon their relationship in a more oblique yet equally effective manner. Because market mechanisms of the visual arts generate greater volumes of journalism and history, the LACMA project holds a more prominent position, yet I



would suggest the latter is equally if not more significant, since it better exemplifies the manner in which the bulk of activities in art/technology and art/science has subsequently been practiced, i.e., through personal and smaller scale relationships rather than through larger institutions and spectacular public events.

To make the discussion manageable, if not more disjunctive, I will present the LACMA show through the arts journalism it received, and the collaboration between Dewan and Lucier from the perspective of Congressional policy on science funding in response to the Vietnam War. I can do this for *Art and Technology* thanks to the work of Anne Collins Good-year in her paper “From Technophilia to Technophobia: The Impact of the Vietnam War on the Reception of ‘Art and Technology,’” and her dissertation as excellent guides to the LACMA project and other issues of art, technology and science during the time.³ Indeed, the gross movements of waxing and waning in various relationships of the arts to technology/science at the cusp of the 1970s is concurrent with technophilic to technophobic perception, even as both activity and perception continued unabated through other means.

Under the direction of Maurice Tuchman, *Art and Technology* matched artists with large Southern California corporations and their R&D departments. The artists were, as David Antin wrote in his *Art News* review, “primarily a small, though perfectly good enough, group of New York artists who had dominated the early 60s in a kind of generalized Pop ambience—the Castelli-Janis axis—combined with a small number of other artists that the museum happened to like.”⁴ He was correct in this assessment; the Museum received 78 unsolicited proposals from artists once word got out about the project and although some were given due consideration, in the end, none were accepted.

For Antin, *Pop ambience* meant a ritual urge to *marry the culture*, in other words, to open the garret door to other activities besides spilling one’s psyche or trapping the cosmos on canvas. He borrowed the term *marry* from Tuchman himself who used it to describe the pairing of artists with corporations. Unlike Antin’s own New York art world haunts, however, Tuchman’s idea was formed through the patronage environment of “typical coastal industries as chiefly aerospace oriented (Jet Propulsion Laboratory, Lockheed Aircraft)...” in the military-industrial ambience of Southern California. Marriage in this case was a polygamous affair of the artists, institution, with corporate culture tied to armaments and systems used in the nuclear arsenal, military intelligence, the militarization of outer space and the war in Vietnam.

For Antin, the *technology* in “Art and Technology” might have had many meanings—not long before it had been associated in the art world with machines, for example—but given Tuchman’s commitments he had no choice but to summarize the overriding meaning to be “Technology is corporations.”⁵ Thus, his remaking of “Art and Technology” into his review entitled “Art and the Corporations.” However, Antin seemed unwilling to commit himself beyond a loosely anti-corporate reading of the show to make any point about the fact that most of the corporations were profiting substantially from military contracts.

Max Kozloff, in contrast, was unequivocal in “The Multimillion Dollar Art Boondoggle,” his review published in *Artforum*:

Some of the companies involved by the museum are as follows (quotes are from the Report itself): the Garrett Corporation (“has been designing high-performance jet engines for military aircraft”); General Electric (“has its own think tank called TEMP, which runs seminars on nuclear weapons”); Hewlett-Packard Company (“radar, guided-missile control”); Jet Propulsion Laboratory; Littleton Industries (“builds submarines, amphibious assault ships, and advanced guidance and fire-control systems”); Lockheed Norris Industries (“a major ordnance manufacturer since World War II”); North American Rockwell, and the Rand Corporation.⁶

Kozloff summarized these companies as “a rogue’s gallery of the violence industries. Subsidized decisively by the American government, that had grown to their present bulk through the business of slaying.” Moreover, the Museum and its collaborating corporations were systemically complicit in the disintegration of the economy and society represented by events over the



four-year term of the project: "...the My Lai massacre, the Chicago Democratic Convention riots, the assassinations of Martin Luther King and Robert Kennedy, the invasion of Cambodia, and the student killings at Kent and Jackson State...even the most rabid conservatives realized that capitalism was suffering a possibly mortal disease."

In a not so-oblique reference to *9 Evenings, E.A.T.*, and their meeting with the LACMA project at the Pepsi Pavilion at Expo '70 in Osaka, Kozloff described how "...the art world mounted an enterprise [of "art and technology" in the general sense], actually outdated even before it began, designed to congratulate us on our technical prowess and rosy future. Nor was its general foolishness allayed by having been suffused by the quack theories of Fuller, McLuhan, and Cage, the gurus of '60s far out."

