

PULSE FIELD

SoundScape II

TEXTS

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VOICES

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AMALGAMS

**Program by: Robert S. Thompson, Ph.D.
December 2002**

PULSE FIELD

SoundScape II

Disc I

Jason Dixon (Northern Ireland)

1) Strong Words Softly Spoken

8:28 2002

Ruth v. Mengersen (Germany)

Ruth v. Mengersen started her education as a classical musician, studied dance (at the European Dance Development Center, Arnhem and the Limon Institute, NYC) and music composition with James Fulkerson, William Duckworth and Joan La Barbara. As a performer of both music and dance she has been a member of Mary O' Donnell ' s Dance *Alliance(Dlisseldorf)*, Howard Katz Fireheart's *KookMusicDanceTheater (Berlin)* and *Adriana Thompson's Company Soulskin (NYC)*.

Commissions include works for the Barton *Workshop* in Amsterdam, GEDOK Berlin, the Frankfurter Blaserserenade and various instrumentalists. Her piece "NJa'el" received an honorable mention in the Composition Contest of the International Society of Bassists 2002. Sound installations have been exhibited in various spaces in Berlin.

Ruth has created music for choreographies by Joao da Silva, Janine Schneider and the *Strong Current Dance Company*, which have been performed in Germany, Italy, Hungary, Slovenia, The Netherlands and the USA. Currently she lives in Berlin where she collaborates with the visual artist Daniel Wiesenfeld and the poet S.M.Groh among others.

Having been brought up as a classical musician first, later studying contemporary dance and performance art I now search for music that encompasses both the European traditional language and the world of sound, acoustic landscapes, movies for the ear. Many of my pieces have their origin in the portrait of a character -real or imaginative, I am interested in atmospheres, emotions and the sensuality of sound. I take my materials from all my acoustic surroundings, then look at them with the eye of a classical musician in terms of structure and composition. As each of my pieces derives from a very specific emotional core, compositional technique and formal aspects vary and are defined from scratch according to the inner laws of the pieces material. (R. v.M.)

2) The Missing is in the Link

8:26 2000

text: Anne Bregentzer (Belgian performer of words and movement). An inner monologue -spoken by the whispering voice of a computer -intertwined with musical fragments.

Chin-chin Chen (Taiwan)

Chin-Chin Chen, composer and Director of the GVSU Music Technology Center, joined the music faculty in 1999. Prior to coming to GVSU, she taught at Millikin University in Decatur, IL. She holds the degree D.M.A. in Composition / Theory, the degree M. Mus. in Music Theory, as well as M. Mus. in Piano Performance at the University of Illinois (Urbana/Champaign), and the degree B. A. in Social Work from Fu-Jen Catholic University in her native Taiwan. Ms. Chen's electroacoustic works *Points of No Return (1997, for two-channel tape)* and *Points of Arrival (1998, for violin and tape)* won First Prize and Honorable Mention, respectively, in the Concorso Internazionale Luigi Russolo in Varese, Italy. Her works have received international performances and broadcasts in such cities as Corfu, Buenos Aires, Seoul, Lyons, Prague, Pomona, Austin, Santa Fe, San Jose, Montreal, Melbourne, Belo Horizonte, Stony Brook, Barcelona, Beijing, Nashville, and others. She is published by Media Press.

3) **Oceangreen of Shadow**

4:30 2002

Oceangreen of Shadow was composed for the First Otto Joachim Project Studio Residency Competition, Concordia, Montreal. The work is based only on the - opening text of the Siren chapter of Ulysses by James Joyce, which is narrated by Bob Shechtman, composer-in residence at GVSU. This piece is developed from clearly identifiable text or syllables to unrecognizable text or syllables. The opening first minute functions as a prelude to the entire piece in the same way as the text used functions in its chapter.

Daniel Hosken (United States)

Daniel Hosken's music has been performed at Carnegie Recital Hall, the "Cube" at the MIT Media Lab, and at such festivals as the National Conference of the Society of Composers, the National Conference of SEAMUS (Society for Electro-Acoustic Music in the US), and the International Symposium on Electronic Art. His honors include Finalist in the Concorso Internazionale "Luigi Russolo", Honorable Mentions in the ASCAP Grants to Young Composers competition, and a grant from the MIT Council for the Arts. Hosken is a co-founder of AUROS, a Boston-based new music ensemble, for which he has served as co-director and conductor. He has also served as a co-director and conductor for the Madison Chapter of the Wisconsin Alliance for Composers.

Hosken holds a D.M.A. from the University of Wisconsin–Madison where he managed the computer music studios and taught courses in music technology and computer music. He also holds an M.M. in Composition with Academic Honors from New England Conservatory of Music and a B.S. in Music and Physics from the Massachusetts Institute of Technology. He studied computer music with Barry Vercoe, Tod Machover, and Robert Ceely, and composition with John Harbison, Stephen Dembski, and William Thomas McKinley. Hosken is currently Assistant Professor of Music Technology at California State University, Northridge where he teaches courses in music technology and composition and manages the Music Technology Lab.

4) **Blackbird Fly**

6:00 2002

Blackbird Fly is based on a poem of the same name by E.J. Graff. I first encountered this poem as a graduate student at New England Conservatory in Boston. *Blackbird Fly* is etched into the platform (along with several other poems) at the Davis Square "T" (subway) stop, and I stood on that platform nearly every day for two years reading this poem and planning to create a setting of it. Ten years later, here it is.

The basic materials for the piece come from a recording of the poem which then undergoes extensive computer processing including granular synthesis and linear predictive coding using the Csound synthesis language and Matt Ingalls' score generator. The components of the piece were mixed using Digital Performer.

Formally, the work begins with a "reading" of the three line poem which is followed by "variations" on each of the lines and concludes with a second "reading" that reflects the material developed in the variations. Here the text of the poem by E.J. Graff:

*As I leave the spit-gray factory,
Crowds of Blackbirds drift
up into the cumulus
Like released balloons.
I hold the wings of my fingertips in my coat pocket.*

5) **Alchemy: Visions**

6:03 2002

Alchemy: Visions is the dream/nightmare presentation of mysterious visions. The work is intended as a direct experience rather than a representation or mediation of an experience. The listener receives these visions and must then interpret their nature.

Alchemy: Visions is based on vocal and percussion recordings that are processed by granular synthesis and analysis/resynthesis techniques into new forms that reveal the inner structure of the source sounds while at the same time producing a unique sonic world. The work was realized with the Csound synthesis language and Matt Ingalls' score generator in my home studio and the studio of the University of Wisconsin–Madison.

Paul Rudy (United States)

Paul Rudy (1962) was born in South Bend, Indiana, USA. He is Assistant Professor of Composition and Director of the Inter-media/Music Production and Computer Technology Center at the Conservatory of Music, University of Missouri, Kansas City. From 1995-2001 he was the composition technologist at the Aspen Music Festival and School where he directed the Amplified Music Performance Series (AMPS) and created "The Virtual Concert Hall" a radio program of electroacoustic music for public radio currently broadcasting on Resonance FM (104.4) in London, England. He is the 2002 winner of the EMS Electroacoustic Music Prize (Stockholm, Sweden) along with other awards and honors from the Bourges Electroacoustic Music Competition, the Fulbright Foundation, Meet the Composer, the National Music Teachers Association, and the Missouri Music Teachers Association. Commissions include Meet the Composer USA, Music From China, New York New Music Ensemble, Kansas City Chorale, newEar, the UMKC Accordion Orchestra, and the Missouri Music Teachers Association. His works, published by Twisted Trail Music, have been broadcast and performed worldwide (England, Scotland, France, Spain, Germany, Finland, Sweden, Croatia, Canada, Korea, China, New Zealand, Australia, Cuba, and New York) and can be found on Living Artist, SCI (Capstone), and Centaur recordings. In addition to composing he has an avid interest in bicycling, hiking, camping, and mountaineering. In 1994 he completed the Colorado Grand Slam after climbing all 54 of Colorado's 14,000 ft peaks.

6) Thema Omaggio *after Berio*

8:53 2002

"Thema" began with a 1' 45" vocal improvisation recorded in the studio. This recording served as the basis for a composition in which I explored improvisational methods of working with sound material in the studio. Much of the final work resulted from recorded performance passes manipulating mixes of previously processed material. The result was a completely satisfying balance of improvisational instincts with compositional craft in an attempt to preserve the human presence and energy often lost in fixed works. Like Berio's work, variations stem from this theme but in a recursive rather than a linear manner. Sections of the theme are interspersed throughout followed by variations which encompass the rest of the theme from that starting point. As a result, it ends with the last portion of the theme heard after numerous variations. Thema: Omaggio was awarded the 2002 EMS Prize, Stockholm, Sweden.

David Heuser (United States)

David Heuser received his bachelor's degree in composition from the Eastman School of Music and his doctorate from Indiana University. His teachers include Samuel Adler, Claude Baker, Joseph Schwantner, David Liptak, Warren Benson, Frederick Fox, Wayne Peterson and Don Freund. He teaches theory and composition courses and runs the electronic music studio at the University of Texas at San Antonio. Before coming to UTSA he taught at West Chester University (PA) and Temple University.

Heuser has won various awards, grants and commissions including an ASCAP Young Composer Award, six ASCAP Standard Awards, a First Music commission from the New York Youth Symphony, and the Delius Composition Contest Chamber Music Award. His music has been performed by various groups and individuals and on festivals and conferences throughout the US and abroad. Recent projects include a commission for the SOLI Chamber Ensemble (*Catching Updrafts*), and *Woman Ironing*, a work for woman's choir.

Michael Souther in the Register-Guard (Eugene, OR) called Heuser's orchestral work *Cauldron* "an exciting, dynamic tour-de-force." Reviewer Mike Greenburg, writing in the San Antonio Express-News, said of *Deep Blue Spiral* (saxophone and tape), "With its jazzy solo line seamlessly integrated with the crashing, nervous, streetwise, cop-show adrenaline rush of the tape part, *Deep Blue Spiral* wanted to be heard in a hip urban warehouse;" the same writer wrote of Heuser's *Miniatures for Piano*, "All are exceptionally well-crafted, and all contain a lot more music than the term 'miniature' might suggest."

Heuser's music is published by Non Sequitur Music and has been recorded on the Albany Records label.

Music (that is, pure music, without any other art form attached) tells no story, or tells all stories. This abstract quality of the art has always attracted me, and with some of my electronic pieces, I actually take away meaning by starting with a sound source which does not speak to something specific, and removing that meaning by treating it simply musically. (D.H.)

7) Homage to Plan 9 (Part 1 – Paranoia)

1:58 1998

This Homage is intended to eventually cover a number of serious, or not so serious, topics introduced by the writer/director Edward D. Wood in the movie most often voted the worst film of all time. Personally, I love it.

8) Birds

5:32 1993

Birds is one of a series of works for tape which utilize a single, real-work sound source for all their musical materials. All of the sounds in this piece are from my pet birds. The majority of the material came from a parakeet: various chirps and whistles as well as cage rattlings and bird toys. The one loud cry comes from a cockatiel. The piece is in rondo form: ABACADA. Special thanks to Bugs and Freddie.

Mark Zaki (United States)

A prolific composer, Mark Zaki has created works that range from traditional chamber music and concert forms, to multimedia and music for film. Also an accomplished and active violinist, Zaki was one of the first musicians to use and explore the Zeta (MIDI) violin as an instrument for avant-garde composition and performance. Assimilating an eclectic array of compositional techniques, his work incorporates and transforms elements from traditional and popular forms, serial procedures, improvisatory contexts and acousmatic practice into a highly idiosyncratic approach.

While much of his music is either acousmatic in nature or intended for his own use as a performer, Zaki has also had works performed by the Nash Ensemble of London, Speculum Musicae, Earplay, the New York Bachanalia Festival, the Composers Ensemble at Princeton, violinist Nina Beilina and soprano Dana Hanchard. His composition teachers have included Paul Lansky, Steven Mackey and Charles Wuorinen. He also has received doctoral degrees in composition from Princeton University and in violin/viola performance from Rutgers University. Currently, he is a lecturer in electronic music at the University of California in Irvine and he divides his time between Los Angeles and New York City.

"The future isn't what it used to be."

Considering individual philosophies about music, I believe that they are necessary for the composer, but I'm not so sure that it is essential to expose them as *raison d'être*. When a composer has to explain his theories, he either places himself where his future work must conform to his concept or he eventually has to extricate himself from what he's proposed in order to try anything different. To me, the act of writing music is a course of action, a process which can take many forms that may only be personally evident and relevant. The remains of this process (i.e. the "piece") enable experiences that listeners can have based on their own knowledge and awareness of the medium. Therefore it seems that how I think about creating music is inconsequential, at least as long as a listener is stimulated enough to produce their own thoughts, feelings and reactions about my work.

Having said that, I feel that the most important aspects in my present work are contained within its sounds and gestures, and the environment created to contain the possible trajectories and consequences of these gestures. Examination of these elements can suggest potential larger scales of form without which a piece lacks justification. Thus a sound's particular motion, surface energy and internal rhythm are integral elements within a hierarchy, as are larger temporal considerations that may act as boundary conditions for the expression of these elements. To echo (and paraphrase) Jean-Paul Sartre, these sounds and gestures are private little celebrations, objects defined by their movement and having no other existence. (M.Z.)

9) L'autre voix

9:14 2001

L'autre voix has its roots in an earlier modulation study that was done in 2000. The piece subsequently developed into a slowly shifting pointillistic treatment of materials and environment. Serial techniques were used to create formal dimensions for its structure, throughout which vocal sounds are placed in contrast with their "found// and sometimes synthesized counterparts. In its present form, *L'autre voix* alludes to a vision of a larger fragmented work for choir, soloists and ensemble where each group of sounds inhabits and moves through its own space. *L'autre voix* was realized on a Macintosh G4, employing mixing and processing techniques in ProTools, Logic Audio, and MAX.

PULSE FIELD

SoundScape II

Disc II

Karlheinz Stockhausen (Germany)

Karlheinz Stockhausen (b. Mödarath, near Köln, 22 August 1928) Stockhausen entered the Music High School in Cologne in 1947, and later studied at the university. In 1951, he married and went to Paris, where he studied with the composers, Olivier Messiaen, and for a time, Darius Milhaud. Returning to Cologne in 1953, he cofounded its celebrated electronic music studio by becoming director in 1963. From 1954 to 1956, at the University of Bonn, he studied phonetics, acoustics, and information theory and composition. After lecturing at the contemporary music seminars at Darmstadt (1957), Stockhausen gave lectures and concerts in Europe and North America. From 1955, he was the co-editor of the theoretical journal, "Die Reihe" (The Row).

He has worked at the musique concrète studio in Paris, at the Studio for Electronic Music in Köln, and has taught Darmstadt summer courses. He's worked with serial, aleatory, and electronic procedures, with spatial placements of sound sources, and with graphical notation. Some works are constructed from discrete units of musical time called "groups" or "moments."

