

The Columbia-Princeton Electronic Music Center

by Alice Shields

The Columbia-Princeton Electronic Music Center was the first electronic music center of its kind to be established in the United States, and from 1959 to the late 1970s it was one of the premier sound facilities in the world. The history of the EMC falls into four sections: 1951-59, as the original experimental studio begun by Vladimir Ussachevsky; 1959-1980, the Columbia-Princeton Electronic Music Center, directed by Ussachevsky, and the leading electronic music studio in the United States; 1980-1994, as the Columbia University Electronic Music Center, directed by Mario Davidovsky; and 1994 to the present, as the Columbia University Computer Music Center, directed by Fred Lerdahl and Bradford Garton. From 1951 to 1980, the function of the EMC was the teaching and production of electronic music, and the vast majority of pieces composed at the Center--approximately three hundred--were composed during this period. Some of these compositions have become classics of music history.

Vladimir Ussachevsky, who directed the Center during its most vibrant period, was steeped in the literature and techniques of old Slavonic church music and European classical music. I first met him when I was an undergraduate student in his counterpoint class, where I watched him write five-part sixteenth-century counterpoint on the blackboard in real time. His musical adeptness inspired music-making in those around him.

In May 1952, Ussachevsky presented the first electronic music concert in the Western hemisphere, with five of his experimental compositions, all composed in 1951: *Transposition*, *Reverberation*, *Experiment*, *Composition*, and *Underwater Valse*. Soon after the concert, Otto Luening, who also taught composition at Columbia, joined Ussachevsky's experiments. In October 1952, Leopold Stokowski presented Ussachevsky's and Luening's compositions at a concert at the Museum of Modern Art. These works were Ussachevsky's *Sonic Contours* and Luening's *Low Speed*, *Invention in Twelve Tones*, and *Fantasy in Space*.

In 1959, with funding from the Rockefeller Foundation, the Columbia-Princeton Electronic Music Center was founded, with Ussachevsky as director, and his colleagues Otto Luening, Milton Babbitt, and Roger Sessions on the committee of direction. A number of composers were invited to do the first work at the Center, including Bülent Arel (Turkey), Halim El-Dabh (Egypt), Mario Davidovsky (Argentina), and Charles Wuorinen, who was then a graduate student at Columbia. The Center presented its first concert in May, 1961, the program consisting of Ussachevsky's *Creation-Prologue*, Arel's *Stereo Electronic Music No. 1*, Halim El-Dabh's *Leila and the Poet*, Milton Babbitt's *Composition for Synthesizer*, Mario Davidovsky's *Electronic Study # 1*, Otto Luening's *Gargoyles for Violin Solo and Synthesized Sound*, and Charles Wuorinen's *Symphonia Sacra*. This wide variation in musical style and aesthetic continued at the Center for the next twenty years, until Ussachevsky's retirement.

Since 1959, the main studios of the Center have been in Sheffield Hall (later called Prentis Hall) on West 125th Street in Manhattan. This building has had controversial occupants. One of the goals of the student riots at Columbia in the 1960s was to get Riverside Research, an occupant of Sheffield Hall, out of Columbia, as they were reputed to be the developer of the highly toxic Agent Orange then being used by the U.S. military to devastate Vietnam. Sheffield was also thought to have been a site for some of the Manhattan Project's activities in the 1940s. When in 1964 I walked into the building for the first time, I could see and hear the laboratory monkeys screeching in their cages. Such was the building in which the Electronic Music Center existed, and for at least twenty years nurtured the creation of hundreds of wildly diverse works of art. The Center's four to five studios would be simultaneously in use, scheduled around the clock. In addition to three or four studios in Sheffield, there was another in the basement of Dodge Hall next to McMillin (now Miller) Theatre, and for several years a small studio in the Music Department in Dodge.

With the assistance of engineers Peter Mauzey and James Seawright, Ussachevsky designed the studios, whose contents are listed below as they were around 1970. He also created or developed a number of the techniques I describe below. Ussachevsky also assisted in the development of other technology by sending Robert Moog specifications for a voltage-controlled amplifier, an envelope generator (which was later called the ADSR), and an amplitude follower.

SOUND SOURCES IN THE CLASSICAL ANALOG STUDIO:

In electroacoustic technology of the 1960s and 1970s, the composer could choose sound sources that were either electronic or concrete in origin: that is, the composer could either access simple electronic wave forms from a tone generator or record acoustic sounds like that of the human voice. Then, as now, there are tendencies for composers of a certain aesthetic to gravitate toward one or the other.

1) sine/square/sawtooth wave oscillators

Six or more oscillators were present in each EMC studio through the 1970s. These machines generated either sine, square, or sawtooth waveforms. The pitch was adjusted by hand, and was relatively stable. For his pieces *Postlude* and *Out of Into*, Bülent Arel recorded pure electronic sounds from these oscillators. Daria Semegen, at first Arel's student and later his colleague, also used oscillators to generate the pure electronic wave forms used in her piece *Electronic Composition No. 1*.

2) phonograph

One of the mainstays for concrete sound sources of the French musique concrète composers of the 1940s and 1950s. In my *Dance Piece No. 3*, I used a fairground calliope sound recorded from a sound-effects record .

3) microphones

It goes without saying that one needs a microphone in order to record acoustical sounds. In his *Prelude No. 8*, Ilhan Mimaroglu used a microphone to record a harpsichord and a celeste. Ingram Marshall constructed his work *Cortez* from one recorded syllable of the speaker's voice. Further, in my work *Dance Piece No. 3*, I used recorded brass notes from Ussachevsky's library of brass sounds.

4) Buchla synthesizers

Two Buchla synthesizers were present in several EMC studios, each synthesizer having a touch-sensitive keyboard and voltage-controlled sequencer with 16 tracks. Around 1965-66, the first Buchla analog synthesizer appeared at the Center, causing quite a bit of excitement, as its voltage-controlled sequencer permitted for the first time the creation of a sequence of notes without splicing. One could turn the sequencer's voltages either into electronic wave forms or use the voltage as a gate to access a live or prerecorded sound. In my two pieces on this recording I did both, using the sequencer to generate phrases of electronic pitches as well as sequences of envelopes, which I imposed upon my voice and harpsichord. Both a white-noise and a pink-noise generator were present on the Buchla, and a separate white noise generator near the mixing console; I used these to form the whooshing sounds in *Dance Piece No. 3*.