Kozloff stopped short of associating specific corporations with specific artists. Robert Rauschenberg, for instance, was central to the growth of art and technology efforts in the United States. A founder of E.A.T., he collaborated on his last major technological piece *Mud Muse* with Teledyne, a corporation that had substantially increased its size during the early 1960s through military contracts connected with the Vietnam War, including electronic and computer components for attack and logistics, and the development and manufacture of remotely piloted vehicles, progenitors of the drone aircraft increasingly put to use by the United States.

However, close examination will show that, while corporate complicity can be easily mapped, the same is not true for the individual artists, scientists and engineers involved. For example, James Turrell who, with Robert Irwin, was paired with Garrett Aerospace, a company heavily invested in military research, had been imprisoned for advising young men on how to avoid the draft that would send them to fight in Vietnam. Ed Wortz, the engineer on the project, left Garrett Aerospace to pioneer therapeutic brainwave biofeedback and become a Zen-influenced counselor with many clients in the Los Angeles arts community.

Maurice Tuchman was not entirely oblivious to the situation, as he stated in the catalog itself:

I suspect that if *Art and Technology* were beginning now instead of in 1967, in a climate of increased polarization and organized determination to protest against the policies supported by so many American business interests and so violently opposed by much of the art community, many of the same artists would not have participated.⁷

His concession was based on the suppositions that the Vietnam War, resistance against it in the arts community, and the connection with corporations involved in the project, had only occurred since 1967. The controversy surround *Art and Technology* alienated large institutional players for many years to come, and I cannot think offhand of an equivalent attempt at pairing large corporations and such well-known market-based artists. But there was another, less obvious set of brakes slowing down the advance of arts and technology, arts and science.

The ragtag economics of experimental music in the United States meant that multi-million dollar boondoggles were impossible. Because of the negligible trade in specialized commodities or classically patronized culture, experimental musicians during the 1960s had little recourse to the institutional power of art markets, metropolitan symphonies and academic departments. Instead, as Amy C. Beal has detailed, they sought support in West Germany and other European destinations.⁸

Experimental music also had a deeper historical connection to the utilization of new technologies than its visual arts counterparts and, consequently, was not as susceptible to the oscillation from technophilia to technophobia. Its tradition from electronic music in the 1920s to digital sound synthesis in the early-1960s, and its connection with cinematic sound tracks, meant that it moved more easily from institutional mainframe computing to the micro-computing (personal computers) and media as they developed during the 1970s. The DIY electronics of American composers including David Tudor, Gordon Mumma and David Behrman benefitted from the military surplus outlets around the country, whereas others benefitted from the knowledge generated in the funding largesse of Cold War science, as was the case with the composer Alvin Lucier and his collaboration with Edmond Dewan.



Dewan was an officer in the United States Air Force who split his time between the Stanley Cobb Laboratories for Psychiatric Research at Massachusetts General Hospital, the Air Force Cambridge Research Laboratories at Hanscom Air Force Field at Bedford, and the Physics Department at Brandeis University where he was adjunct professor.⁹ During the early 1960s his work took a dramatic turn upon meeting Norbert Wiener, after which they became friends and colleagues.

Dewan compared Wiener's influence on himself, in cybernetics and non-linear mathematics, to John Cage's influence on Alvin Lucier, in that both Wiener and Cage had a liberating effect and a wide-ranging influence. It was Wiener who convinced Dewan that he should research brainwaves, which he did under part of a large Air Force research project on spatial disorientation among helicopter pilots and crewmembers produced by the stroboscopic light shining through helicopter rotor blades. Dewan studied power spectra of brain waves, not flicker, with a long-term goal of rendering data into formulae that he personally hoped would eventually contribute to a model of consciousness. Through the course of his research he figured out how to use brain waves in a simple control mechanism.

For reasons he could not fathom and we surely cannot reconstruct, Dewan had an intuition that his brain wave control system could be used to make music. Dewan performed difficult 20th Century organ music as an avocation: perhaps the reason ran through the most widespread of electronic musical instruments? He did know that he was generally motivated by a respect he had always had for composers that had gained strength through his own musical performance practice. He offered this idea, expertise and the accompanying equipment to several composers, until Alvin Lucier accepted, and produced what he considers in retrospect to be his first mature composition, *Music for Solo Performer* (1965), known famously as "the brainwave piece."

Dewan also suggested that, since Lucier liked the electromagnetic sounds of transduced brainwaves, he might also contact colleagues at the Air Force Cambridge Research Labs conducting research into naturally-occurring ionospheric radio. Lucier never did so, but he did search out recordings of natural radio that lead to his composition *Whistlers* (1966), and to related compositions. He also told Lucier about a demonstration of room acoustics at AFCRL given by Amar Bose, likewise a close associate of Norbert Wiener, whom you will know from the Bose line of consumer electronics. Bose's presentation of making a recording of speech and playing it back into a room, recording that, etc., formed the backbone of Lucier's well known work *I am sitting in a room* (1970).