Stockhausen is relatively unconcerned with musical tradition and history; he explores fundamental psychological and acoustic aspects of music, an attitude that was intensified by the development of electronic music. As a counterbalance to the increasing mechanization of music, Stockhausen gives performers a large role in determining certain elements ("parameters") of a composition, even to the extent of determining form. In each work, certain elements are played off against one another, simultaneously and successively: in "Kontrapunkte," (Counterpoints; first performed in 1953 for 10 instruments) pairs of instruments and extremes of note values confront one another in a series of dramatic encounters; in "Gruppen," (Groups; 1959, for 3 orchestras) fanfares and passages of varying speed are flung from one orchestra to another, giving the impression of movement in space; in "Zeitemasse," (Time-Mass; 1956, for 5 woodwinds) various rates of acceleration and deceleration oppose one another.

In his electronic music, these procedures are taken still further. In "Kontakte" (1959-60), one version of the work contains "contact" between the instruments and the electronic sounds to which they respond. In addition, there is contact between the different electronic sounds themselves: all of them are created in similar ways. Thus, every sound or sound-complex or texture can be heard in relation to the others (e.g. "Momente," 1962, for soprano, 4 choruses, and 13 players). In such works as "Klavierstück XI," (Piano Piece XI, last of a series, 1956) the music consists of separate fragments, and the performer is given a certain freedom in regard to the dynamics, attack, and the order or number of fragments played.

1) Gesang der Jünglinge

13:40 1956

(programme text for the world premiere 1956)

The starting point for work on the electronic composition GESANG DER JÜNGLINGE (SONG OF THE YOUTHS) was the idea of unifying vocal sounds and electronically produced sounds: audibly they were to be as fast, as long, as loud, as soft, as dense and interwoven, with as small and large pitch intervals, and in as differentiated variations of timbre as the imagination might require, freed from the physical limitations of anyone singer. Consequently, much more sophisticated electronic sounds had to be composed than heretofore, since sung speech-sounds probably represent the most complex of sound structures -in a broad scale from vowels (sounds) to consonants (noises). A merging of all the colours used into one sound family can only be experienced if sung sounds can appear to be electronic sounds, and electronic sounds to be sung sounds. At certain points in the composition the sung sounds become comprehensible words; at other points they have a value purely as sounds, and between these extremes are various degrees of verbal comprehensibility. Single syllables and words are taken from the *Song of the Youths in the Fiery Furnace* (3rd Book of Daniel), and whenever language emerges momentarily from the sound signals of the music, it praises God.

Just as important as this new way of experiencing musical language is the following: in this composition, for the first time, the direction and movement of the sounds in space is shaped by a musician, opening up a new dimension in musical experience. GESANG DER JÜNGLINGE is composed for 5 groups of loudspeakers which are to be distributed in space around the listeners. The side from which the sounds and sound -groups are emitted, and from how many loudspeakers at once, whether the sounds move clockwise or counter-clockwise, whether they are static or mobile -all this becomes decisive for this work. (K.S.)

"Imagine finding an apple, perhaps even an ash tray on a distant star. Here it would be so banal: there a marvel of magic" - Stockhausen

**A Journey into the Fiery Furnace:
Stockhausen's *Gesang der Jünglinge***

**By:
Scott A. Shoemaker**

Karlheinz Stockhausen was born in Cologne, Germany on August 22, 1928 to a rather non-musical family. His father taught school, and entertained an interest in theater. His mother was an amateur singer, though she was committed to a sanitarium when Stockhausen was five years old, and died there when he was fourteen. It is speculated that she was killed to lighten the burden on the Nazi state. Nonetheless, Stockhausen developed an interest in music, and entered the Cologne Musikhochschule in 1942, at 14 years old, where he studied piano with Otto Schmidt Neihaus and composition with Frank Martin. While a student, Stockhausen played piano in bars and clubs, and spent some time improvising accompaniments for a magic show. His studies there were interrupted by a short service in the German military, where he served in a hospital near the front. In 1951, he received a certificate in music education from the Cologne Musikhochschule.

The summer following his graduation from the Musikhochschule, he attended the Freikurs für Neue Musik at Darmstadt, where he met Karl Goyvearts, a student of Olivier Messien, who was experimenting with total serialism, and had completed his Sonata for Two Pianos in this style. While at Darmstadt Stockhausen heard, for the first time, Messien's piano work *Mode de valeurs et d'intensités* from the *Quatre Études de rythme*. This encounter radically changed Stockhausen's compositional voice. His student compositions showed a "melancholy expressive character" which sought to emphasize thematic construction. His pieces such as *Drei Leier* demonstrate what Richard Toop calls "a major talent, but not an avant garde sensibility", and clearly show the influence of Mahler. By the end of 1951, Stockhausen had written his first total-serialist work, *Kreuzspiel*, for chamber ensemble of six players. This piece represented a vast break from his final student composition, *Sonatine for Violin and Piano*, which he had completed earlier that same year. There can be little doubt that the summers spent at Darmstadt had a profound effect in the transformation of Stockhausen's compositions.

In 1952, he married his first wife, Doris Andrae, to whom he would later dedicate *Gesang der Jünglinge*, and moved to Paris to study with Messien. While in Paris, he moved freely in the avant garde circle. In addition to studies with Messien, he attended some lectures given by Darius Milhaud and was also introduced to Pierre Boulez. His work in the avant garde also put him in contact completed his first work for tape, *Konkrete Etude*, after the dominant Parisian *musique concrète* model. At the same time, he was working in an ultra-serialist style, producing *Kontra-punkte*, in a pointalistic voice, very much in the style of Boulez.

In 1953, Stockhausen returned to Cologne, already becoming a major figure in the avant garde, taking a position at Nordwestdeutscher Rundfunk in their *Studio für Elektronische Musik*, which had been established in 1951 (the same year as the Columbia-Princeton Electronic Music Center). Studios of this type had become common across Europe, and most networks maintained one under the auspices of "cultural programming". With his return to Cologne, he began to work seriously in electronic music, which he viewed as the "essential future of music". In the years preceding the composition of *Gesang der Jünglinge*, Stockhausen produced two *Elektronische Etuden*, where he refined his skill in the German model of synthesized sound (in opposition to French work in *musique concrète*). While working at the Cologne radio station, he was given a scholarship to pursue doctoral studies at the University of Bonn, with Werner Meyer-Eppler, who was conducting research in phonetics and communication studies. Although he never completed the degree, he always considered Meyer-Eppler to be one of his most influential teachers, as he deeply effected Stockhausen's compositions. He wrote that Meyer-Eppler was...

...a teacher who had come from phonetics, had given up analyzing the different sounds of language in order to devote himself to studying statistics, because he wanted to know more precisely what all the different noises were, and analyzing the wave structure and consonants in language led him to use statistical methods of description and analysis. He would give us exercises demonstrating the principles of the Markoff series; in one we were given cut outs of individual letters from newspaper articles, and we had to put them in sequence by a chance operation, and see what sort of text came out.

His work at the University of Bonn spawned two life-long interests. The first of these is an interest in the composition of language, which is immediately audible in *Gesang der Jünglinge*. The second is an interest in indeterminacy, which would eventually come to consume much of this career.

After composing his electronic etudes, he longed to write something more substantial. In 1955, Stockhausen began to write the piece that "...is an elegant consummation of this first long love affair with the electronic medium". During six months in 1955 and 1956, he composed, with the assistance of Gottfried Michael König and Hugh Davis, *Gesang der Jünglinge*. The work grew out of Stockhausen's deep spiritual devotion. The original concept was to compose a Mass, intended for liturgical use, or for transmission via radio. The plan, however, was short lived due to the belief that such a project would be condemned by the church hierarchy. Nonetheless, Stockhausen created a monumental work, vast in scale. The work lasts thirteen minutes (the original plan was for a twenty-minute-long work), nearly one-third longer than any of his previous electronic works, and requires five loudspeakers for performance (simplified from six, in the original sketches). His piece, for five-channel magnetic tape, uses the sound of a boy's voice, subjected to electronic manipulation, as well as electronically produced sounds as its palate. The boy sings an Anglican canticle, *The Benedictine*, which draws its text from the Biblical book of Daniel, Chapter 3, verses lvii-lxv. The text is the prayer sung by the Children of Israel after having been cast into Nebuchadnezzar's Fiery Furnace in Babylon. Historian Joseph Kerman suggests that this might be an allegory for the use of furnaces by the Nazi army to dispose of Jews during Stockhausen's youth. The text is rarely discernable, as it is often split into individual phonemes. However, when it is, it praises God. The phrase, "Preiset den Herrn" ("Praise the Lord") was deliberately chosen by Stockhausen to act as a refrain throughout the piece, which has been called the first masterpiece in the electronic genre, and holds a unique place, as it is the first piece to combine synthesized sound with *musique concrète*.

Stockhausen wrote in his notes on *Gesang der Jünglinge*:

My work on the electronic composition Gesang der Jünglinge proceeded from the idea of bringing together into a single sound both sung notes and electronically produced ones: their speed, length, loudness, softness, density, and complexity, with width and narrowness of pitch intervals and the differentiations of timbre could all be made audible exactly as I imagined them, independent of the physical limitations of any singer.

The work is in six sections, but was originally cast to be in seven. It was cut short to bring the work to completion before its premiere on May 30th, 1956. The structure of the work is not a radical departure from his earlier pieces, especially the *Elektrosche Etude #2*. The work is, in some ways, motivic. The final section of the work combines and develops ideas stated in the previous sections. Though the work employs violent contrasts, they serve to give the piece shape, and become part of the larger form. It is these contrasts that give the work its "alertness, its youthful, early-morning-visionary quality". It is also similar to his earlier works from a theoretical standpoint. Stockhausen constructs from the sound elements twelve scales of contrast. His work in Parisian electronic music studios had led him away from the tempered twelve-tone scale, and the justification of using the number twelve disappeared. He began to work with "proportion squares", and extended these from pitch to all aspects of a work. In this case, he constructs three scales, one for each of the primary sound elements, electronically generated tones, noise, and recorded singing. He also created scales between harmonic spectra and noise, between dark and bright noise, and between dark and bright timbre, all of which can be controlled continuously via electronic means. He then created scales in the recorded sub-material, dark to light vowels (u to i), vowels to consonants, and dark to light consonants (ch to s). Finally, he creates a scale between electronic sound and the human voice. This works on two levels. The first is the blurring of the line between human and electronic sound and secondly on blurring the line between meaning and abstraction. The scales are then serialized in pairs. For each vocal element, there was a synthesized one. These, then, represent the interval relationships, and can be used in any dimension, including harmonic and melodic ratios, sound and phonemes, sound groups and pitch regions, formant region figures (effecting timbre), and placement in space. The scales describe a continuum from the melodic to the harmonic, and the sequences can be folded over on themselves to form continuous cycles. Stockhausen was always seeking a system that was not arbitrary, but one that was founded on scientific principles. An ideal system would draw strength from the world of human experience, and would be "more likely, as a matter of course, to connect with the perceptions of the 'ordinary listener'."

Gesang der Jünglinge was criticized on its premiere for being an aesthetic "U-turn", away from the more abstract electronic music, and back toward Stockhausen's roots in *musique concrète*. Others felt that he was crumbling to popular opinion. However, the work represents a shift in aesthetic position, and demonstrates a moment of self-assurance in the new medium. It illustrates the increase in sophistication in his knowledge of acoustics and phonetics, such that it was inevitable that he should work with recorded words. The work was

further criticized for the avant garde treatment of a sacred text. Stockhausen held his ground, however, stating

Our aim is not to "interpret", but – as it is in Gesang der Junglinge, Kontakte, Momente, Hymnen, Prozession, and Telemusik – to hear with fresh ears musical material that is familiar, "old", performed; at to penetrate and transform it with contemporary musical consciousness.

There can be little doubt that the work was a vast step in bringing together the concepts of musique concrète and pure electronic music

Throughout his career, Stockhausen felt that he was "establishing a new path", and felt that his composition was under constant scrutiny by Schoenberg and Stravinsky, each "looking over his shoulder" to make certain that there was no sign of plagiarism. Where Webern felt that he was a continuation of the Austro-German tradition, Stockhausen did not, and his work arose with almost no direct influence. While his work parallels that of Berg, but it important to note that he was working independently of many of the Second Viennese School composers. By the time that Webern's scores were published in 1953, Stockhausen had completed his "point music" phase. Kontra-punkte had already been published and he was working on his electronic studies. Rather than inherit and expand the German tradition, Stockhausen felt that the purpose of composing was not just the addition of new works to the repertoire, but, indeed, to redefine the possibilities of composition itself. The motivation behind Stockhausen's quest for the "not yet heard", were deep religious conviction (originally Catholicism), and a passion for innovation. He saw ultra-serialism as a sort of acoustic theology, and "attempted paradigm" of creation, where all elements are remain in balance, though not always configured in the same way. Initially, he sought to isolate and serialize all aspects of sound, including density of harmonic structures, vertical masses, the number of events occurring in time segments, size of intervals, choice of register, attacks and articulations, and rate of change of texture and color. Further, he attempted to create a scale for subtly transforming sound, but it soon became clear that it would be impossible for a performer to meaningfully realize these changes, as in the Klavierstucke I – IV (1952 – 1953). Stockhausen's initial work in electronic music was to remedy this issue, as the composer was able to break down the discrete steps required by live performers. A composer could go farther, breaking down distinctions of the tempered scale, between noise and pitch, between electronic sound and recorded sound, and even sound and silence, as in the case of Gesang der Jünglinge. Even with the microscopic details under his control, Stockhausen's real gift was his ability to remain in control of the large-scale shape of a composition. This is clear, even in his earliest ultra-serial compositions. This primary difference with Boulez led him away from ultra-serialism in the 1950's. It was at the same time that he was turning away from serialism, he was beginning to find and incorporate existing materials into his music, attempting to show them in a new perspective. By 1955, Stockhausen had made a shift toward "group composition", where the individual details were becoming subservient to the larger form. By the middle of the 1950's, Stockhausen had began experimenting with his the aleatory elements that he had first encountered at the University of Bonn in 1953. In Gesang der Jünglinge, aleatory becomes one of many contributing factors in the process model. By 1957, Stockhausen had moved securely into the aleatory, with the "open forms" of Klavierstuck XI, which lead to the possibility of interchangeable sections.