5) Thomas electronic organ

This substantial piece of equipment had its own 6-channel mixer, and approximately 8 "percussion" stops. The prime use of this organ involved this percussion box, which I used to generate some of the sounds for *Dance Piece No. 3*.

ANALOG SOUND MANIPULATION:

Envelope control (the sculpting of the amplitude characteristics of a sound)

1) Splicing

One of the first electronic music techniques to be developed, tape splicing involves three pieces of equipment: a splicing block to hold the tape, a razor blade, and splicing tape to put over the cut. On a splicing block there are depressions for two different cuts: straight and oblique. In splicing two different pitches together, a straight cut results in an abrupt, sudden change of pitch, whereas an oblique cut results in a more gradual, legato change of pitch. More advanced use of splicing as a compositional tool includes cutting a small amount (perhaps a 1/4" or less) from one sound as an attack to precede another sound. In this case the variables played with include the volume, timbre, and pitch contrast between the attack sound spliced in and the steady-state sound that follows. Splicing was used not only to create individual attacks and decays on each note, but to link several notes together into a phrase and phrases into whole sections of a work.

2) Mixer Volume Controls

The volume controls on the mixer were manipulated to create attack and decay on a sound, raising and lowering the large, smooth potentiometers to let through the sound as desired. This method could create surprisingly sharp and dramatic attacks and decays, its effectiveness limited only by the composer's performance skills.

3) Moog Voltage-Controlled Envelope Generator (both dual and quad) with key device.

This voltage-controlled device, present in all Columbia studios, enabled one to pre-set the attack time, steady state time, and decay time for a sound fed through it. All the pieces on this recording except Arel's and Dodge's would have used this device or the similar voltage-controlled sequencer on the Buchla synthesizer for the imposition of amplitude envelopes. The related devices called Amplitude Follower and Frequency Follower allowed one to impose an amplitude envelope or pitch profile from one source, and impose it upon another.

Filters (for removing frequencies from the timbre of a sound)

Each studio at the Center had a number of filters, including two or more of the following: dual third-octave filters (28 slots apiece); Spectrum band-pass filters (high-/low-pass); Dynamic noise filter; and in the case of room 106 Dodge, an Albis slot filter.

Frequency Shifter (for shifting the fundamental of a sound, or adding frequencies to a sound)

Each studio at the Center had a number of pitch/timbre modifiers, often including a Bode frequency shifter ("Klangumwandler") and two ring modulators. These devices could be used to shift the perceived fundamental of a sound with unpredictable, though sometimes interesting, results. Frequency shifters were most sought after by composers whose process involved improvisatory play with equipment.

Electronic Switches

Each studio at the Center had two or more dual electronic switches, devices that switch back and forth between two inputs. The variables that could be played with included the rate and type of shift between the two inputs. An electronic switch could be used to create a simple trill; a compound trill (where two trilling electronic switches are fed into a third); a custom wave form (where the two inputs switch back and forth so fast that they can no longer be perceived as separate sounds, instead being heard as one sound); or to create ascending or descending melodic phrases (where the output of an electronic switch is fed into a frequency shifter before being put into the input of a second electronic switch).

Speed Variation

Perhaps the single most useful developmental device in the classic analog studio was speed variation, a device that controls the playback speed of a tape recorder in order to raise or lower pitch or speed. Each studio at the Center had two of these variable-speed panels, which could be attached to any of the four 1/4-inch stereo tape recorders. A sound could be played back on such a tape recorder, not only at the octave variant of 7.5 or 15 inches per second, but at any speed down to around 3.75 ips and up to around 25 ips. The speed of playback could vary continuously, in accelerando or ritardando, creating glissando or portamento. On the present recording, Marshall's *Cortez* is made of speed-varied versions of one vowel of the speaker's voice, and in my *Dance Piece No. 3*, the raucous fairground calliope is occasionally slowed down and speeded up in order to convey a satirical effect.

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Feedback

1) Simple Feedback: In feedback a sound is recorded, played back, and immediately recorded again. The entire process is preserved on a second tape recorder. The interval of time before a sound repeats is determined by the distance between the record and playback heads of the first tape recorder, and the speed at which it is recording. Thus if one records feedback on a particular sound at 7.5 ips, and plays the final recording at 15 ips, the rate of repetition is twice as fast.

2) Pitch-Changed Feedback: Further, if the played-back sound is put into a frequency-shifter before being sent back to the tape recorder to be recorded again, a process will begin in which each fed-back repetition will be either higher or lower in pitch than the one that preceded it, depending on the setting of the frequency shifter. This will result in ascending or descending phrases comprised of the original sound. Some pitch-changed feedback can be heard in my piece *Dance Piece No. 3*.

3) Variable Feedback Tape Recorder: Ussachevsky designed and had built a stereo 1/4-inch tape recorder in which the distance between the record and playback heads was variable, the tape extending along a metal guide-pole which could extend the distance between the heads by up to several feet. This custom-designed device could be used to slow the rate of repetition of the fed-back sound, or it could be used to record true canons, up to the rate (at 7.5 ips) of a nearly 20-second delay.

Reverberation

Each Columbia studio had access to a large EMT reverberation chamber, which could be set for length of reverberation, distance from the loudspeaker, and volume of incoming sound. One way of using the EMT chamber was to filter the original sound, echo the filtered version, and mix the echoed result with the unfiltered original. This technique enhanced foreground clarity by giving subtle timbral shades to the echo.