Where this tale fits in with the LACMA *Art and Technology* project is how the Vietnam War influenced the funding priorities under which Dewan worked. Lucier and Dewan's collaboration was collegial, a personal relationship with no other demands. From Dewan's perspective, it was facilitated by the blue-sky umbrella of pure research, as well as a certain amount of free time and absence of scrutiny, that had been made possible by the largesse of military funding at the time. Whatever was understood to be broadly relevant to the pursuit of long-range missions, which could themselves be broadly stated, could be and was often funded. The so-called Mansfield Amendment changed that by tightening the requirements for funding to projects that could demonstrate relevance to specific military missions.

Senate Majority Leader Mike Mansfield was a liberal critic of U.S. involvement in Vietnam. What is called the Mansfield Amendment was a series of measures mooted and implemented from the late 1960s to put political pressure on the dominance of military funding for scientific research, as a response to campus protests against the War and the presence of the military at universities in training programs (R.O.T.C.) research. The Mansfield Amendment (associated with Senator J. William Fulbright) was passed in 1969 and attached to this was an "Authorization for Military Procurement, Research and Development, Fiscal Year 1970, and Reserve Strength." It promised but did not deliver a proportional shift of funding sources for basic research, and thus caused consternation that could be read amid the editorial sections of prominent science journals on the cusp of the 1970s.¹⁰

In the new set of research priorities, Edmond Dewan's mathematical skills were directed to the study of atmospheric gravity waves, complex turbulences that occur between different



atmospheric layers, a topic of urgent interest to the Air Force. He studied the propagation of different frequencies, including optical, i.e., lasers that could be used for communications, tactical beam weaponry, missile guidance, and radar.¹¹ Dewan stated that there had been a small periphery where his interaction with the arts was possible, and that periphery existed due to the largesse of military funding. He attributed the end of his involvement to the changed funding patterns brought about by the Mansfield Amendment. Most practically, once his scientific research was directed toward military application, it became highly classified and, thus, his activities were more closely monitored. He was eventually awarded for this line of research by the Air Force and, in the end, preferred the work because it was more mathematically challenging than his work on brainwaves. Alvin Lucier, on the other hand, continued to compose with scientific themes through the 1970s, until concentrating more on compositions using sine waves, instrumental tones and the resulting beating patterns.

The degree of technophobia that Goodyear detailed with respect to the visual arts was not evident in new developments in experimental music. The waxing and waning of the arts in relationship to technology and science were certainly felt and could be implied as certain scientists who may have found themselves in collaborative projects were withdrawn from doing so through the Mansfield Amendment, among other reconfigurations of research in the United States during the 1970s. Experimental music in the United States at the time not only had a legacy of avant-garde engagement with electronic performance since the 1920s, it also represented a historical retreat in the Western classical tradition from dependence on the large institutions of symphony orchestras and ensembles, toward composers performing their own works with fellow composers, non-institutional musicians and non-musicians, that is, experimental music composers did not have to wait to hear their music performed.

This was the reverse of relationships earlier in the 20th Century, where visual artists were more independent from large institutions while composers were more beholden. LACMA's *Art and Technology* was, therefore, a furtive attempt to engage the putative independence of artists in a large institutional framework in order to carry out a technological mission. It just so happened that, in Antin's equation, "technology" was corporations and, in Kozloff's accusation, those corporations were contemporary versions of shops looking for window design.

Certain composers such as Steve Reich and Philip Glass moved from technological means to conventional ensembles and larger spectacles in mainstream maneuvers but Pauline Oliveros, Gordon Mumma, Alvin Lucier, David Tudor, Robert Ashley, George Lewis and many others did not. The technologies of experimental music made their way into grassroots practice through synthesizers, DIY electronics, and micro-computing, making a gradual transition to when technology would be readily associated with media. What was noise to musical institutions became the soundtrack to digital culture. Into and through the 1970s and beyond, experimental music was not corporations, yet.



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- ⁹ On Dewan, see my Alvin Lucier, Edmond Dewan und Music for Solo Performer (2010). In D. Gethmann (Ed.). *Klangmaschinen zwischen Experiment und Medientechnik* [Sound Machines Between Experiments and Media Technology] (pp. 211-229). Bielefeld: transcript Verlag.
- ¹⁰ The Mansfield Amendment to the "Authorization for Military Procurement, Research and Development, Fiscal Year 1970, and Reserve Strength" states "None of the funds authorized by this act may be used to carry out any research project or study unless such a project or study has a direct and apparent relationship to a specific military function or operation." It forced the Department of Defence to "more carefully delineate the military relevance of defense research projects." See Nichols, R. W. (1971, April 2) Mission-Oriented R & D. *Science*. 172(3978), 29-37.
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