In 1956, Stockhausen began teaching at Darmstadt, which had become synonymous with the European avant garde. Due to his increasing fascination with aleatoric composition, and with his counter culture aesthetic, he invited John Cage to lecture at Darmstadt in 1958, leading to rifts with Boulez. In the 1960's he carried this concept to the limit, as he toured extensively with his "intuitive music ensemble", culminating in daily performances at the World's Fair at Osaka, Japan in 1970. By the early 1960's, Stockhausen had outgrown his Darmstadt reputation, and enjoyed wide performance of his works. From 1963 to 1968, Stockhausen directed the Kölner Kurse für Neue Musik, formed in the model of Darmstadt. By the end of the 1960's his musical reputation had been extended beyond the avant garde, reputedly selling more records for Deutsche Gramophon than any other composer except Stravinsky. Further proof of his reputation came when he was included on the cover of the pop-culture icon album Sgt. Pepper's Lonely Heart's Club Band by the Beatles. During the 1970's his reputation pulled back somewhat due, in part, to a cultural shift. However, his 1971 acceptance of an appointment as professor of composition at the Cologne Musikhochschule proved that his career was not yet over. By the late 1970's, however, his life had become consumed by his gargantuan opera cycle Licht, a vast seven-section composition (one for each day of the week). Even so, by as late as 1980, Joseph Kerman calls him "...one of the most significant forces among advanced composers today".

There can be no doubt that Stockhausen is one of the seminal musical minds of our time, and perhaps better than most, a voice for the 20th century. His "unflinching modernist aesthetic" and his embrace of new

technology, and his subsequent triumph through it ensure him a place the musical awareness of generations to come. Perhaps Joseph Kerman sums it up best

The Sanctus of Bach's Mass in B Minor is a magnificent piece, but are his baroque angels really speaking for us, as they chant their triumphant "Holy, Holy, Holy" around the throne? Brilliant and visionary in technique, inner-personal and tentative in its expression of faith, the Song of Children makes it own cool, authentic statement for the present age of technology.

Notes:

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- ⁴ Simon Emmerson and Denis Smalley, "Electro-Acoustic Music". New Grove Dictionary of Music and Musicians, 2nd ed. Ed. Stanley Sadie and John Tyrell, (London: MacMillan, 2001), 64.
- ⁵ Emmerson, 64
- ⁶ Toop, 401
- ⁷ Emmerson, 64
- ⁸ Robin Maconie, The Works of Karlheinz Stockhausen. 2nd ed. (Oxford: Clarendon Press, 1990), 58.
- ⁹ Maconie, 58
- ¹⁰ Maconie, 57
- ¹¹ Toop, 404
- ¹² Maconie, 57
- ¹³ Maconie, 57
- ¹⁴ Maconie, 60
- ¹⁵ Karl H. Wörner, Stockhausen: Life and Work, Ed and Tras. Bill Hopkins, (Los Angeles: U. of California Press, 1973), 23.
- ¹⁶ Joseph Kerman, Listen, 3rd ed. (New York: Worth Publishers, 1980), 466.
- ¹⁷ Maconie, 59
- ¹⁸ Morgan, 466
- ¹⁹ Maconie, 61
- ²⁰ Jonathan Harvey, The Music of Stockhausen, (London: Faber & Faber, 1975), 80.
- ²¹ Harvey, 80
- ²² Toop, 406
- ²³ Harvey, 79
- ²⁴ Maconie, 59
- ²⁵ Harvey, 79
- ²⁶ Maconie, 59
- ²⁷ Maconie, 59
- ²⁸ Maconie, 59
- ²⁹ Wörner, 77
- ³⁰ Donald J Grout and Claude V. Palisca, A History of Western Music, 5th ed. (New York: W.W. Norton & Company, 1996), 749.
- ³¹ Toop, 404
- ³² Toop, 404
- ³³ Toop, 404
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- ³⁵ Eric Salzman, Twentieth Century Music, An Introduction. 3rd ed. (Englewood Cliffs, NJ: Prentice Hall, 1988), 157.
- ³⁶ Salzman, 157
- ³⁷ Morgan, 346
- ³⁸ Toop, 405
- ³⁹ Morgan, 381
- ⁴⁰ Wörner, 220
- ⁴¹ Toop, 399
- ⁴² Toop, 399
- ⁴³ Kerman, 466
- ⁴⁴ Toop, 404
- ⁴⁵ Kerman, 466
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Music and the Centers of Man

Karlheinz Stockhausen

Each of us is, as you know, a person with many levels -- there are after all whole cultures which have differentiated them. I have a sexual center, three vital centers, two mental centers and a suprapersonal center. If I can perceive that, I have come far enough to have awoken seven different centers in myself. And with different things I can bring each center into vibration. I can set my sexual center in vibration with a certain sort of music, but with another music I can set my supranatural center in vibration. And I will add to that: have you perhaps gone far enough yet to discover which parts of a type of music, or which pieces of music, set which of your centers especially in vibration?

There is also music that goes through all the centers: hence there are moments in which you are addressed in a purely sacred, a purely religious way; and other moments in which you are addressed purely sensually, purely erotically. That is pretty reckless music. One must be very strong to be able to experience that completely. Above all, this music must be exceptionally well balanced, fantastically composed. If it is not, then there are overloadings, and when one hears it one is overexcited in a certain way, and brought out of equilibrium.

Hence it is naturally better if one hears music that draws one up higher than one is by nature. We are mostly pretty physical sacks, are we not -- all of us? Most of us spend most of our time on feeding ourselves, taking care of clothing and shelter, copulating and sleeping; primarily satisfying physical desires, then. Now and again one reminds oneself: "We are spirits, and spirits should be connected with the superhuman, with the Cosmos, with God." Much music also serves for that! But such music is very rare today, extremely rare. Most music is just physical, and speaks to centers in us that belong more to the animal than to the superhuman (I mean here by "superhuman" what we are as spirits, when we are freed from flesh and bones).

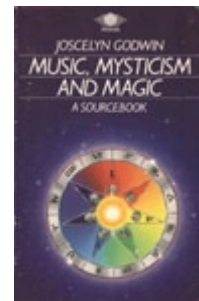
That is what should be the most important thing now: that each person should gradually become conscious enough to choose specific music and to be able to say: "I choose that within myself which comes to vibration through this music."

The Composer and his Spirit

There will be people who will discover this music. That is the wonderful thing on this earth: everything that exists has its meaning. Everything is consumed -- that is the most remarkable thing ... everything is found ... if you do not eat it, another will ... what we do not eat, the animals eat, what they do not eat becomes earth again. Everything is alive. So it is not so important for the whole whether anyone likes something or not. It cannot be decisive for me as a composer whether you like my music or not. If you do not like it, someone else will like it; if no one liked it, then that too would not make me despair. I work on something, and when it is finished I make something new. Naturally I am happy if I now meet someone who is sympathetic to me -- in whom I detect waves that are beautiful -- and who likes what I have made. But that is a purely personal matter, that is Stockhausen. That which in my music is not Stockhausen -- the most essential part -- is

timeless, universal. "Stockhausen" is only a label, a name. When I have gone, it is no longer there. But the music lives on. Then my name is merely a word, as when I say "Moments" (*Momente*, 1962-64) to name something. But that no longer has anything to do with me. None of you knows "Beethoven." He is a myth! He is a series of letters. None of you knows the person. Seen from the exterior he was a decrepit little man who usually had pains in the ear and belly-aches, who now and then ate a hare and drank a glass of wine, who was usually grousing like a madman and quarrelling with housekeepers: he was certainly a complex and, to many, an unsympathetic man. With a very fine sensitivity to vibrations you might perhaps have understood what kind of a being the other Beethoven was, whom Bettina von Arnim described. She was a wise woman. She got him to talk, and saw what a wonderful soul lay behind this wild facade. So she quoted sentences of his that are fantastic, so wise and so enlightened! She managed it. For the others he was a taciturn type. Today of course, today everyone finds his music wonderful. But what is that? Everyone finds *themselves* wonderful, when they like it. They do not know Beethoven at all. While listening to this music they feel wonderfully alive, full of energy, elevated, divine. In every Beethoven-lover there lies hid this spirit that was in Beethoven. I will tell you: Stockhausen's music is not Stockhausen, but this spirit which is using me. And you, too, are not what you appear to be. Your human personality is quite limited and temporary. You are little lights, as I am, which flicker -- which whisper something to one another, to pass the time. What it is that we say is fundamentally also not so important ... what is important is that we are together like this ... for twenty lights simply give off more light ... than a single one ...

(K.S.)



Luciano Berio (Italy)

b. Oneglia, 24 Oct 1925), Italian composer. He studied with his father and grandfather, both organists and composers, and with Ghedini at the Milan Conservatory in the late 1940s. In 1950 he married the American singer Cathy Berberian, and the next year at Tanglewood he met Dallapiccola, who influenced his move towards and beyond 12-note serialism in such works as his Joyce cycle *Chamber Music* for voice and trio (1953). Further stimulus came from his meetings with Maderna, Pousseur and Stockhausen in Basle in 1954, and he became a central member of the Darmstadt circle. He directed an electronic music studio at the Milan station of Italian radio (1955-61), at the same time producing *Sequenza I* for flute (1958, the first of a cycle of solo explorations of performing gestures), *Circles* (1960, a loop of Cummings settings for voice, harp and percussion) and *Epifanie* (1961, an aleatory set of orchestral and vocal movements designed to show different kinds of vocal behaviour). These established his area of interest: with the means and archetypes of musical communication.

For most of the next decade he was in the USA, teaching and composing, his main works of this period including the Dante-esque *Laborintus II* for voices and orchestra (1965), the *Sinfonia* for similar resources (1969, with a central movement whirling quotations round Mahler and Beckett) and *Opera* (1970), a study of the decline of the genre and of Western bourgeois civilization. Two more operas, *La vera storia* (1982) and *Un re in ascolto* (1984), came out of his collaboration with Calvino. Other works include *Coro* (1976), a panoply of poster statements and refracted folksongs for chorus and orchestra, and numerous orchestral and chamber pieces.

2) Thema (Omaggio a Joyce)

8:12 1958

Realized in 1958 at the Studio di Fonologia, *Thema* is one of Berio's electronic/tape pieces, and takes the "Sirens" chapter of *Ulysses* as its source material.

The work opens simply, with Berio's wife Cathy Berberian reading the opening text from "Sirens." Eventually her agile voice is subjected, at first subtly, to amplification and slight distortion, until her final "hissss" opens the doors fully to Berio's technological manipulations. Although there are no electronically *generated* sounds *per se*, her reading is used as the material for a bizarre fugal exploration that eventually renders the text unrecognizable. The applied effects are myriad: distortions, echoes, stutterings; the tape speeds up, slows down; multi-trackings and splicings modulate her voice from incoherence to layered beauty. At times it achieves a spooky otherworldliness; at others it sounds like a tape machine having a particularly bad nightmare. To modern ears, used to Pink Floyd, trip-hop and electronica, it seems almost quaintly outdated; but nevertheless it is certainly due respect, for both its avant-garde spirit as well as the ingenuity it expresses in its limited medium. And even given its technologically dated nature, it's still an impressive accomplishment, and makes for a bizarre and intriguing listening experience, blurring the borders between language and sound. (A. Ruch)

Text by James Joyce

From the "Sirens" Episode of *Ulysses*

BRONZE BY GOLD HEARD THE HOOPIRONS,
STEELYRINING IMPERthnthn thnthnthn.
Chips, picking chips off rocky thumbnail, chips. Horrid! And gold flushed more.
A husky fifenote blew.
Blew. Blue bloom is on the
Gold pinnacled hair.
A jumping rose on satiny breasts of satin, rose of Castille.
Trilling, trilling: I dolores.
Peep! Who's in the... peepofgold?
Tink cried to bronze in pity.
And a call, pure, long and throbbing. Longindying call.
Decoy. Soft word. But look! The bright stars fade. O rose!
Notes chirruping answer. Castille. The morn is breaking.
Jingle jingle jaunted jingling.
Coin rang. Clock clacked.
Avowal. *Sonnez*. I could. Rebound of garter. Not leave thee.
Smack. *La cloche!* Thigh smack. Avowal. Warm. Sweetheart, goodbye!
Jingle. Bloo.

Boomed crashing chords. When love absorbs. War! War! The tympanum.
A sail! A veil awave upon the waves.
Lost. Thristle fluted. All is lost now.
Horn. Hawhorn.
When first he saw. Alas!
Full tup. Full throb.
Warbling. Ah, lure! Alluring.
Martha! Come!
Clapclap. Clipclap. Clappyclap.
Goodgod henev erheard inall.
Deaf bald Pat brought pad knife took up.
A moonlight nightcall: far: far.
I feel so sad. P. S. So lonely blooming.
Listen!
The spiked and winding cold seahorn. Have you the? Each and for other plash and silent roar.
Pearls: when she. Liszt's rhapsodies. Hissss.

Voice of Cathy Berberian

For me, the significance of electronic music lies not so much in the discovery of "new sounds," but more in the unique opportunity to enlarge the domain of sound phenomena and to integrate them into a musical thought that justifies and provokes further extensions. It is within this perspective that *Thema (Omaggio a Joyce)*, composed at the Studio di Fonologia of the Italian Radio in Milan in 1958, should be understood.

In *Thema*, I attempted to present a musical reinterpretation of a reading of a text from *Ulysses* by James Joyce, by developing the polyphonic design that characterizes the eleventh chapter (entitled "Sirens," and dedicated to music), whose narrative technique suggests a reference to polyphonic music and to *Fuga per canonem* in particular. *Thema* is not based on electronically produced sounds, but solely on the voice of Cathy Berberian reading the opening of this chapter. In this work, I was interested in developing new criteria of continuity between spoken language and music and in establishing continual metamorphoses of one into the other. By selecting and reorganizing the phonetic and semantic elements of Joyce's text, Mister Bloom's day in Dublin momentarily follows an unexpected direction, in which it is no longer possible to make distinctions between word and sound, and between sound and noise; or between poetry and prose, and between poetry and music. We are thus forced to recognize the relative nature of these distinctions, and the expressive characters of their changing functions. (L.B.)

3) Visage

21:10 1961

We understand that language is made not only from words and concepts, but rather is a system of arbitrary symbols through which we give a certain form to our way of being in the world. Music, likewise, is made not only of notes and established forms of relations, but rather is the way that we are able to select, shape and relate certain aspects of the sound continuum. The main subject of *Visage* is language. When composing it I was attracted, as always, to a musical search that tends to open or enlarge the possibilities of convergence of musical and acoustical processes and to finding a musical equivalent to linguistic articulations.

Based on the sound symbolism of vocal gestures and inflections, with their accompanying "shadows of meaning" and associative tendencies, *Visage* can also be heard as a metaphor of vocal behavior: it means discourse mainly at the onomatopaeic level. Thus, *Visage* does not present meaningful speech, but rather the semblance of it. Only a single word is pronounced twice: "parole," meaning "words" in Italian. The vocal events used in this work, ranging from unarticulated to articulated "speech," from laughter to crying and singing, from patterns of inflection modeled upon specific languages or dialects (English and Italian as spoken on the radio, Hebrew, Neapolitan and such like) to aphasia, are constantly related to electronically produced sounds. The voice is that of Cathy Berberian.