Synchronization and Mixing

During the 1960s and 1970s, much equipment was custom-designed and built at the Center, one example being the large mixing consoles developed by Ussachevsky and engineers Peter Mauzey, Jimmy Seawright, John Bittner, and Virgilio de Carvalho. These mixers were also built for the Yale and Stony Brook electronic studios. The mixer in all the Columbia studios was a custom-designed analog mixing console (12 in/8 out), connected with a large patch bay. For synchronization purposes, each of the four stereo 1/4-inch tape recorders was equipped with an automatic on/off switch, and could be mixed onto 1/2-inch four-track tape recorder, or later, onto an 1/2-inch eight-track tape recorder. The synchronized tapes remained quite closely in synch, as long as they were kept on the same tape recorder. Most pieces were constructed through the synchronization and mixing of tapes.

OTHER CHARACTERISTICS OF COLUMBIA-PRINCETON ELECTRONIC MUSIC:

Perhaps the technique most emphasized by both Ussachevsky and Arel in their teaching was editing--taking out anything you don't really like, regardless of whether that material was a part of any precompositional plan.

Only a handful of composers creating works at the Center have ever been serial in all parameters, though a good number, like Arel, Semegen and Davidovsky, can be identified as more or less melodically atonal. But the characteristic that links most works composed at Columbia during the 1959-79 period as well as the pieces on this recording, is not so much the nature of melodic succession, but the primacy of the phrase, based on traditional breath lengths.

Some of the composers creating works at the Center during the 1960s and '70s included Jon Appleton, Charles Dodge, Edgard Varèse, Milton Babbitt, Wendy Carlos, myself, Harvey Sollberger, Charles Wuorinen, Bülent Arel, Mario Davidovsky, İlhan Mimaroglu, Luciano Berio, Jacob Druckman, William Hellerman, Arthur Krieger, Pril Smiley, and Daria Semegen. Many composers entered the Center as graduate students, but many came from outside Columbia; Ussachevsky opened the Center to welcome a large number of individual composers from all over the world. In those years, it was an exciting place for a composer to be. After Ussachevsky retired, the activity level of the Center was very much reduced.

Bülent Arel was born in Turkey in 1919. He was graduated from the Ankara Conservatory (founded by composer Paul Hindemith) with an artist's diploma in composition, conducting, and piano. He taught harmony and counterpoint at the Conservatory, and piano and music history at the Teachers College in Ankara. A founder of the Helikon Society of Contemporary Arts and conductor and musical director of the Helikon Orchestra, he also received recognition as a painter and sculptor; his visual artworks have been exhibited and selected for the permanent collection of the Turkish National Gallery.

In 1951, Arel studied sound engineering with José Bernard and Willfried Garret of the Radio Diffusion Française, both members of the groundbreaking Club d'Essai of Paris, a collaboration which marked the beginning of his interest in musique concrète. From 1951 to 1959, Arel was "tonmeister," engineer, and finally, Music Director of Radio Ankara.

In 1957, he pioneered in writing works for electronic music combined with conventional instruments with his piece *Music for String Quartet and Oscillator*. He later revised the work as *Music for String Quartet and Tape*, when in 1959, he was invited by the Rockefeller Foundation to join the staff of the Foundation's newly funded project, the Columbia-Princeton Electronic Music Center in the United States. Arel's contributions to the Center and the field of electronic music include both technical innovations and a body of more than a dozen major compositions of electronic music, both with and without acoustic instruments. His work, along with that of his colleagues, Milton Babbitt, Vladimir Ussachevsky, and later Mario Davidovsky, established the Center as the major facility in the field in the United States, and influenced the development of electronic music as a genre both in the U.S. and abroad.

Arel was a colleague and friend of Edgard Varèse. In 1962, they collaborated in the creation of the electronic-music portions of Varèse's landmark work *Deserts* for wind ensemble and percussion. In this same year Arel also designed and installed Yale's first electronic music studio.

From 1963 to 1965 he was again at Radio Ankara, as head of the Western music programs and founder and conductor of the Madrigal Chorus, which gave numerous performances, both in concert and on recordings.

In 1965, Arel returned to the U.S. as a member of the Yale University music faculty, where in 1969 he was appointed director of the Yale University Electronic Music Studio and professor of composition. From 1965 to 1972, he also taught composition at Columbia University and electronic music at the Columbia-Princeton Electronic Music Center. In 1971 Arel founded the Electronic Music Studios at the State University of New York at Stony Brook, Long Island, and taught there until his retirement. He composed a large number of instrumental, chamber, vocal, and symphonic works, as well as music for ballet, theater, modern dance, television, and film. Arel was the recipient of a Rockefeller Research grant, two National Endowment for the Arts grants, and two New York Research Foundation grants. He died in 1991.

Music for a Sacred Service was commissioned by the United Methodist Church of Illinois. The brightly colored *Postlude* is composed of cascading patterns, based on purely electronic sound sources modified by mixing and an orgy of tape splicing. The piece moves as a whole, in speed and complexity, from a broad and serious beginning to a virtuosic conclusion. Finished in 1961, it is an example of finely detailed handwork in the pre-synthesizer days of electronic music.

Ilhan Mimaroglu

Prelude No. 8 (To the memory of Edgard Varèse)

Ilhan Mimaroglu came to Columbia University from Turkey in 1955 on a Rockefeller fellowship to study, and to work with the musicologist Paul Henry Lang, and work with other critics at the *Herald Tribune*. Trained as a lawyer in Turkey, in the early 1960s Mimaroglu earned a degree at Columbia Teachers' College, where he acquired skills he found to be of compositional interest. For example, he took a course in piano tuning so that he could experiment more effectively in his composing.

Mimaroglu's music, such as *Wings of the Delirious Demon*, can evoke visualized movement, and his titles are interesting in themselves (*White Cockatoo*, for example) Several of his electronic *Preludes* are heard in Fellini's film *Satyricon*.

Mimaroglu created works at the Center throughout the 1960s and '70s, often using musique concrète sound sources. For example, in his piece *Bowery Bum*, the material is developed from the sound of a rubber band, and in *Le Tombeau d'Edgar Poe*, it is derived from a reading of a Mallarmé poem. Other sound sources have included the sounds of the clarinet, voice, and harpsichord. When Varèse was still alive, Mimaroglu had a presentiment of his death. This gave rise to *Prelude No.8 (To the Memory of Edgard Varèse)*, for which Mimaroglu recorded delicate harpsichord and celeste sounds in the green room of McMillin Theatre, just a few steps away from Electronic Studio 106. The delicate instrumental sounds heard in the foreground have a somewhat uneasy but constant kinship to the darker-timbred electronic sounds in the background, with only brief departures from this relationship.