I composed *Visage* in 1960-61, when I left the Studio di Fonologia Musicale of the Italian Radio in Milan, and its destination is not necessarily the concert hall, but rather any conceivable medium for the reproduction of words. For me, *Visage* also constitutes a tribute to the radio as the most widespread disseminator of useless words. (L.B.)

Alice Shields (United States)

ALICE SHIELDS (b. 1943, New York City) taught composition and electronic music at the Electronic Music Center of Columbia University, from where she received her undergraduate and graduate degrees in composition. She had been Ussachevsky's teaching assistant in Sixteenth-Century Counterpoint, and in 1965 started working as Ussachevsky's assistant at the Electronic Music Center. While working with Ussachevsky on his film, theatrical, and electronic opera pieces, she performed as an opera singer at Lincoln Center and wrote electronic music-theater pieces and operas of her own. Shields continues to perform in and record her own operas. In her electronic compositions she primarily uses concrete or sampled sound whether on MIDI, on the SUN computer, or in the analog studio. From 1965 to 1980, Shields and Smiley carried the main burden of assisting the actual studio work of composers who were enrolled in the two graduate courses in electronic music composition. Shields was Associate Director of the Center from 1978 to 1982.

4) The Transformation of Ani

9:04 1970

Saith Osiris, the scribe of Ani,
I have obtained the mastery over the animals,
with the knife in their heads and their locks of hair,
who live among their emeralds,
the aged and the shining beings,
who prepare the moment of Osiris Ani,
triumphant in peace

My seasons are in my body
I do not speak evil in the place of right and truth,
every day advancing in right and truth.
being shrouded in darkness,
sailing to keep the festival of the dead one,
embracing the old man,
the guardian of the earth,
Osiris,
the scribe of Ani,
triumphant

I have not entered into the cavern
of the starry dieties.
I ascribe glory to Osiris.
I have pacified the heart of those deities who
follow him
Not am I afraid of those who create terror,
or of those who live on their lands Behold me
I am exalted upon my standard.
upon my seat.
I am Nu:
not shall be overcome by the doer or evil.
I am Shu of primaeval matter:
My soul is the God,
my soul is eternity.
I am the creator or the darkness.
making its place in the bounds of the sky,
the prince or Eternity.

from *The Egyptian Book of the Dead* translated by EA Wallis Budge
Dover Publications inc. New York

The words of this piece are from the Egyptian *Book of the Dead*. They are recited by the dying soul, who by pronouncing the words of salvation and of identity with the savior Osiris, is carried into eternal life. All sounds except the last, obliterating one, are made from my own voice, speaking and singing the words of the text. Each letter of the English translation was assigned a pitch, and each hieroglyph of the Egyptian was

assigned a short phrase of more indefinite pitch. These two were then improvised upon to create the two non-text elements in the piece: singing-like phrases, and percussive phrases. These dramatic elements move behind and around the child-like, inexpressive speaking voice in explosive bursts. The text is in three verses which follow the transmutation of the speaker. (A.S.)

Brian Belet (United States)

Brian Belet is Music Systems Area Coordinator and Associate Professor within the School of Music and Dance at San Jose State University, and a Research Associate with the Center for Research in Electro-Acoustic Music.

Belet earned the degree of Doctor of Musical Arts in Composition from the University of Illinois at Urbana-Champaign in 1990, with an emphasis on algorithmic composition and software synthesis, and with a dissertation on the music of James Tenney. His compositions, for acoustic and electro-acoustic media, have been performed in the United States, Canada, Europe, South America, and Asia (including several ICMC, SEAMUS, and SCI conferences). Dr. Belet has received composition awards and grants from the National Foundation for Advancement in the Arts, ASCAP, Arts Midwest, Arizona Composers Forum, Arizona State University, and the South Dakota Music Teachers Association. He has also received computer music research grants and fellowships from San Jose State University ("CSU Research Fellow", 1995) and Clark University, MA ("Higgins Fellow", 1992). His theoretical and computer music research has been presented at conferences in the United States, Hong Kong, Canada, Japan, and Luxembourg; and is published in *Perspectives of New Music*, the *Proceedings of the International Computer Music Conference* (1991, 1992, & 1996), the *Proceedings of the Japan Music and Computer Science Society Summer Symposium 1992*, and the *Proceedings of the SEAMUS 1994 Conference*. He has also published articles in *Computer Music Journal* and the *Journal SEAMUS*. His continuing research interests include algorithmic composition, real-time software sound synthesis, real-time computer improvisation, and microtonal theories. With Dr. William Walker (Xerox PARC) he is pursuing research and composition projects utilizing Walker's algorithmic composition program *ImprovisationBuilder*. Belet is currently editing a book of the collected theoretical writings of Ben Johnston, co-edited by Bob Gilmore, Dartington College of the Arts, UK.

Dr. Belet remains active as a performer (bass, viola, guitar, viol, & electronics). He is a founding member of Janus, an eclectic Bay-area contemporary chamber ensemble.

5) difference (no doubt it queues)

1:00 1996

The text invokes (in me) a great turmoil, an angular struggle within reason, disparate and unified (self referential). "Difference, the first good" is a focus point, and is used as the central source sound (with "no doubt it queues" interjected spontaneously as a supporting complement). The original sound excerpts were processed using Kyma, Lemur, and SoundHack.

6) an abstract (difference (queues))

1:00 1996

Clarity is an abstract from the polyphonic monody. "Abstract -difference -queues" are my referential points of clarity within the full text. These sound file excerpts were processed using Kyma and Lemur for a relatively open and sparse texture.

These two miniatures are included on the CD compilation "The Frog Peak Collaborations Project, Frog Peak Music, 1997. All of the 115 works on the double CD utilize the same recorded performance of Chris Mann reading his text as source material:

(The reason that something is an example, a fold (how many does it take to define a problem? (, a predicate», an economy of virtual knowns, interrupts the idea of proof (those names of actions and events) that does a shy redundancy, a wave. Looks like a subject, but. I mean, is is-an- emergent -property -of -any -system -the- increasing -probability -of -asking -a- right -q a question (a parasite that adapts) or no, a science of quantity, a legal? And the additions? A function. Of represents. Information after all is that failure of description, an immune system ala consciousnessed, a parody (a typical number (probability is a product of real numbers), abase maybe parity in bags) that dags as some inductive random, a negative it, sit. Like a tautology is a square of the propensity to explain any point-function as (random is just like absence) a factor (D) of phantom flickers, a sort of they-type time (it disappoints (dusts) description) of non-linear possibilities, an avvy quit. Shit. The

pragmatics of ignorance -something (decorative) you do on my time (my reduction is smaller than your reduction coz lis a large number) -an abstract that, an example of itself, a me-too no-risk of refers picks up a difference on a stick (difference, the first good) and licks (self-evident (a judgment is a perfect rule»): dear sames, a limbo (game) replica in drag, as names (deduction is the administration of violence (credit is the history (interest) of words without history»): claims it (the altruist) I's about. Conspires. In (surrogate) two's. No doubt it queues.)

7) [MUTE]ation

8:52 2000

"Mutation" is defined as the change or alteration, in the form or qualities, of a substance or process. The source sound for [MUTE]ation is trombonist Scott Mousseau performing on his straight mute (without his trombone!). The various taps and whistles he created contain a wealth of compositional potential, and my intention was (and is) to mutate a select few of these sounds into a longer resynthesized structure. The original sound file is heard unaltered and isolated at the structural apex of the composition. The diverse mutations thus lead back to their origins as well as onwards to new aural realizations (variations -> theme -> variations).

Each Jive performance is unique on various micro levels and consistent on the macro level. The performer controls parameter values (including probabilities, density, granulation, morphing, and .- amplitude -both notated and improvised) that affect the processing in real time, and harmonic interjections are algorithmically generated using my program COMP2. Isolated segments of the original sound file were initially processed using Lemur, then further processed and structured using Kyma to establish the macro structure.

Initially composed in 1994 this work has undergone major revisions in 1996, 1997, 1999, and 2000: the process of mutation is dynamic, and perhaps this work will never be finished. In addition to numerous live concert and radio performances, this work is included on "Music from CREAM: Center for Research in Electro-Acoustic Music", CDCM, Vol. 26. This composition is jointly dedicated to Scott Mousseau, trombonist; Kelly Fitz, the principle developer of the Lemur analysis/resynthesis software; and Carla Scaletti, who developed the Kyma software and who has been a true source of artistic support and inspiration for many years. These individuals are also my friends, and my world is much richer because of their presence. (B.B.)

Joji Yuasa (Japan)

JOJI YUASA, born in 1929 in Koriyama, Japan, is a selftaught composer. He first became interested in music in his boyhood. Making the acquaintance of Toru Takemitsu (composer), Kuniharu Akiyama (Musicologist) and others while a premedical student at Keio University in Tokyo, he joined in the 'Jikken-kobo' (Experimental Workshop) in 1952, and turned to devote himself to music. Since then, Yuasa has been actively engaged in a wide range of musical composition, including orchestral, choral and chamber music, music for theatre, and intermedia, electronic and computer music.

Yuasa has won numerous commissions for his works from such institutions as the Koussevitzky Music Foundation, Saarland Radio Symphony Orchestra, Helsinki Philharmony Orchestra, Japan Philharmonic Orchestra, NHK Symphony Orchestra, Canada Council, Suntory Music Foundation, IRCAM and National Endowment for the Arts of the U.S.A., etc.

Yuasa has received a number of scholarships at home and abroad: Japan Society Fellowship(1968-69), Composer in Residence at the Center for Music Experiment UCSD(1976), Berlin Artist Program by DAAD(1976-77), the New South Wales Conservatorium of Music in Sydney(1980), the University of Toronto(1981) and IRCAM(1987), etc.

As a guest composer and lecturer, Yuasa has contributed to the Festival of the Arts of This Century in Hawaii(1970), New Music Concerts in Toronto(1980), Asian Composers League in Hong Kong(1981), concert tour for Contemporary Music Network by British Arts Council(1981), Asia Pacific Festival in New Zealand (1984), Composers Workshop in Amsterdam(1984), Darmstadt Summer Course for Contemporary Music(1988), Lerchenborg Music Tage (1986, 1988), and Pacific Music Festival in Sapporo (1990), etc. Since 1981 through 1994 Yuasa had been actively engaged in music research and education at the University of California, San Diego (currently a professor emeritus). He has also been a guest professor at Tokyo College of Music since 1981 and a professor for the postgraduate course of the College of Arts at the Nihon University since 1993.

8. A Study in White

10:38 1987

The Sea Darkens...

The sea darkens,
voices of seagulls
sound faintly white.

Umi kurete,
kamono koe
honokani shiroshi.

A musical interpretation of Basho's haiku in timbre, sound space and musical poetics. Sound sources are entirely derived from reading of the text and band-limited noise. The text materials were processed for the time-scale expansion using the phase vocoder. The time-scaled version was then analyzed for the creation of time-varying filters. These filters were then applied to complex noisebands of various kinds created by additive synthesis.

I've Lost It

I've lost it.
Lost what?
Have you seen it?
Seen what?
My face.
No.

This piece is concerned with the musical exploration of the psychological impact of this very short poem by R.D. Laing (#4 from "Do You Love ME?").

The structure focuses on a three stage transformation of the text which metaphorically describes a progression from the realm of the conscious to that of the subliminal self. Computer synthesis techniques and sound spatialization are closely linked to this idea.

Final materials were created by additive synthesis of multilayered noisebands and cross-synthesis of these noise bands with text materials, used as time-varying filters.

Also heard in this movement are processed trumpet sounds extracted from improvisations performed by Edwin Harkins. These sounds were time-scaled expanded using the phase vocoder and then combined in dense layerings using an inverse delay technique.

These works were produced at the Computer Audio Research Laboratory at the Center for Music Experiment at the University of California San Diego in 1987. Computer synthesis and sound processing was performed by Robert Scott Thompson. Final recording and mixing was done by Jo Kucera and Robert Scott Thompson. (JY)

PULSE FIELD

SoundScape II

Disc III

Trevor Wishart (United Kingdom)

Trevor Wishart (b. 1946) is an internationally-established independent composer living and working in the North of England. His most well-known works include "Red Bird... a political prisoner's dream" (electro-acoustic), "Tuba Mirum" (1979, music-theater for prepared tuba, electronically-operated audio-visual mutes, tape and actors) and "anticredos" (1980, for six amplified vocalists using extended vocal techniques). He is also well-known for his experimental environmental and participatory multimedia projects of the 70s and for his contributions to music-education, the 'Sound Fun' collection of musical games being recently translated and published in Japanese.

Over the past seven years he has been particularly concerned with exploring new (and existing worldwide) vocal techniques, working on the VOX cycle of vocal works, of which VOX-6 was commissioned for the BBC's 1988 season of Promenade Concerts where the first performance of the complete VOX cycle took place.

Some of his most recent works employs computer technology, for example, to enable the exploration of new rhythmic procedures (VOX 3), and for the transformation of one recognizable sound-source into another (as in VOX-5). He is a founder/director of the "Composer's Desktop Project" making a powerful music-computing tools available to composers using affordable domestic technology and in 1985 published the book "On Sonic Art" exploring the new world of aesthetic possibilities opened up by computer technology.

[Trevor Wishart, Composer's Desktop Project, c/o 11 Kilburn RD., York YO1 4DF, UK]

1) Two Women

14:36 1998

I. Siren -*Margaret Thatcher (quoting St Francis of Assisi)*

"Where there is discord, may we bring harmony."

II. Facets -*Princess Diana (on press photographers)*

"There was a relationship which worked before, but now I can't tolerate it because it's become abusive, and it's harassment."

III. Stentor -*Ian Paisley (on Margaret Thatcher)*

"Oh God, defeat all our enemies. ...we hand this woman, Margaret Thatcher, over to the devil, that she might learn not to blaspheme. And Oh God in wrath, take vengeance upon this wicked, treacherous, lying woman ...Take vengeance upon her O Lord!"

IV. Angelus -*Princess Diana*

"It was a fairy story ...that everyone wanted to work ...It's been worthwhile, yes it has... They were expected to be perfect... (there were 60 to 90 photographers)... I want to be the queen of peoples hearts."

At the end of the twentieth century the two most widely known public voices of Britain were those of two very different women, Margaret Thatcher and Princess Diana.

Two Women explores their very different public personae, through the personality of their voices. These voices are treated in the manner of political cartoons (Thatcher, Paisley) or personal portraits (Diana). All the sounds heard in movements two and four (except its end) and much of the material in movement 3, are derived from the voices of the speakers.

Two Women was commissioned by the D.A.A.D. in Berlin, and received its first performance in a concert celebrating the 50th Anniversary of Musique Concrete, at the Parochialkirche in Berlin, in September, 1998, using the diffusion system of the Berlin Technical University, directed by Folkmar Rein.

2) American Triptych

15:12 1999

The twentieth century was dominated by the American Dream -liberty, technological progress and the pursuit of pleasure, represented here by the voices of Martin Luther King, the astronaut and moon-walker Neil Armstrong, and Elvis Presley.

The fall of the Berlin wall seemed to herald the final triumph of this dream, and signaled to some, in the words of Francis Fukuyama, the "End of History". As we move into the new millennium, how permanent or ephemeral will these icons be ?

American Triptych recreates and transforms these iconic voices. Alongside more conventional techniques, the piece plays with the poor quality of radio reception from space, using the 'Crackly' noise background as source material, and sometimes processing the voices to reduce their sound quality and comprehensibility.

The piece was commissioned by the French Government for the Groupe de Recherches Musicales (GRM), and first performed on January 8th, 2000, as part of the GRM's *Cycle Acousmatique* concert series, in the Salle Olivier Messiaen at Radio France in Paris, on the Acousmonium multi-loudspeaker diffusion system.

3) Tongues of Fire

24:45 1999

Tongues of Fire explores our human aspirations and absurdities, through the transformation of the human voice. The slightly angry, disgruntled, comic muttering with which the piece begins is the source of all sounds subsequently heard in the piece, sounds suggesting drums, water, metallic resonances, fireworks, or entirely imaginary materials or events, all generated through processes of sound transformation on the computer.

There are 4 main sections to the piece. The first lasts for 10 minutes, and ends as a granulating voice changes into a regular ticking sound, like a clock. After a brief pause, section 2 begins when the opening vocalisations are heard again, lead immediately to a rhythmic variation. These materials continue to develop, at one point the voices accumulating into sounds like water around rocks in a stream. I Around 16 minutes, without a pause, we enter section three, when the theme's rhythmic version recurs, ushering in a collection of voice-derived 'machines' and leading to a landscape of soaring noise bands. As these evaporate, the vocal granules become strongly pitched and an extended rhythmic climax culminates in the 'fireworks' transformations. Once these have subsided, the concluding section of reminiscences (the coda) begins.

A more detailed description of the musical form of the piece can be found in 'Sonic Composition in *Tongues of Fire*' in Computer Music Journal, Vol 24, No 2 (Summer 2000).

The music was made on a home computer, using software developed by myself and other participants in the Composers' Desktop Project (CDP) supported by public domain software (Barry Vercoe's *Csound* and Mark Dolson's *Phase Vocoder*). The whole range of processing and texturing tools were used, including several new ones (e.g. spectral tracing, waveset distortion, sound-shredding), many of which were developed specially for this piece.

The final mixdown was planned at the GMEB studio in Bourges, France, but realised at home with the CDP software. This planning period was made possible by a commission from the GMEB studio and the assistance of the British Council. The premiere took place at the 1994 *Synthese* Festival in Bourges. *Tongues of Fire* was awarded the Golden Nica for computer music at the Linz Ars Electronica in 1995.

4) Vox 5

6:06 1986

In 1980 I began the composition of a cycle of vocal works collectively entitled "VOX". Most of these works are amplified vocal quartets with or without tape accompaniment. The whole cycle is intended to be performed together, but each work in the series *may* stand on its own in performance.

Poetically speaking, the cycle is concerned with the creation and disintegration of human culture, and its spiritual nature. The poetic content of the cycle is strongly influenced by the imagery of the Shiva myth, but draws on many other sources of inspiration in its six movement span.

VOX-5 forms the penultimate movement of this work, and is the only entirely electro-acoustic piece in the VOX series. It presents the image of a single "supervoice" located at the front center stage, whose utterances metamorphose into natural events... the sounds of crowds, bells, bees and other creatures, and less specific sound-events... poetic images of the creation and destruction of the world contained within one all-enveloping vocal utterance (the "voice of Shiva").

The idea for a work involving the detailed metamorphosis of the human voice was submitted as a project to IRCAM in 1979-80, when I was becoming aware that computer technology should make possible the realization of a particular vision I had of the plastic manipulation of sound materials. As a result, I was invited to the IRCAM introduction course in 1981 and there discovered the particular sound analysis tools I needed. During the course I was approached about an IRCAM commission but events were to conspire against me. During the following four years IRCAM's old computer finally fell from grace and a new one was installed involving a complete rewrite of much of the software. It was only in 1986 that the (now upgraded) Phase Vocoder sound analysis program was ready for me to use once again. *VOX-5* was thus finally commissioned by IRCAM and produced there during 1986.

The piece was made using computer programs I wrote to manipulate sound-analysis data obtained from Mark Dolson's Phase Vocoder program. My own programs permitted continually changing vocal spectra to be stretched (making them bell-like) or interpolated with the spectra of natural events. Both the Phase Vocoder, and my own programs have subsequently been made available on the Composer's Desktop Project (running on the Atari-ST) and will, I hope, soon become familiar to a much larger number of composers.

The piece also makes special use of sound-spatialisation (in surrounded sound) so that natural events appear to be physically ejected from the "mouth" at the front center stage, circling and scattering around the space of the auditorium to converge again at the front center stage for the start of a new syllable. I have tried to retain what I could of this aspect of the piece in this stereo reduction.

I would particularly like to thank Thierry Lancino, Etienne Bultingaire and the many other people at IRCAM who helped me in the realization of this piece, Mark Dolson for the Phase Vocoder program itself, and the Ralph Vaughn Williams Trust & the Arts Council of Great Britain for their financial support during the preparatory stages of the project. (TW)

Computer Sound Transformation

A personal perspective from the U.K.

Trevor Wishart

Introduction

For the past thirty years I have been involved in developing and using sound transformation procedures in the studio, initially working on analogue tape, and then through various types of computer platforms as computer music came of age. Over these years I've developed a very large number of procedures for manipulating sounds. Being a composer, I refer to these processes as musical instruments and they are developed as part of my musical work. However, I have not been prominent in publishing this work in academic journals as I'm primarily a working artist. Nevertheless, the processes (and source code) have all been available to others with the facilities to use (or develop) them through a composers' cooperative organisation based in the UK, the *Composers' Desktop Project*. As there has been a recent surge of interest in the Phase Vocoder¹ as a musical resource, I've been advised by friends in the academic community to put my contribution to these developments on record.

Origins

The earliest successful transformations I developed can be heard in the piece *Red Bird* (1973-77)². The musical structure of the piece was conceived in terms of such transformations between sound types, but techniques for achieving this had to be developed on an ad hoc basis - through discovering what was practicable with the facilities available in the local analogue studio. The transformations, all from the voice to other sounds, include 'lis' (from the word 'listen') to birdsong, 'rea' (from the word 'reason') to animal-sounds, 'reasonabl-' to water, and various machine-like events constructed from vocal subunits. They were achieved by combining the elementary studio facilities available (tape editing, mixing, mixer eq) with extended vocal techniques (developed while working as a free improvising vocal performer³). A discussion of the approaches used in *Red Bird*, and the concept of Sound Landscape, can be found in *On Sonic Art*⁴. A more detailed description of the composition of this piece can be found in *Red Bird, A Document*⁵.

Realising that these notions of spectral transformation could in principle be generalised in a computing environment, when major computer music facilities became available in Europe (at IRCAM in Paris) I submitted a proposal for a work based on vocal transformation and was invited on the induction course in 1981. There I discovered a potential transformation tool (Linear Predictive Coding⁶), and was invited to compose a work. Unfortunately the mainframe system at IRCAM, and much of the indigenous software, was changed immediately following this visit, and the project could not proceed until 1986, when the research and composition for *Vox 5* was finally commissioned. It was suggested to me that the CARL Phase Vocoder (Moore, Dolson) might be a better tool to use, but no-one at IRCAM at that time had inside knowledge of the workings of this program, so I took apart the data files it produced to work out for myself what was going on.

I eventually developed a number of software instruments for the spectral transformation of sounds which were then used to compose *Vox 5*. These instruments massaged the data in the analysis files produced by the Phase Vocoder. The most significant of these were **stretching the spectrum** (see below) and **spectral morphing** – creating a seamless transition between two different sounds *which are themselves in spectral motion*. These are described in a Computer Music Journal article⁷.

Establishing a personal computer based development environment in the U.K.

Returning from IRCAM to the UK musicians were faced with an entirely different development environment. There was no independent national research centre for music – music research was confined to University music departments. Most of these were small and very poorly funded – they were seen as primarily sites of humanities research and hence could not attract the money required for advanced computing equipment, which at that time was very expensive. A number of departments had PDP-11 computers accessible to a few research students and staff – updating this equipment was a constant financial worry.

During 1986-7, a group of composers (initially Andrew Bentley, Archer Endrich, Richard Orton, and myself) and developers (Martin Atkins and David Malham) based in York, (and all ex-graduates or current staff of the University of York), working in financially astringent circumstances⁸, ported Richard Moore's *Cmusic*⁹ and the Mark Dolson Phase Vocoder to a desktop platform. I then implemented the instruments developed at IRCAM. The platform chosen at the time was the Atari ST as this machine was *just* fast enough to be able

to play stereo soundfiles running at a sample rate of 48,000 – at that time the Macintosh was not fast enough¹⁰. This was the start of a larger project to make computer music tools available to composers and institutions without significant financial resources. This project was called the *Composers' Desktop Project* (CDP). In fact the idea of a user-group development-environment based on personal computers originated out of necessity in this environment, predating subsequent developments at IRCAM and elsewhere by several years.

The instruments ran initially in a command-line environment (a graphic environment was developed later by Rajmil Fischman and others working at the University of Keele). They were later ported from the Atari ST first to the Atari TT then to the PC where they ran (and, in 2000, still can be run) under MS-DOS. Almost all later platforms were chosen partly for their low cost – many CDP users, including myself, did not have departmental salaries or budgets to buy expensive personal computers or to constantly update them. The software also ran on the Silicon Graphics machines at the University of York and elsewhere. More recently two different graphic interfaces have been developed to drive the software, my own contribution being the *Sound Loom*, written in TK/TCL so that it is potentially portable from one computer platform to another.

Immediately after the IRCAM project in 1986, working in the CDP environment, I developed a large number of other spectral transformation tools using the Phase Vocoder data as a starting point. Subsequently, I also created a number of original time-domain instruments (e.g. **waveset manipulation**, **grain manipulation**, **sound shredding**) and extensions of existing instruments (e.g. **brassage**¹¹). In 1994, a complete description of all the spectral, time-domain and textural transformation possibilities available on the CDP system was published in the book *Audible Design*¹². The book has been used subsequently as a source by other software developers (for example by Mike Norris who implemented many of my waveset manipulation procedures on the Macintosh, now available from *Sound Magic*) some of whom may well have had access to the CDP code.

I would stress that the work of researchers and developers at IRCAM (notably Steve McAdams who introduced me to contemporary psycho-acoustic research on the 1981 induction course and, later, Miller Puckette), and at the G.R.M.¹³ – where I attended the composition course in 1993 – were an important source of knowledge, ideas and inspiration for my work. However, when the sound morphing and spectral stretching instruments for *Vox 5* were originally developed as part of the public domain system shared by IRCAM, Stanford and other major sites, IRCAM's research priorities were focused elsewhere. The instruments did make their way to the USA via the University of Santa Barbara and Dan Timis (the resident computer wizard at IRCAM when I was working there). Later IRCAM did decide to pursue Phase Vocoder based transformation and the *Super Phase Vocoder* (SVP) group was established (the basis of the later *AudioSculpt*). During the development phase of SVP, when the CDP spectral transformation suite was already quite large, I was a visitor at IRCAM, and discussed possible transformational approaches with some of the team working on the program.

The pioneering development work of the CDP has remained largely unknown or forgotten about as the vast majority of the Computer Music community eventually opted for the Macintosh as the machine of choice. Furthermore, being developed primarily by a group without official financial support from within the University infrastructure, the project was always short of resources. An initial grant from the Gulbenkian Foundation helped propel us forward in the first 18 months, but this was exceptional. Nevertheless the CDP continued to make both its instruments and its code available to interested users and developers. I am indebted to the work of many other developers (including in particular Richard Orton and Richard Dobson) and to the C.D.P. Administrator, Archer Endrich, for continuing to promote, support and develop the system, and make it more accessible to users, despite the lack of financial rewards. The system has tended to be adopted by independent composers or small educational institutions with limited budgets. However, the source code has been available at a number of UK (and other) University sites at different times, even after these moved to a primarily Mac-based studio system. And some institutions, notably the Institute of Electronic Music in Vienna, developed sophisticated graphic interfaces of their own.

The Instruments – (1) Spectral Transformation using the Phase Vocoder

There is not enough space to describe all the C.D.P. procedures in this article, so I will describe only the more interesting ones, or those not available elsewhere. Full descriptions of all these processes can be found in *Audible Design*.

In the first phase of development (post 1986), many spectral transformations were implemented in the Atari environment. These included **spectral morphing** (see above), and various types of **spectral shifting** and

spectral stretching, from a linear shift (adding a fixed value to all frequency data, thus e.g. making a harmonic spectrum become inharmonic), through a multiplication (preserving harmonic relations between data, but transposing the pitch – but with the ability to split the spectrum at a given frequency, and hence produce doubly-pitched output sounds) to differential multiplication of the data (**spectral stretching**, a more sophisticated way to convert harmonic into inharmonic spectra, used in *Vox 5* to convert vocal sounds into bells). **Time-variable time-stretching** procedures were also implemented, more general than those existing in the CARL Phase Vocoder implementation itself. These are important if one wishes to preserve the attack characteristics of a sound while time-stretching the sound (as a whole) by a large factor.

Spectral cleaning was developed using a comparative method – part of the spectrum deemed to be (mainly) noise (and, in some options, part of the spectrum deemed to be clear signal) being compared with the rest of the signal and appropriate subtractions of data or other modifications made.

From a musical point of view, the most innovative early new developments were **spectral banding**, a rather complicated 'filter', which enabled the spectrum to be divided into bands, and various simple amplitude-varying (and in fact frequency-shifting) processes to be applied to the bands, **spectral tracing** and **spectral blurring**.

Spectral tracing simply retains the N channels with the loudest (highest amplitude) data on a *window-by-window basis*. If N is set to c. 1/8th the number of channels used in the PVOC analysis, this can sometimes function as an effective noise reduction procedure (the value of N which works best depends on the signal). When N is much smaller than this, and a complex signal is processed, a different result transpires. The small number of PVOC channels selected by the process will vary from window to window. Individual partials will drop out, or suddenly appear, in this select set. As a result, the output sound will present complex weaving melodies produced by the preserved partials as they enter (or leave) the select set. This procedure is used in *Tongues of Fire*¹⁴.