Mimaroglu is presently writing his autobiography.

Charles Dodge

As part of his graduate work at Columbia in the 1960s, Charles Dodge studied with Godfrey Winham at Princeton, converted his digital tapes at Bell Telephone Laboratories, and for a short while experimented at IBM's Watson Laboratories, which had online digital-to-analog converters. In 1969, Dodge was contacted by three geophysicists at the Goddard Institute for Space Studies at Columbia. They had tabulated changes made by the sun's radiation upon the Earth's magnetic field with graphs referred to as "Bartel's Musical Diagrams," resembling music notation. Each "note" in the Bartel diagram represented three hours of data, resulting in eight notes per day. Using figures from the year 1961, one of the NASA scientists made a five-line musical staff representation of the data, and mapped onto it both a 7-note C scale and a 12-note chromatic scale.

Dodge's function as composer, since the pitches were already given to him, was to play with timbre and rhythm. In the summer of 1970, he began experimenting on an IBM mainframe computer at Columbia University using a version of MUSIC 4BF in Fortran, written by Godfrey Winham. Dodge used comb filters to experiment with timbre in the first part of the piece, and Allpass filters in the second part. *Earth's Magnetic Field* was the first explicit use of comb filters in music; previous to this, comb filters had been used only to simulate reverberation. Dodge created two different algorithms for the organization of rhythm: In the first half of the piece, there would be accelerando-ritardando patterns; in the second half, a fixed tempo within which two patterns, A and B, would alternate, the A pattern having one note to a beat, and the B pattern 2 to 14 notes to a beat. Dodge's multiple-note B pattern responded to "sudden commencements," which were increases in the scientists' data that would occur from time to time due to an increase in solar flares and solar winds which would more intensely affect the Earth's magnetic field. On the original vinyl disc of *Earth's Magnetic Field*, Side 1 of the record contained the diatonic pitch mapping with comb filter timbre modifications; Side 2 contained the chromatic pitch mapping with Allpass filtering. The present recording is Side 1 of the original record, the part of the project that is considered the composition. *Earth's Magnetic Field* was Dodge's first piece after his doctoral work *Changes*, and was a turning point in his musical life: It is a relaxed, expressive piece in which he captures a sense of radiance. It was considered by John Rockwell of *The New York Times* to be one of the "ten most significant works of the 1970s."

After *Earth's Magnetic Field*, in 1971, Dodge began to work at Bell Labs. He and Max Mathews agreed that Dodge would explore the possibility of using the computer to create "vocal" music. In 1972, Dodge began to compose *Speech Songs*, in which he recorded texts and fed them into the computer through an analog-to-digital converter. The computer would analyze the voice sound and resynthesize it based on that analysis. Dodge would then edit the analysis to produce altered effects on the vocal sound using software, some of which had been designed by Bell researcher Joseph Olive.

From 1977 to 1994, Dodge founded and then directed the Brooklyn College Center for Computer Music, which was known during its lifetime as the place to go in the United States for a variety of computer techniques, including voice synthesis. For a period during the 1980s the Center flourished with the support of a number of institutions and grants. The Center welcomed a variety of electroacoustic composers, including Judy Klein, Sorrel Hayes, Frances White, Anna Rubin, Alice Shields, Reynold Weidenaar, Morton Subotnick, Sten Hanson, Curtis Bahn, and Richard Karpen. During the late 1990s, however, the funding at CUNY for this activity was drastically reduced. At that time Dodge left Brooklyn to begin his current position as visiting professor at Dartmouth.

Since the mid-1980s, Dodge has been writing for live instruments and tape, including such works as his lyrical *Viola Elegy* of 1987. He remains one of the most prominent composers of synthesized computer music.

Daria Semegen

At the age of seven, before she could speak a word of English, Daria Semegen was dumped into an American primary school. Without other instruction, she listened to the English being spoken, and bit by bit figured out what the sounds meant. Her listening survival skills may perhaps have led her to the intense focus present in her music, and perhaps even to her choosing to become an electronic composer.

In 1965, as a student at the Eastman School of Music, Semegen composed *Six Plus*, for six instruments and music concrète sounds on tape. She was a Fulbright scholar in Poland in 1968-69, studying with composer Witold Lutoslawski. During 1969-71 she studied electronic music with Bülent Arel at Yale University. Arel had just finished his work *Stereo Electronic Music No. 2*, and he took several of his students, including Semegen, to Columbia to hear the piece in quad, as it had been designed. Semegen says she was blown away by the experience of hearing this piece in four-channel playback. Arel spoke to Ussachevsky, who advised that she come and work on her music at the Columbia studios. In the summer of 1971 Semegen completed *Stereo Electronic Music No. 1* at the Columbia-Princeton Electronic Music Center, and continued composing at Columbia until 1975. In 1974 she joined the music faculty at the State University of New York at Stony Brook, where she is currently director of the Electronic Music Studio and teaches composition.

Semegen lives in Long Island near the shore, among stately trees. Aside from teaching, her time is taken up with detailed house-engineering projects. Semegen also likes to throw large parties for her students. Dill pickles. Ukrainian cabbage rolls. Apricot-flavored agar-agar. Certain sounds are like ear candy to her, Belgian truffles. Sweet and sour contrasts (truffles/pickles) are present in her music as well: violent, aggressive sections versus placid, contemplative sine-wave sections; discernible contrasts. If *Electronic Composition No. 1* is viewed as a weather pattern, in the first part the clouds build up--then thunderbolts rage in with intense square waves.

The muscular span of timbral and dynamic contrasts often gives Semegen's music an orchestral breadth and the seriousness of orchestral drama, even when the pieces, like the present one, are not very long.

In the realm of melody Semegen's music is essentially atonal, usually avoiding fifths, thirds, and fourths, and in rhythm she uses microvariation of rhythmic units with few motific rhythmic patterns. She pays close attention to distance perspectives, to the left/right and forward/backward placement of sounds, closer to/farther away from the listener. The dimension of space is generally used as an organizing force in her music.

Electronic Composition No. 1 is made from totally electronic sound sources, and utilizes classical studio techniques. The initial rather simple material was spliced together, note by note or phrase by phrase, and was then mixed together in various ways. Elaborate mixing and editing results in a variety of sound successions and their variations. The composition's structure outlines several main sections, which are linked together by short transitions. Each section has its own characteristic timbres, durations, pitch combinations and densities. The agitation and tension in the first part of the piece is broken by a tranquil section of long sine waves. Later, these sine waves return and are heard as slightly out-of-tune "beating" tones at the end of the composition. *Electronic Composition No. 1* was a winner of the 1975 International Society for Contemporary Music prize, a Columbia/Odyssey recording.

Semegen has received six National Endowment for the Arts grants, a National Academy of Recording Arts & Sciences prize, fellowships to Yaddo and the MacDowell Colony, BMI awards, a National Chamber Music Competition prize, and the Pennsylvania Institute for the Arts & Humanities Studies award. In 1987 Semegen was the first woman to be awarded the McKim Commission from the Library of Congress for a work composed for the Theater Chamber Players of Kennedy Center.

Bülent Arel and Daria Semegen

Out of Into is a ribald animated film by Irving Krieberg of metamorphosing figures. The electronic music soundtrack for *Out of Into* was composed by Bülent Arel at the Columbia-Princeton Electronic Music Center with the technical and musical help of Daria Semegen. The sound sources are electronic. Techniques of construction include loops, mixing, and synchronized tape reels.

Both composers also collaborated on the electronic piece *Trill Study*, which was created with sound materials used for *Out of Into*.

Ingram Marshall

Ingram Marshall came to Columbia in 1964 as a graduate student in musicology. In 1965 he took Ussachevsky's course in electronic music, in which Ussachevsky would play the latest electronic music from around the world.

From this point on, Marshall's life changed, and he started hanging out with composers. *Transmogrification* was the first piece he finished at Columbia, and he was writing another for his girlfriend at that time, a dancer. Then Marshall met the poet Snee McCaig; they became drinking buddies at Googie's Bar in Greenwich Village. Crowds of itinerant Village types frequented this bar, alleged poets and hangers-on. McCaig was a real poet, and Marshall started hatching ideas about his poems.

Cortez has an interesting evolution. Marshall recorded several of McCaig's poems, but as it turns out *Cortez* is the only one he set to music, and that happened just after he left Columbia in 1970, after several years of graduate study in musicology. Marshall left for the California Institute of the Arts, lured by Morton Subotnick. Driving to California through the mountains of New Mexico, he saw blue wildflowers, and suddenly remembered McCaig's poem *Cortez* and its blue wildflowers. The ideas for the piece, which had been evolving for some time before he left Columbia, were now ready, and he composed the piece once he got to California.

The entire piece is made from one vowel of the speaker's voice: "Oh." The techniques used include the classical studio techniques of tape manipulation (loops and speed variation) and filtering. Although a lot of the pieces Marshall was working on at the time were more improvisatory, *Cortez* is tightly constructed of loops and repeating patterns. Marshall used graph paper to chart out the different timbres of sound, the overlaps, the textures and densities.

While still at Columbia, Marshall had first heard live gamelan at a Group for Contemporary Music concert, where a group of white kids from Wesleyan played Javanese music. Its very slow and stately pace astonished him. When he got to the California Institute of the Arts he found himself drawn to the World Music program, where he worked with Javanese teachers on gamelan. In 1971 he traveled to Bali and Java to study gamelan music. Over the next few years he cultivated his interest in this music, while continuing his experimental work with electronic music. Certain characteristics of Marshall's music, such as a slowed-down sense of time and the use of melodic repetition, can be traced to his study of Indonesian music. His most important influences, in addition to Javanese music, are early Steve Reich, and Alvin Lucier. Perhaps his best-known and most performed work is *Fog Tropes* for brass sextet, which dreamily evokes the foggy landscape of San Francisco Bay.

In the 1970s Marshall was more involved in process--following a preconceived idea in a piece. Now, he tends to follow intuition more. In the eighties and early nineties, he did a lot of live electronics. Now he's more into pieces for instrument and modifying electronics. He has just finished *Out of this World*--a project with the Stuart Pimsler Dance Theater in Tucson, where Pimsler uses health care workers as dancers. This piece is a long song using a Mark Strand text, for soprano, boy's choir, mariachi band, and brass quartet.

Marshall has performed his own music widely in the U.S. and Europe, concentrating on live-electronic works, such as *Fragility Cycles*. His ensemble music has been performed and commissioned by a variety of performing organizations ranging from symphony orchestras (Saint Louis, San Francisco, Los Angeles, Minnesota, Pittsburgh) to chamber groups (Kronos Quartet, San Francisco Contemporary Music Players, Steve Reich and Musicians). Awards, grants, and commissions have come from the Rockefeller Foundation, the National Endowment for the Arts, the Fromm Foundation, the California Arts Council, the Washington State Arts Commission, the Aaron Copland Fund, and the American Academy of Arts and Letters. Recent works include *Sierran Songs*, written for Paul Hillier and premiered in California in 1994; *Fog Tropes II*, commissioned by the Kronos Quartet, premiered in London in 1994; and *Dark Waters*, written for the English hornist Libby van Cleve and premiered at Wesleyan University in 1995. Paul Hillier's Theater of Voices commissioned *Hymnodic Delays*, based on early American hymns, and the American Composers Orchestra commissioned him to write *Kingdom Come* for their 1997-98 season at Carnegie Hall. Marshall was Visiting Professor at the Institute for Studies in American Music at Brooklyn College in 1990, and has guest-taught composition at the Yale School of Music, the Hartt School of Music, and the San Francisco Conservatory.