Spectral blurring is an analogous process in the time dimension. The change in frequency information over time is averaged – in fact, the frequency and amplitude data in the channels is sampled at each Nth window, and the frequency and amplitude data for intervening channels *generated* by simple interpolation. This leads to a blurring or 'washing out' of the spectral clarity of the source.

Arpeggiation of the spectrum (a procedure inspired by vocal synthesis examples used by Steve McAdams at IRCAM to demonstrate aural streaming) was produced by 'drawing' a low frequency simple waveform onto the spectrum. This oscillator rises and falls between two limit values – values of frequency in the original spectrum – specified by the user. Where this waveform crosses the spectral windows, the channel (or surrounding group of channels, or all the channels above, or all those below) is amplified. **Spectral plucking** was introduced to add further amplitude emphasis (and an element of time-decay of the emphasized data) to the selected channels.

A number of other processes (such as **spectral freezing** and sustaining of the spectrum at particular moments, and **spectral interleaving**, timewise, the spectra from different sources) were implemented in this early phase.

Tuning the spectrum was introduced a little later. **Tune spectrum** works by selecting channel data lying close to the partials of a specified set of pitches, and moving the frequency of that data to (or towards) the desired partial frequency. The spectrum can also be traced (see above) before doing this. **Choose partials** selects channels which should contain frequencies close to those of a specified set of partial frequencies (harmonics of, odd harmonics of, octaves above, linear frequency steps away from, or a linear frequency displacement from harmonics of a given fundamental). As analysis channels above the 21st are sufficiently narrow to focus on a semitone band of frequency or less, the channel number itself is sufficient to grab the desired partials.

After discussing possible algorithms with the SVP developers, I implemented some of their ideas for spectral filters (defining filters in a more conventional way than the banding procedure described above), and implemented various types of **low pass**, **high pass**, **band pass**, **notch** and **graphic e.q. spectral filters**, together with a **chorusing** procedure suggested by Steve McAdams' work (introducing jitter into the partials data).

After discussions with Miller Puckette about his work on tracking the pitch produced by instrumentalists performing in real time, procedures to **extract the pitch** of PVOC data were finally developed into a useful form, and instruments to correct the data, to transform the pitch data (**quantise**, **shift**, **vibrato**,

approximate, or randomise the pitch, and **exaggerate, invert or smooth the pitch contour**), and **apply the pitch to other sounds**, were developed.

At the same time, the **extraction of formants** from the PVOC data was implemented satisfactorily for the first time within the CDP environment. This enabled the **inner glissando** procedure to be developed. Here, the process retains the time-varying spectral envelope (the formant envelope) of the sound, but replaces the signal itself by an endlessly glissandoing Shepard Tone signal¹⁵.

Shuffling the sequence of windows, and **weaving** a specified path (including possible repetitions and omissions) through the windows were implemented at an earlier stage. A '**drunken-walk**' through the analysis windows was suggested by Miller Puckette's work in MAX. Miller also suggested the procedure of **octave pitch-shifting** through selective partial deletion, while Oyvind Hammer of NOTAM¹⁶ proposed **scattering** of the spectral data.

The Instruments – (2) Original Time-domain procedures

Alongside this spectral transformation work, a large number of time-domain procedures have been developed for sonic composition.

Waveset distortion was developed for the CDP while composing *Tongues of Fire*. I defined a waveset as the signal between any pair of zero-crossings. With a simple sine-wave the waveset corresponds to the waveform. But even with a harmonic tone with very strong partials, the waveform may cross the zero more than twice in a complete cycle. In this case the wavesets are shorter than the waveform. With complex signals (e.g. speech) containing noise elements, the definition of the waveset produces many varieties of technically arbitrary, but potentially musically interesting, artefacts. A whole suite of procedures was developed to manipulate wavesets. I have used three at prominent moments in compositions.

The first of these involves replacing each waveset with a standard-shape waveform (e.g. a sinewave). This produces a very pronounced spectral transformation of the source, but one where the zero-crossings of the result are exactly aligned with those of the source. It is thus possible to use a simple mixing procedure (another CDP process, **inbetweening**, does this) to produce a sequence of sounds intermediate between the source and the new sound. These two procedures were developed and used to produce the 'Wood' to 'Drum' transformations in *Tongues of Fire*.

The second, **waveset averaging**, involves extracting the shape of each waveset, and then averaging this shape over a group of N adjacent wavesets. Again, this produces an extreme modification of the source (usually a relatively harsh sound and often a transformation so distant from the source that little audible connection is apparent!) and is used in the 'fireworks' transformation immediately after the rhythmic climax of *Tongues of Fire*. The article *Sonic Composition in 'Tongues of Fire'*¹⁷ discusses this in more detail.

Finally, **waveset repetition** generates unusual pitch artefacts in complex signals. In particular, any small fragment of a noise signal, if repeated a number of times, generates a tiny pitch artefact. The second movement of *Two Women*(18), based around the voice of Princess Diana, uses this instrument to ornament and fragment the vocal material, different repetition rates being used in the left and right channels to produce an irregular panned echo/delay, with **iteration** (see below) being used as a reverb-like process to sustain various pitch elements which arise from the first procedure.

Familiarity with the G.R.M.'s work on the classification of sounds¹⁹ drew my attention to the difficulty of time-stretching iterative sounds i.e. sounds like a rolled 'r' or a low contrabassoon pitch, where the sound is perceived as a series of individual attacks. In (realistic) time-stretching, we need to avoid time-stretching the event attack itself as stretching this can dramatically alter our recognition (or mental classification) of the source. Hence we would usually apply a time-stretching parameter which itself varies through time, being 1.0 (no stretch) during the attack, and increasing rapidly to the desired stretch ratio immediately after the attack. With iterative sounds, however, we are faced with a whole stream of attacks, and this simple solution is not available. To deal with these a number of **Grain manipulation** instruments were developed. These instruments extract the (loudness) envelope of the sound by gating it. Using this envelope the source can be fragmented into attacked elements and these elements repositioned in time (or in pitch or both) in the output sound. (The process can also track the *overall* amplitude of the source and adjusts the gate level for the grains correspondingly).

This approach also allows one to **reverse an iterative sound**. Most sounds have an asymmetric form with a (relatively) loud initiating event at the beginning, and a tailing away to zero at the end (these features

themselves can have a vast number of forms). Playing a sound backwards therefore rarely results in a sound that we recognise as being a close relative of the original. Only sounds of (on average) steady amplitude which have attack and decay as inverses of one another e.g. a slow fade in matching a slow fade out, will appear similar when we reverse them. Iterative sounds are particular difficult in this respect as every attack within them gets reversed. If we extract the grains and then sequence them in the reverse order, without reversing the grains themselves, we achieve a convincing sense of retrograding the sound without change of source recognition.

Similar sound-structural considerations apply to extending sounds using looping procedures. Recording a rolled 'r', isolating a single tongue-flap sound, then looping it to generate a 'rolled-r' at the same rate as the original produces an entirely mechanical artefact sounding completely unlike the original rolled-'r' source. Natural 'repetition' is usually micro-inexact. Thus the **Iteration** instrument allows a signal to be looped, but imposes (user-controlled) random pitch, amplitude and timing fluctuations on the repeated elements. Using Iteration the sound generated from the single flap can be extremely natural (but, of course, more distant transformations are also possible). Grain manipulation and Iteration were both developed and used while composing *Tongues of Fire*.

Various instruments allow scrambling of a sound through simple editing and rejoining of the edited segments. In particular, in **Sound Shredding**, I cut up a sound (at random time-points) into a number of separate segments, shuffles these segments, and reassembles them to the exact duration of the original. The *resulting* sound is then cut up again, differently, and the reassembly repeated. This process can take place any (user-specified) number of times. Applying the process about 400 times to rapid speech material produced a sound very similar to that of water running around rocks in a small stream, and this transformation can be heard spanning a 2 minute section of *Tongues of Fire*.

The Instruments – (3) New perspectives on existing procedures

What are now referred to as **granular synthesis** procedures, but applied to input sources, were developed at any early stage of the CDP. (The CDP instruments are almost exclusively concerned with the transformation of existing sources, rather than with synthesis). These are described as **texture generation** instruments. Initially these procedures generated scripts for a simple *Csound*²⁰ instrument which read (any number of) input sounds and then distributed them in the texture according to the instructions given by the user. The dependence on *Csound* scripts was superseded by direct use of the soundfiles themselves.

Texture Generation was (and is) able to use an arbitrarily large number of input sounds, to generate a stream of events where all the following parameters can themselves vary through time:

- the average time between event repetitions (the density of events) *or* the specification of a sequence of event times
- the scatter (or randomisation) of event timings (which means the instrument can generate anything from dance-music-like regularity to complete arhythmicity)
- a quantisation grid for times (or none)
- a specification of which range of input sounds are to be used
- the range and range-limits of pitch-transposition of the events
- the range and range-limits of event amplitudes
- the range and range-limits of durations of the individual events in the texture
- the spatial centre of the texture on the stereo stage, and its motion
- the spatial bandwidth of the texture on the stere
- o stage. A neutral texture is generated from independent events over a transposition range without regard to tuning, tempering etc. However, the texture can also be generated...

- over a harmonic field (not necessarily tempered) which can itself change through time
- clustered into groups of events of specified or random pitch-shape
- formed from a line with arbitrary or specified decorating patterns (which themselves have properties with independent parameters of their own).

The texture generation instrument are used extensively in all my sonic art pieces since *Vox 5*.

The **brassage** techniques extensively and powerfully developed by the G.R.M. and implemented (in various guises) in *G.R.M. tools* I have independently implemented in the CDP environment. The G.R.M. have divided brassage into a series of sub-categories based on musical outcomes (based on many years of musical experience), providing the user with control of parameters over a musically meaningful range for each resulting tool. I admire this approach and accept that it is much more accessible to the user who is a computer *user* rather than a programmer. However, compositionally I often find it interesting to explore the areas where a process pushes against its limits and falls over into another area of perception. E.g., if the size of grains used in a time-stretching brassage routine (as used in the *harmonizer*) exceeds a certain threshold we begin to hear the resulting sound as a rapid collage of elements rather than as a simple timestretch. Hence the CDP brassage routine offers **timestretch**, **pitch-shift**, **granulation** and **source-scrambling** as independent modes, but also allows access to *all* the parameters of the brassage process at the same time.

- timestretch or compression and its range
- segment density and its range
- segment size
- segment transposition and its range
- segment amplitude and its range
- segment splice-length
- segment spatial position
- segment spatial scatter and its range
- segment timing randomisation
- segment search-range in the source

where every parameter can also be varied in time.

The process can also be applied to more than one input sound.

Modifying the loudness contour (envelope) of a sound is a fairly standard procedure.

Envelope extraction and superimposition (written by Richard Orton) and **envelope manipulation** (which I developed from Richard's programs) were some of the earliest processes to be developed in the CDP.

These allow the envelope to be extracted at different resolutions (e.g. a tremolo sound which crescendos has a small-scale, rapidly-varying loudness envelope defining the tremolo, and a large scale overall envelope defining the crescendo. These can be extracted separately using a different window-size for the envelope extraction). The envelope can then be changed (**envelope warping** – normalise, limit, compress, exaggerate, corrugate etc), and applied to the original, or a different sound. Even applying the envelope comes in two varieties. Simple envelope superimposition is found in most mixing packages (often implemented by drawing the envelope), where an envelope contour is imposed on the existing sound. However, we can also **envelope replace**, where the new envelope replaces (rather being superimposed over) the envelope of the processed sound. In this case we force the original sound to have a flat level throughout (treating in a special way points in the sound where the envelope approaches zero), then apply the new envelope to the flattened sound.

Enveloping can obviously be used to produce tremolo. More radically, in a reversal of the Karplus-Strong synthesis procedure²¹, we can **produce a plucked attack** on an existing sound. (The procedure involves finding the first steady-pitch wavecycle in the source – assuming there is one – then preceding it by copies which become increasingly loud and noisy). This process was developed and used in *Tongues of Fire* but is not 'automatic' in its operation and is quite tricky to sculpt.

Mixing is now usually carried out in a graphic environment displaying pictorial representations of waveforms (and envelope and panning contours) in tracks on the screen. The CDP Submix instrument (which I developed from existing CDP mixing facilities developed by Andrew Bentley and others) is based on a much earlier paradigm, mixing from a (text) list of soundfiles. Despite being much less friendly than screen based mixing, this does allow for some powerful global procedures to be applied to mixes. The CDP submix should be thought of as a way to generate a new event from several source sounds, rather than as a conventional track-mixing environment (although I do *all* my mixing in this environment).

First of all, there is no limit to the number of 'tracks' used (apart from the memory space of the computer). Any number of sounds can be superimposed. Secondly, global operations on the mix are available, from simple features like doubling (or multiplying by any number) the distance between event onsets, or randomising them (very slightly or radically), to randomly swapping around the sound sources in the mix, automatically generating particular timing-sequences for event entry (from regular pulses, to logarithmic sequences etc.), or redistributing the mix output in the stereo space in a new, user-defined way.

More specialised procedures involve **synchronising the mix events** (e.g. at their mid-point, or end, as well as at their start), or **synchronising the event-attacks** (where the search-window for the attack peak can be delimited by the user). These latter procedures are particularly useful for building complex sonorities out of less rich materials e.g. by superimposing transposed copies of the sound (over the original duration, or in a different duration) onto the original. Similarly, **Inbetweening** allows the generation of sets of closely related sonorities (see above), while **Cross-fading using a balance function** allows a sound to gravitate between its original form and a transformed variant in a time-varying way.

There are no original filter algorithms in the CDP, but some powerful filter design frameworks are available. In particular **filter varibank** allows one to define a filter over a set of pitches which itself varies in time, where each pitch element has an associated amplitude (which can go to zero so that pitches, or moving-pitch-lines, can be 'faded out' or cut). The number of harmonics of those pitches (and their relative level) can be specified (these serve to define further individual filter frequencies), and the filter Q can also vary through time. This filter-building algorithm was developed and used during the composition of *Fabulous Paris*²².

Finally, at a time when synthetic bell-sounds seemed to dominate computer music works, I decided a bit of grittiness would be welcome, and developed instruments which **lower the resolution** of the sound (reducing the effective bit-representation, or the sampling rate), **ring modulate** and **inter-modulate** sources, and even attempt (rather unsuccessfully) to simulate manually **scrubbing a tape over the heads** of an analogue tape-recorder.

Additional Aids to Composing

Over the years I have also developed a large number of utilities which I find indispensable as a composer, starting with an instrument which **searches a tape of source recordings and extracts significant segments** from surrounding silences or clicks, using gating, and selection parameters specified by the user. Next there are facilities to **compare sounds**, or **compare the channels of a single sound**, (are they the same, or almost the same to within specified limits?), to **balance the level of sources**, or the channels of a source, to **invert (or narrow) spatial orientation**, and to **invert phase** (which, apart from anything else, can be used to gain more headroom in a mix).

In the various instruments described in this article, almost all parameters can vary through time. Data for this is provided in simple textfiles containing time+value pairs. To aid in working with such data, hundreds of automatic data-creation and data-modification processes have been implemented, and are made available in the **Table Editor**, now also driven from the graphic interface. I have used it to design and modify complex filter specifications, to generate 'random funk' accentuation patterns as envelopes over an existing stream of events (*Birthrite A Fleeting Opera*²³) – and even to do my tax returns(!). As an additional aid, a **Music Calculator** allows easy conversion between a great variety of musical and technical units.

The future...

Currently (October, 2000) all this software works in non-real-time in a PC environment, mainly with 16-bit soundfiles. The next version (early 2001) will handle all currently available soundfile formats. In addition the sound-buffering is being modified so that those instruments which could, in principle, run in real-time can be enabled to do so. There is also no reason (apart from lack of time or resources) why this entire environment should not run on the Macintosh, or any other platform, as it is written in 'C' and TK/TCL. These two latter tasks could be accomplished without great difficulty by someone with the time and enthusiasm to commit.

Footnotes

1. A process which divides the source sound, timewise, into tiny (overlapping) 'windows', performs a fourier analysis on each window to determine the spectrum of the sound in the window, then deduces the frequency of the components in the window by considering the change of phase from one window to the next.
2. This can be found on the CD *Red Bird: Anticredos* (EMF CD022)
3. The vocal techniques were documented in a catalogue of extended vocal techniques, *The Book of Lost Voices* (1979), later incorporated as a chapter in the book *On Sonic Art* (see footnote 4).
4. Originally published privately in 1984: republished (edited by Simon Emmerson) by Harwood Academic Publishers, 1996. (ISBN:371865847X)
5. Originally published privately by Trevor Wishart, 1978. See publications.
6. A procedure developed for the analysis and resynthesis of speech. It first differentiates noise and pitch based elements in the source. It then generates a sequence of filter specifications for consecutive moments in the source which, when applied to a buzz (rich in harmonics) tone or a noise source, reproduces the original sound.
7. *The Composition of Vox 5 at IRCAM*: Computer Music Journal Vol. 12: no 4: Winter 1988.
8. Despite the involvement of staff members, no financial support was forthcoming from the University authorities at that time. I donated 100 to help pay for materials to build the first 'SoundSTreamer', the buffering device, designed and built by Martin Atkins and David Malham, which enabled us to get sound in and out of the ROM port of the Atari ST.
9. General purpose software sound-synthesis environment.
10. To all those chuckling into their anoraks I would add that the Atari ST was 100% reliable. It simply never crashed in all the years it was used.
11. A process that cuts the sound, timewise, into segments (possibly overlapping, possibly separated in time), then reconstructs the sound by splicing these back together in different ways.
12. Published by *Orpheus the Pantomime*, UK. (ISBN : 0951031317)
13. Groupe de Recherche Musicale, Paris.
14. *Tongues of Fire* is available, by itself, on CD, or on the album *Voiceprints*.
15. A tone which appears to rise (or fall) in (chromatic) pitch forever while remaining in the same tessitura.
16. The Norwegian Centre for Computer Music.
17. Computer Music Journal: Vol 24 No 2 Summer 2000
18. On the CD *Voiceprints*.. See publications.
19. *Solfège de l'objet sonore* by Pierre Scaeffe and Guy Reibel.
20. General purpose software sound-synthesis environment, by Barry Vercoe.
21. A compact algorithm to synthesize plucked-string sounds of many types.
22. On the CD *Or Some Computer Music: 1* from *Touch*.
23. *Birthrite A Fleeting Opera* with Max Couper: River Thames, London, 2000. A score of *Birthrite* is also available, for dryland performance.

PULSE FIELD

SoundScape II

Disc IV

Roger Reynolds (United States)

Roger Reynolds was educated in music and science at the University of Michigan. His compositions incorporate elements of theater, digital signal processing, dance, video, and real-time computer spatialization, in a signature multidimensionality of engagement. The central thread woven through Reynolds' uniquely varied career entwines language with the spatial aspects of music. This center first emerged in his notorious music-theater work, *The Emperor of Ice Cream* (1961-62; 8 singers, 3 instrumentalists; text: Wallace Stevens), and is carried forward in the VOICESPACE series (quadrasonic tape compositions on texts by Coleridge, Beckett, Borges and others), *Odyssey* (an unstaged opera for 2 singers, 2 recitants, large ensemble, multichannel computer sound; bilingual text: Beckett), and JUSTICE (1999; soprano, actress, percussionist, computer sound and real-time spatialization, with staging; text: Aeschylus).

In addition to his composing, Reynolds' writing, lecturing, organization of musical events and teaching have prompted numerous residencies at international festivals. He was a co-director of the New York Philharmonic's Horizons '84, has been a frequent participant in the Warsaw Autumn festivals, and was commissioned by Toru Takemitsu to create a program for the Suntory Hall International Series. Reynolds' regular masterclass activity in American universities also extends outward: to the Sibelius Academy in Helsinki, IRCAM in Paris, to Latin America and Asia, to Thessaloniki. His extensive orchestral catalog includes commissions from the Philadelphia, Los Angeles and BBC Orchestras.

In 1988, perplexed by a John Ashbery poem, Reynolds responded with *Whispers Out of Time*, a string orchestra work which earned him the prestigious Pulitzer Prize. Critic Kyle Gann has noted that he was the first experimentalist to be so honored since Charles Ives. Reynolds' writing, beginning with the influential book, *Mind Models* (1975), has appeared widely in Asian, American and European journals, while his music, recorded on Auvidis / Montaigne, Mode, New World, and Neuma, among others, is published exclusively by C.F. Peters Corporation, New York.

In 1998, Mode Records released WATERSHED, the first DVD in Dolby Digital 5.1 to feature music composed expressly for a multichannel medium. "As in all art making, there is a kind of 'alchemy' going on [producing] a richly nuanced and authentic result," wrote Richard Zvonar in *Surround Professional*. In the same year, The Library of Congress established the Roger Reynolds Special Collection. Writing in *The New Yorker*, Andrew Porter called him "at once an explorer and a visionary composer, whose works can lead listeners to follow him into new regions of emotion and meaning."

1) The Vanity of Words

20:13 1986

During 1985 and 86, I composed two extended pieces of computer music using F. R. Moore's cmusic unit generator, space and the editorial algorithms SPLITZ and SPIRLZ. The first, *Vertigo*, was based upon performed piano sounds, the second, *The Vanity of Words*, employs vocalists Philip Larson's reading and singing of a text that I extracted from Milan Kundera's novel, "The Unbearable Lightness of Being". These two compositions explore the effect of spatially controlled differentiation on musical and speech materials both from structural and expressive perspectives. The basic materials were recorded as performed so that it would be possible for me to capture and then use compositionally the interpretative volition which performers superimpose upon musical notation's objective specifications.

My adaptation of Kundera's text fall into three sections. Larson read each in a distinctive manner (aspirate, deeply intoned, declamatory). A few sung phrases were also recorded. Such distinctions help to differentiate the proportional design of the composition, its transformational mosaic formal plan. Each "tile" of the musical mosaic is custom-designed. So too are their successions, so that groups of tiles exhibit larger trends, both in terms of temporal structure and spatial character. The spatialization of multiple, simultaneous layers of textual fragments markedly improves their intelligibility. It mitigates the degree to which coincident, or nearly

coincident elements obscure one another as well as the success with which a listener can register and apprehend successive fragments that occur with extreme rapidity. Perhaps an analogy with the distinctions between normal photographs and holographic representation could be made. On successive encounters with sound materials presented in this fragmentary, layered fashions, a change in listening perspective allows quite different information to be clearly registered.

This twenty-one-minute stereophonic work was realized at the Computer Audio Research Laboratory at the University of California, San Diego. It could not have been accomplished without the very important contributions of my musical assistant John Stevens.

Christian Calon (France / Canada)

His sound installation projects, radio or stage works are rooted in a common exploration of the listening experience. Spatial sound projection, the acousmatic conception of sound forms and the importance of listening contexts are at the heart of his creative research leading to a on-going process of investigation of new technologies.

His first works emerged in Canada and soon brought him international attention. In 1991 he was appointed to the musical direction of the GMEM (France) and in 1995, he was a guest of the DAAD in Berlin where he lived for several years. His artistic research lead at that time to the development of a widely used graphical multichannel spatialisation system based on the principle of holophony.

In parallel in order to further his interest in the narrative forms through sound he turned to writing for the radio medium. His present work focuses on the ideas of Time, Presence and Transformation. A free-lance artist he now lives in Montreal and develops his creation projects across the Atlantic. Some recent landmarks:

— The Ulysses project (1997-00), radio and stage work for voices and multitrack sound projection. It was awarded the prestigious Lynch-Staunton prize (Canada Council) and at the unanimity of the jury, won the Grand Prix Marulic of the European Broadcasting Union (UER/EBU) 1999.

— Die Zimmer der Erinnerung (*The rooms of memory*) (1997), radio essay (Hörspiel) on Time and creation, after the life and works of Marcel Proust. Commissioned by the German National Radio (DLR).

— The standing man (1994-96), architectural sound installation for a child's voice and three-dimensional acoustical fields (24-channel spatialization). After François Villon's *Épitaph*. Commission of the Inventionen Festival, Berlin.

— Les corps éblouis(1994), acousmatic concert work (exploration of the the guitar instrument), was awarded the 2nd prize at the Bourges International Competition (1994) and Distinctions at the 1995 and 1997 Ars Electronica.

His work is presented worldwide and received honours in major international competitions : Italy - Prix Russolo, USA - Newcomp Prize, UER /EBU - Prix Marulic, Germany, Austria - Ars Electronica, France - Bourges Competition. His work received assistance from the Canada Council and le Conseil des Arts et des Lettres du Québec. His music is published by Empreintes Digitales (Montreal).

2) The Ulysses Project

54:00 1998

to my father, Ulysses of a new world

In *The Ulysses Project*, the ancient myth is present as a network of relations and a fountain of symbols in which to draw and which are subject to processes of transformations. In the background of this contemporary transposition, one can find traces and inspirations of the original poem attributed to Homer as well as i of Joyce's interpretation at the beginning of the century.

In sounds as well as in text images, theses traces are organized around several paths.

-Language which is our tool to apprehend the universe

- Writing - the story-teller. The intercessor and red-thread between past and future.
- Migration - the (non) return - the stranger - Identity. An autobiographic quest.
- Matter. The knowledge of the world and limits of our perception
- Space matter in its opposite perspective. The Mother of all of us.
- God. Reality and virtuality
- Love The supreme hand which triggers and calms tempests - Time.

The main characters around Ulysses and Penelope are Homer and Athena (the mediatic voice). As listeners, sheltered in our homes, we do experience this acoustic adventure revealed to us, and thus become the potential and perfect Telemachus.

These 24 sequences are an homage to the creators of the 24 sequences of the cinema...for the ear .

Here we begin. There is a book - or a voice- and a bed.

with the voices of :

Shelley Hirsch, Nada Laukam-Josten, Wolfgang Michael. Gerry Wolff.

Uli Aumüller, Detlef Baltrock, Clarisse Cossais, Irma Laukam-Josten, Jonas Maron, and Gotz Naleppa

guitar material: Rene Lussler

- 1 *The men*
- 2 *Invocation*
- 3 *Overture*
- 4 *The tale*
- 5 *Jupiter*
- 6 *Circe*
- 7 *Bloom*
- 8 *HMS Calypso / Tempest 1 + Calypso*
- 9 *The word- the wind*
- 10 *Heliosphere*
- 11 *the dream*
- 12 *Height of simulacra*
- 13 *the parking lot*
- 14 *the outline of reality*
- 15 *the border*
- 16 *Through the book + second journey*
- 17 *The sob + Tempest 2*
- 18 *God cleans up*
- 19 *Man and God*
- 20 *Ulysses first glance on his Home*
- 21 *Together*

Winner of the Lynch-Staunton Prize and the Grand Prix Marulic 1999

PULSE FIELD

SoundScape II

Disc V

Paul Lansky (United States)

Paul Lansky is one of the most prominent and accessible of modern American composers who write primarily for the medium of computer-generated sound. He has made advances in purely technical areas, especially those of Linear Prediction Coding, which he developed for his own first computer-generated pieces, and Cmix (in the 1990s), a set of programs which he has made freely available. In the areas of theory and analysis, Lansky has collaborated closely with George Perle, a former teacher of his, in developing the latter's ideas of "twelve-tone tonality," a way of combining serial techniques with pitch-centered motion. Lansky is a thoughtful and articulate writer and speaker, and has written extensively on his own music. The metaphor most often used by Lansky to describe his use of the computer is as an "aural microscope" (sometimes a "camera"), with which he "tries to make the ordinary seem extraordinary, the unmusical, musical. [I] try to find implicit music in the worldnoise around us." Like photographs, "recordings of real-world sounds ... create a nostalgic ache in that they almost capture events which are, in reality, gone forever," and Lansky's music can be extremely affecting.

Lansky began his musical career, after graduating from Queens College in 1965, playing French Horn in the Dorian Wind Quintet for two years. His first compositions, which were entirely acoustic, date from this period. They are all for chamber ensembles, though curiously (considering his later interest in manipulating sounds created by people, and especially vocal sounds) none use the voice. In his pieces from this period Lansky was mostly concerned with expanding on George Perle's ideas of twelve-tone tonality.

Lansky returned to school, and received a PhD in composition from Princeton University, where he has taught since. In the early 1970s, Lansky continued his use of Perle's technique in his instrumental writing, but also began to compose music solely for tape, such as *mild und leise* (1973). In this piece Lansky uses a few ideas which were to become very important in his later development. For example, timbre is used as a structural element (similar timbres tie together parts of a piece, much as a returning melody helps the listener with the structure of a classical piece). As well, Lansky uses previously written music as a jumping-off point for his work, a hallmark of his later style. In this case the music is that of Wagner (whose "Liebestod" aria from the end of *Tristan und Isolde* begins with the words Lansky uses as the title of this piece), and specifically the "Tristan chord," a half-diminished seventh chord. Similarly, in the 1978 piece *Crossworks*, for piano, flute, clarinet, violin, and cello, Lansky uses the relatively famous opening chord of the second of Arnold Schoenberg's *Fünf Orchesterstücke*, Op. 16 as a basis for a whole piece. Lansky thus was moving away from the manipulation of abstract pitch sets (he co-wrote the article, with Perle, on "Set" for the *New Grove Dictionary of Music and Musicians*) to working with fragments of music that already had built-in associations for the listener.