Cortez

**whenever the world is supposed to end, it does.
within a month & a day of the end the Aztecs expected came
Cortez.
Oh the blue wild flowers blossoming
in each cold spring wind,
bend their heads.**

-- Snee McCaig

From *Last Poems* by Snee McCaig. Grindstone City, Michigan: Alternative Press, 1978. Used with permission.

Alice Shields

I came to Columbia in 1961 to study music and literature as an undergraduate. In 1963 I took Ussachevsky's course in sixteenth-century counterpoint, and found it a fascinating discipline. I entered graduate studies at Columbia in composition, and became Ussachevsky's assistant at the Electronic Music Center. In 1965 I began studying voice with Helen Merritt, and within a few years began performing. In 1966 and 1968 I was apprentice opera composer at the Lake George Opera Festival, where I produced scenes from two of my early operas, and in 1970 conducted my opera *Odyssey*.

I have performed as mezzo-soprano soloist with the New York City Opera, Clarion Opera Society (Italy), Opera Society of Washington, D.C., Wolf Trap Opera, Metropolitan Opera Studio, Rochester Opera, Lake George Opera Festival and the Yale-at-Norfolk Festival.

I often use my own voice as sound source in my electronic works, such as in *The Transformation of Ani*, *The Red Woman*, and my electronic opera *Shaman*, which was premiered by the American Chamber Opera Company in New York in 1987. Non-electronic vocal works include the unaccompanied music-drama *Ave*, the chamber opera *Wraecca*, and *Levertov Songs* for mezzo-soprano and viola. Recent works include the electronic opera *Mass for the Dead*, premiered by the American Chamber Opera Company in 1993 and the multimedia animation *It's Haunted Here* premiered at Pseudo Gallery in New York in 1996.

Since 1991 I have studied and performed classical South Indian Bharata Natyam dance-drama with the dancer Swati Bhise. As a musician with Bhise's Bharata Natyam company I perform as Nattuvanar (vocalist/rhythmic recitation) with a South Indian singer, violinist, and Mridangam drummer. I have performed as Nattuvanar at institutions including the American Museum of Natural History, the Asia Society, the Lincoln Center Institute, and at Wesleyan University. My compositions which use traditional Bharata Natyam metrical cycles, choreography, and texts include *Shivatanz*, an electronic dance-drama in Sanskrit and Hindi for mezzo-soprano and tape and my electronic opera *Apocalypse*.

From 1965 to 1982 I served as technical instructor and then as associate director of the Columbia-Princeton Electronic Music Center. I am currently artist-in-residence at the Center for Computer Music of the Conservatory of Music, Brooklyn College, CUNY.

Dance Piece No. 3 was composed in 1969 for the Mimi Garrard Dance Theatre in New York City. The musique concrète sound sources for the piece include a cheesy fairground calliope, a glockenspiel playing Mozart's "Ein Vogelwänger bin ich ja" from *The Magic Flute*, and sounds from Ussachevsky's taped brass sound library (the loud farting-type sounds). The classical studio techniques I used for the piece include splicing, mixing, reverberation, Klangumwandler, and synchronized tape reels.

Study for Voice and Tape was composed in 1968, using my prerecorded singing voice synchronized with electronic sounds on tape. The sound sources for the tape part include phrases created on an analog Buchla synthesizer, my own singing voice, and a shaken bell-tree. Pitch and timbral modifications occur through Klangumwandler and elaborate feedback (created through Ussachevsky's Variable Feedback Tape Recorder and multiple ring-modulations) resulting in spiraling patterns that rise or fall in pitch and speed. The piece was premiered by the International Society for Contemporary Music, on March 9, 1969, at McMillin Theatre, Columbia University. It was the beginning for me of a long journey into the use of my voice in traditional vocal repertory and in my own music.

The Sunbather

She, sun
beating, walloping,
(save yourself, idiot)
--dead tired, can't make it
(save yourself, idiot)

and she smothering you
you lie stinking, hot and nude on an asphalt roof.

She whacking, pummeling you,
my advice is, Complain.
--and then your bellow is beefed and gutted,
spat with smirking cheeks over the parapet.

Wide scraping sun-hips skin you, flail you,
idiot, idiot,
and you gravelling there nude on asphalt,
and you ecstasy in your bright bloody face.
--Alice Shields

SELECTED WORKS AND RECORDINGS

Bülent Arel

- Music for String Quartet and Oscillator*. (1st version) 1957 (created at Radio Ankara, Turkey).
Electronic Music No. 1. 1960. Son Nova 1988 3/S-3; CRI SD 356.
Wall Street Impressions. 1960 (film).
The Scapegoat. 1960-61 (theater).
Fragment from *The Scapegoat*. 1961. Son Nova 1988 3/S-3.
The Scapegoat Suite 1961.
Short Electronic Study. 1961.
Stereo Electronic Music No. 1. 1961 (2 channel and 5 channel versions). Columbia ML 5966, MS 6566.
Music for String Quartet and Tape. 1961.
Music for a Sacred Service: Prelude and Postlude. 1961. Son Nova 1988 3/S-3.
Music for String Quartet and Tape. (2nd version) 1962. Opus One 59.
Mimiana I: Flux. 1968 (film and dance). Finnadar SR 9020.
Mimiana II: Frieze. 1969. Finnadar SR 9020.
Cappriccio for TV. 1969 (music for dance, on film).
Stereo Electronic Music No. 2. 1970. CRI CD 611; CRI SD 268; Finnadar QD 9010.
Out of Into (with Daria Semegen). 1971 (music for animated film).
Trill Study (with Daria Semegen). 1971.
Mimiana III: Six and Seven. 1973 (music for dance). Finnadar SR 9020.
Fantasy and Dance for Five Viols and Tape. 1973. Musical Heritage Society CD 513-235M.
Rounding. 1985. (music for dance) (created at the Electronic Music Studios of the State University of New York at Stony Brook).

Charles Dodge

- A Composition for Converted Digital Tape*. 1967.
Changes. 1969. Nonesuch H 71245.
Earth's Magnetic Field. 1970. Nonesuch H 71250.
Speech Songs. 1972. 1750 Arch S-1752 (excerpts); CRI 348 (complete); New Albion CD 043.
Extensions. (electronic; with trumpet) 1973. CRI SD 300; Crystal S-366.
The Story of Our Lives. 1974. CRI 348.
In Celebration. 1975. CRI 348; Centaur CRC 2213.
Palinade for Computer and Orchestra. 1976.
Cascando. 1977.
Any Resemblance is Purely Coincidental. New Albion CD 043.
He Met Her in the Park. 1982.
The Waves. (Joan LaBarbara) 1984. New Albion CD 043; PNM 27.
Profile. 1984. Neuma CD 450-73.
Roundelay. (for chorus and tape) 1985. WER 2024-50.
Viola Elegy. 1987. New Albion CD 043.
The One and the Other. 1992 (strings, winds, and marimba).
Fades, Dissolves, Fizzles. 1996 (tape alone).
"That Which I Sould Have Done..." 1996 (organ and tape).
The Staff of Asclepius. (electronics with alto soloist, violin soloist, orchestra, and chorus) 1997.

Ingram Marshall

The Fragility Cycles. 1979. Ibu Records IBU 101.

Fog Tropes: Gradual Requiem, 1984. New Albion 002; Gambuh CD 1988.

Siciliano (for Gus). 1985. Cold Blue Records L10.

Three Penitential Visions: Hidden Voices. 1990. Nonesuch 79227.

Fog Tropes "American Elegies." (Orchestra of St. Luke's, conducted by J. Adams) 1991. Nonesuch 79249.

Alcatraz. 1992. New Albion NA 040.

In My Beginning is My End. Piano quartet (Dunsmuir Trio) 1995. New Albion NA 092

Evensongs. String quartet (Maia Quartet) 1996. New Albion NA 092.

Ilhan Mimaroglu

Four the News (Visual Study No. 1 after Jasper Johns). 1963-64.

Green on a Black (Visual Study No. 2 after Ahmet Gursoy). 1964.

Bowery Bum (Visual Study No. 3 after Jean Dubuffet). 1964. Turnabout TVS 34004; Finnadar CD 91305-2.

Nocturne for Strings and Tape. 1964.

Le Tombeau d'Edgar Poe. 1964. Turnabout TVS 34004; Finnadar SR 9012.

Intermezzo. 1964. Turnabout TVS 34004; Finnadar SR 9012.

Encounter and Episode 2 from Anacolutha. 1965. Finnadar 9001.

Agony (Visual Study No. 4 after Arshile Gorky). 1965. Turnabout TVS 34046; Finnadar SR 9012.

White Cockatoo (Visual Study No. 5 after Jackson Pollock). 1966. Finnadar 9001.

Twelve Preludes for Magnetic Tape. (excerpts) 1966-67. Turnabout TV S 34177.

Piano Music for Performer and Composer. 1967. Turnabout TVS 34177.

Preludes Nos. 2 and 12. (second versions for the film *Fellini Satyricon*) (in film) 1969.

Wings of the Delirious Demon. 1969. Finnadar CD 791305-2.

Music Plus One. 1970 (with violin). Turnabout 34429; Finnadar 90104-1; Finnadar CD 791305-2.

Sing Me a Song of Songmy. 1970 (prerecorded jazz quintet, narrators, orchestra, organ, choir). Atlantic SD 1576.

Interlude II (from *Sing Me a Song of Songmy*). 1970. Finnadar 9001.

Hyperboles. 1971. Finnadar 9001.

Provocations. 1971. Finnadar 9001.

For Jean Dubuffet's Film Coucou Bazar. 1973. Finnadar 9003.

Prelude No.13. 1973.

Prelude No.14 (Face the Windmills, Turn Left). 1973. Finnadar SR 9012.

Tract. 1974 (prerecorded speaking, singing, and instruments). Folkways FTS 33441.

To Kill A Sunrise. 1974 (prerecorded speaking, singing, and instruments). Folkways FTQ 33951.

Prelude No.15 (Word from Che). 1974.

Prelude No.16 (The Long March). 1975 (prerecorded singing). Finnadar 9012.

Session. 1975 (prerecorded piano and voice). Finnadar SR 9021.

Prelude No.18. 1976.

Eight Preludes for Magnetic Tape (Nos. 1,2,6,9,11,12,14,16). 1976. Finnadar 9012.

I May as Well Speak Out the Truth While I Am Here (tape part only) 1977
(with live jazz group; composed for Charles Mingus, using Mingus's recorded voice).
The Offering 1979 (prerecorded voice). Finnadar 90104-1.
Still Life 1980. 1980 (with cello). Finnadar 90104-1.
Immolation Scene. 1983 (prerecorded voice). Finnadar 90104-1.
Mao Sketches. 1985.
Sleepsong for Sleepers. 1985. Finnadar LP 90266.
Preludes 19 to 24. 1993.
La Belle et la Poubelle. 1994.

Daria Semegen

Jeux des Quatres. 1970 (chamber music). CRI SD 443.
Electronic Study. 1970-71 (composed at the Yale University Electronic Music Studio).
Electronic Composition No. 1. 1971. Odyssey Y34139.
Out of Into (with Bülent Arel). 1971. Music for animated film by Irving Kriesberg (composed at the Columbia-Princeton Electronic Music Center).
Trill Study (with Bülent Arel). 1971 (composed at the Columbia-Princeton Electronic Music Center).
Music for Violin Solo. 1973. Opus One 59.
Spectra Studies. 1974-76 (composed at Electronic Music Studios, SUNY Stony Brook).
Arc: Music for Dancers. 1977 (composed at Electronic Music Studios, SUNY Stony Brook). Finnadar SR 9020.
Spectra: Electronic Composition No. 2. 1979 (composed at Electronic Music Studios, SUNY Stony Brook). CRI SD 443.
Epicycles: Music for Dancers. 1982 (composed at Electronic Music Studios, SUNY Stony Brook).
Rhapsody; for Yamaha MIDI Grand Piano. 1990 (composed at Yamaha Studios, NYC). Opus One CD 152.
Arabesque. 1992 (composed at Electronic Music Studios, SUNY Stony Brook).

Alice Shields

Volti (Dance Piece No.1). 1966 (electronic music).
Icarus and 4-H Club: Two Radio Plays by Sam Shepard. 1966 (featured actor: Joseph Chaikin).
Walking on the Surface of the Sun. 1966 (electronic music).
Wildcat Songs. 1966 (songs for soprano and piccolo). Opus One 13.
The Storyteller. 1967 (cantata for bass-baritone and full orchestra).
Spring Music. 1967 (for soprano, trumpet, and oboe). Premiere: Music in Our Time, Town Hall, NYC.
The Witches' Scenes from Macbeth. 1967 (electronic cues for Shakespeare's *Macbeth*; directed by John Houseman).
Domino. 1967 (electronic music for dance). Mimi Garrard Dance Theatre.
My Feathers are Growing Longer. 1967 (electronic music for dance). Loizeaux-Murphy Dance Company.
Line of Apogee. 1967 (assisting Vladimir Ussachevsky, with Pril Smiley) (film). New World 80389-2.
Dance Piece No.2. 1968 (electronic music for dance). Mimi Garrard Dance Theatre.
Study for Voice and Tape. 1968 (electronic music with Shields' prerecorded voice on tape, on poem by Shields).
Dance Piece #3. 1969 (electronic music for dance). Mimi Garrard Dance Theatre.

We. 1970 (with Vladimir Ussachevsky) (electronic score for radio play).
The Transformation of Ani. 1971 (electronic vocal music). CRI CD 611; CRI SD 268.
Odyssey. 1975 (chamber opera for singers and instruments).
Farewell to a Hill. 1975 (electronic work). Finnadar QD 9010.
Bicycle Music. 1977 (electronic film score for documentary).
Coyote. 1979 (from the electronic opera *Shaman*). CRI SD 495.
Neruda Songs. 1981 (songs for mezzo-soprano and cello). Opus One 83.
El's Aria. 1983 (for soprano, flute, and tape). Opus One 90.
Rhapsody for Piano and Tape. 1984. Opus One 94.
Levertov Songs. 1986 (songs for mezzo-soprano and viola).
Shaman. 1987 (electronic opera for singers, instruments, and tape). American Chamber Opera, NYC.
Komachi at Sekidera. 1987 (song for mezzo-soprano and koto). Inoue Chamber Ensemble, NYC.
Voices. 1989 (created on SUN computer). Tellus Audio Cassette # 22.
Wraecca. 1989 (chamber opera). Golden Fleece Opera, NYC.
Mass for the Dead. 1992 (electronic opera for singers, instruments, and tape). American Chamber Opera, NYC, 1993.
Organ Screaming and *The Dawn Wind*. 1993 (excerpts from electronic opera *Apocalypse*). CRI CD 670.
Apocalypse. 1993 (electronic opera). CRI CD 647.
Shivatanz. 1993 (electronic dance-drama for mezzo-soprano and tape). Akademie der Künste, Berlin, June, 1993.
The Red Woman ("An Bean Rua"). 1993 (electronic poem for actress and tape). CBGB's Gallery, NYC.
Fragile Breakfast, *It's Haunted Here*, and *Sparkling Brains*. 1996 (3 multimedia works--poetry and computer animation) Pseudo Gallery, NYC.
Shanti. (1998; opera-in-progress) for La Mama E.T.C., NYC.

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Bülent Arel

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Charles Dodge

Dodge, Charles and Thomas A. Jerse. *Computer Music--Synthesis, Composition, and Performance*. Schirmer Books, N.Y., 1985; second edition, 1997.

Ingram Marshall

Schaeffer, John. *New Sounds: A Listener's Guide to New Music*, Harper & Row, 1987.

Strickland, Edward. *American Composers: Dialogues on Contemporary Music*, Indiana University Press, 1991.

Smith, Geoff and Walker Smith, Nicola. *New Voices: American Composers Talk About Their Music*, Amadeus Press, 1995.

Daria Semegen

"Electronic Music Musings" *SEAMUS Journal*. 1998.

"Art-Tickle: Points to Ponder" *Perspectives of New Music*, vol. 32, No. 1. Winter, 1994.

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"The Joy of Splicing" *Music Journal*. March, 1978.

"Plain Speaking on Electronic Music" *Music Journal*. Dec., 1976.

"Once More With Feeling" *Heresies Journal*, Summer 1980.

"Comments on Composition" *Interface: Journal of New Music Research*, vol. 9, Nos. 3-4. Ghent and Utrecht State Universities, Netherlands, 1980.

Percussion Instruments in the Contemporary Orchestra, by W. Kontonski. PWM Publ. Book. Warsaw, Poland, 1968. Translated and edited by Daria Semegen, 1970.

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Bülent Arel (1919-1990)

1 *Postlude from "Music for a Sacred Service"* (publ. by American Composers Alliance; BMI) (1961) 3:55

Charles Dodge (b. 1942)

2 *Earth's Magnetic Field* (publ. by North Cape Music; ASCAP) (1970) 14:05

Ilhan Mimaroglu (b. 1926)

3 *Prelude No. 8 (To the memory of Edgard Varese)* (publ. by Ilhan Mimaroglu; ASCAP) (1966) 3:55

Bülent Arel and Daria Semegen

4 *Out of Into* (publ. by American Composers Alliance; BMI) (1972) 14:47

Ingram Marshall (b. 1942)

5 *Cortez* (publ. Ibu Music; BMI) (1973) 8:37

Recorded voice and poem: Snee McCaig

Daria Semegen (b. 1946)

6 *Electronic Composition No. 1* (publ. by American Composers Alliance; BMI) (1971) 5:47

Alice Shields (b. 1943)

7 *Dance Piece No. 3* (publ. Symbolion Music; BMI) (1969) 5:57

8 *Study for Voice and Tape* (publ. Symbolion Music; BMI) (1968) 5:01

Recorded voice and poem: Alice Shields

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