The *Six Fantasies on a Poem by Thomas Campion*, completed in 1979, mark a turning-point in Lansky's career. Since this piece, Lansky has written almost solely for computer-generated tape (Lansky first combined computer-synthesized tape with traditional acoustic instruments in *As If* for string trio and tape, completed in 1982, and since then has composed only occasional pieces involving acoustic instruments, such as *Values of Time* (1987) for string quartet, wind quartet, and tape; almost all include a computer-generated tape part). There are several compositional and technical concerns, which have become central features of his music, which made their first appearance in this piece. Lansky based this piece on a reading of the poem "Rose-cheekt Lawra" (published in 1602). The reading is by Lansky's wife Hannah MacKay, who has been the original voice upon which a large proportion of Lansky's music is based. Lansky has written that he sees a strong similarity between the reading of a text and the performance of a musical score, so that he uses both as sources for his computer-generated extrapolations. All his music after the *Six Fantasies* is based in some way on the manipulation of previously generated sound: usually a musical performance or reading of a text, although Lansky often uses conversations as well. The *Six Fantasies* also marked the first time Lansky used the Linear Predictive Coding (LPC) algorithm to alter his given sonic material, and this technique has been common in his music since. LPC, which has also been used by other

composers (Andy Moorer and Ken Steiglitz, for example), was originally developed at Bell Telephone Laboratories to compress speech for efficient transmission; it is designed especially for modeling and manipulating the human voice, and so fits naturally with Lansky's compositional concerns.

Lansky has written that "[his] goals are not mainly to achieve relative mastery of one form or another ... as they are to experiment," and his music throughout the 1980s and 1990s is quite varied. However, the pieces can generally be divided into several distinct, though related, streams, based on the subject matter used as a basis for manipulation: previously existing music, ambient urban sounds, or the spoken word (either the reading of a text or an improvised conversation). The main factors in common to his pieces are that the original sound is created by human activity, and that they "all attempt to look at ... familiar things from new vantage points, using a novel perch to gain a fresh perspective on things we may have come to take for granted." "For me," he has written, "success means creating new ways of listening and hearing." Lansky used found music most often in his earlier computer-synthesized tape pieces, such as the *Folk-Images* suite from 1981, which consists of settings of folk melodies from Cecil Sharp's anthology (with one original piece in a folk style). Lansky later added eight pieces in 1991-93 to make the album *Folk Images*. Among other things, his goal in these pieces has been "as in many of my other pieces, where I attempt to confront our perceptions of things which we take for granted, these highly filtered images of folk music are meant to develop new perspectives."

Lansky has used ambient urban sounds in only a few pieces, and they have tended to be not quite as successful as those based on music or speech. In *Night Traffic* (1990), Lansky processes the sounds from a local four-lane highway, while in *Quakerbridge* (1990) he uses the sounds of a shopping mall as source material. More interesting has been the combination of voice and other sounds in *Table's Clear* (1990), an interpretation of the sounds of his two sons clearing the table after dinner.

Lansky has written that composing for tape entails very different strategies than composing for a live audience, which are needed to make his works (which exist only on recording, thus staying exactly the same with each "performance") "remain lively on repeated hearings." Lansky's most successful solution to that problem has been his music based on the spoken word, perhaps because either the text or the speaker has personal importance for him. Usually, the speaker is Lansky's wife Hannah MacKay, a trained actor. Often she is reading a text that Lansky has written (as in *Things She Carried* (1996), a "computer 'opera' "). Equally often, Lansky has set conversations between himself and his wife (as in *Smalltalk* from 1990), using the words to "trigger" music, by activating the pitches implicit, though not heard, in the spoken word - the effect is similar to that of Steve Reich's *Different Trains* (1988), where the pitches of short phrases of speech are reiterated by a string quartet. Lansky's goal is, as always, to make the listener hear the music behind all voices: "I fundamentally believe that voice, speech and music are inextricably intertwined."

Another strategy Lansky has developed to engage the listener is worked out in the series of "idle chatter" pieces: *Idle Chatter* (1985), *just_more_idle_chatter* (1987), and *Notjustmoreidlechatter* (1988). Lansky uses recordings of people speaking, with the words cut up so that they are (just) unintelligible, with the effect of a huge, chattering crowd (the sound is curiously similar to that of Jean-Michel Jarre's *Zoolook* album from 1984). His intent is for the listener to "lean forward" to try to understand the conversations, "not to bewilder, but rather ... the randomness and complexity of the texture creates a listening environment which encourages the ear to wander and be curious."

Lansky has described his theories of how technology is changing the relationship between listeners, performers, and composers. For one thing, he says, "the respective roles of concerts and recording have been switched. Recording is the norm and concerts are glorifications of recording." This reversal of roles, Lansky believes, has implications for everyone involved in music that have not been sufficiently thought through. Technology has also resulted in more people being able to contribute to musical life, especially "instrument builders" (a term he uses to describe both designers of acoustic instruments and music software programmers) and "sound givers" (anyone who distributes recordings), though Lansky has distanced himself somewhat from the latter concept.

--David McCarthy -- mccarthy, david\lansky.txt, All Music Guide

I look forward to the day when nobody will care whether or not a computer was used in the process of making a piece. After all, virtually everything that is recorded today involves computer mediation to some extent. If any kind of music is to survive it has to hide its technology, so to my mind, 'Computer Music' should become irrelevant as a category. While it's obvious that computers can do things with sound that are previously unimagined and unimaginable, I remain convinced that what we hear as 'music' has everything to do with the voice of the utterance-what is being said-and less to do with the machinery it uses to speak. Or, in the words of the song, 'It ain't the meat, it's the motion.' But, since you asked, aside from the pre-recorded sounds, all the music on this CD was created entirely with software on a Silicon Graphics workstation and Apple iMac computer. The basic pieces of software used were Cmix, Rt, and SuperCollider. More detail can be gleaned from my web page at www.music.princeton.edu/paul.

Paul Lansky, September 2000

1) Idle Chatter Junior

10:41 2000

Idle Chatter Junior (1999) has three elder siblings, *Idle Chatter* (1985), *just_more_idle_chatter* (1987) and *Notjustmoreidlechatter* (1988), (all recorded on Bridge 9050, *More Than Idle Chatter*). The urge to strike again was motivated by the hope that time, experience and better hardware and software, would give Junior advantages his siblings lacked, and consequently, a substantially different voice. Having more fun with the basic idea of turning incomprehensible speech into percussion music was also irresistible. (I never listen to the words anyway.) As with the earlier pieces, any listeners who think they make out coherent utterances, in any language, are urged to consult a specialist.

2) Looking Back

3:38 2000

Looking Back (1996) is a short piece written for the 60th anniversary of the High School of Music and Art in New York City, a magical place where I spent three of the happiest years of my childhood. The piece is basically a foggy processing of me singing the school song. We all knew the tune, as you will, but few of the words-which is why my setting is so foggy.

3) Now and Then

12:30 1992

Common wisdom has it that it is never too soon to read to children. Even before they can speak they enjoy the regular, soothing patterns of speech - it must be a kind of music to them. We regularly read to our children and *Now and Then* is a musical encapsulation of the sound of this activity. Here my wife Hannah MacKay reads several dozen phrases, typically found in many children's stories, and all of which refer to time -hence the title of the piece. They thus form a kind of story with no content, merely the chronological underpinnings of one. I supply musical continuity and decoration (Jonah and Caleb again supply some percussion) and our memories of the sound of this special kind of speech-music take care of the rest.

4) Pattern's Patterns

7:07 2002

5) Say that Again

4:37 2002

Readers:
Hannah MacKay,
Paul Lansky

Paul Lansky's latest Bridge release is a suite of ten brand new pieces. Lansky writes: "The inspiration came from the TV show, *Sesame Street*, where the celebration of letters and numbers, those atoms of daily life, is often clothed in lively musical garb." Lansky asked the graphic artist Grady Klein to animate some of the music, and the result is a charming and quirky enhanced CD—full of imaginative and playful visual and sound art. The disc is playable on CD players and computers, including Windows and Macintosh platforms. Included in the 32-page full color booklet is a complete printing of Grady Klein's *Alphabet Book*, the graphic work upon which the CD's animation is based. Paul Lansky was called "America's foremost electronic composer" by *Playboy Magazine*, and this, his eighth release on Bridge, shows him expanding in new directions.

6) Word Color

12:58 1994

Word Color is based on the sense that words, as sounds, can ring, and have resonance in our memory. While that resonance may be regarded as purely sonic, words themselves inevitably reach more deeply into

other areas of our consciousness. The music in this piece therefore consists of a number of arbitrary words, simply ringing in sonic space, and also a setting of a passage from Walt Whitman's Song of Myself (verse 17). The two 'contexts' engage in a dialogue in which meaning is inferred rather than made explicit. The piece was first played at a festival in Delphi, Greece. The reader is Hannah MacKay.

*These are really the thoughts of all men in all ages and lands, they are not original with me,
If they are not yours as much as mine they are nothing, or next to nothing,
If they are not the riddle or the untying of the riddle they are nothing,
If they are not just as close as they are distant they are nothing.*

*This is the grass that grows wherever the land is and the water is,
This the common air that bathes the globe.*

7) Memory Pages

13:05 1994

We've all had the experience of having a sound, smell, image, or taste, trigger a long buried memory so vividly that it almost seems as if we are reliving the experience. It is such a remarkable sensation that it inevitably moves us deeply, but we can never share it, only marvel, as Proust did when the taste of a madeleine flooded his consciousness with memories of Combray. It's often a painful experience as we feel the permanence of the loss of the past, and are stunned by how real our perception is, despite this irretrievable loss. Memory Pages is a musical excursion into this realm. The text is comprised of a few personal memories my wife Hannah MacKay and I have had, along with thoughts about remembering and the passage of time. At the piece's end, an odd setting of a well-known Australian folksong rings down the curtain, much like the titles at the end of a film, giving the listener a chance to reflect, and make the transition back to the theater lobby.

A Tuner of His World: An Interview with Paul Lansky

Alistair Riddell

Few composers in recent years have explored the boundaries of computer music as imaginatively as Paul Lansky. Recognizing that Lansky's creative stature is as palpable in the exquisiteness of his music as it is in the detail of his curriculum vitae, I decided to think of this interview as a collection of corridor chats (non-linear, of course!). Over time, I was hoping to gain insight into his current creative concerns the way I had through incidental daily contact as a graduate student at Princeton in the early 1990s.

Although this interview was conducted by email, the text, I hope, has an imprint of candid spontaneity and informality to the extent possible through this type of exchange and under the imperative of general publication. The fact that we are seasoned emailers-communicating this way for more than a decade now-would, at least, ensure that the interview mechanics were natural and relaxed.

Certainly, this text is considered. It's measure is different from that of a conversation transcribed from a recording because it evolved over a much longer period. A slow dialogue in electronic letters. I like to imagine he composed his responses on the same computer he composes his music (I know I did). Entirely probable, and an observation I'm sure would appeal to his sense of technological engagement.

To view Lansky as a computer hacker or boffin is to see him with only one of his hats on (others he wears are Professor of music at Princeton University, composer, guitar freak and folk music lover). Certainly his computer is a complex audio tool and he has toiled in its evolving creative domain now for more than two decades on both software and sound. Yet his enthusiasm for the computer is always mediated by a richly humanistic perceptiveness, tuned to a world most of us recognize with little difficulty. Like Walt Whitman or Henry Thoreau, Lansky's creative palette is the world he inhabits and his creative offerings reveal this world as far richer, far more complex, than we might have first thought. While listening to his music, we sometimes recall that the computer is operative in the scheme of sounds. We then marvel at how technology has contributed to our experience and how Lansky has used it. More often than not, however, the technological processes are transparent against the musical narrative. Interestingly, he compensates for this lack of overt technological statement by making much of the software he uses freely available on the Internet, effectively saying, 'Well, here's how I compose my music. Try it for yourself.' Many of us found this an irresistible and deeply engaging challenge.

To think of Lansky's music as 'computer music,' after one has heard it, is difficult. Under this rubric what we probably wish to recognize is the potential of digital technology in the hands of someone with considerable skill and creativity. The label certainly fails to invoke the sheer magic of his ideas unfolding in sound but it does say something about the openness of the future of this musical genre. Certainly, a glance over his uvrre on CD is enough to indicate a breadth of musical direction that seems to be ever-expanding and defiant of simple descriptions.

In one direction, his music is a synthesis of traditional musical gestures and real-world sounds. *Night Traffic*, based on Doppler-shifting traffic sounds tuned in diatonic harmony, is a good example. In another direction, many of his works employ text in ways that are not merely innovative but ground breaking. Frequently, the text is given deeper resonance through readings by his wife and creative partner, Hannah MacKay Lansky. The intimacy this invokes within a work is breathtaking, reminiscent of a private reading between two people or a soliloquy of complex hue, as in *Things She Carried*. Traditional music often struggles to achieve this state of emotional directness, perhaps because from conception it is imbued with the imperative of performance. When music is manifest solely in the recorded domain, the composer can frame the experience as a communion between him- or herself and an imaginary immediate listener. I think this arises certainly because the listening experience tends to be private but also because the composition process is reflexive; the composer creates the sound, then listens, rejecting or accepting the result. In due course, the work freezes, possibly definitively, the result of a particular mode or context of working; a creative undertaking not easily duplicated or reentered at a later time. The idea of a music not performed but composed into existence, is a difficult concept to grasp for those who have never thought of music as something not performed. Even in our culture of listening to music on CD we find it hard to disassociate music from human activity in the physical world.

The experience of reading a book is, I think, an analogy useful in appreciating Lansky's music. Perhaps this is a consequence of technology that we can step away from something to look at it afresh. Indeed, another direction of his music also confirms that he is finding new ways to define his music in this way. For instance, Lansky has taken an interest in presenting familiar musical genres replete with a mixture of real and synthetic instruments such as the guitar interpreted through the 'plucked string' algorithm. With these sounds

he carefully constructs the genre until the composition possesses a compelling *raison d'être*, not easily ignored, but not authentic. Here he is working through his passion for certain musical styles in a meta-compositional manner that positions him at once as both *aficionado* and practitioner. In particular, Lansky has expressed his appreciation of certain Folk and Rock music and more recently certain piano music styles in this way. A truly innovative stance.

In all, we find evidence of a musical sensibility not constrained by academic or high art contexts but one which reaches out to an increasing complex musical world. In doing so, Lansky articulates the importance of intimate musical expression and the role technology plays in achieving this, not only for himself but for many composers today.

The following interview took place between mid May and early October 1998.

Alistair: You have been involved with music technology and computers for many years now, what has been the most significant moment for you as a composer?

Paul: That's a hard question to answer. I've always regarded the computer as nothing more than yet another instrument. On all the instruments I've studied (guitar, french horn, piano), there was always a point where a productive feedback loop began, that is, I played something that sounded so good that all I wanted to do was play it over again. In the early days of computer music, making any noise at all was such a huge task that it was a wonder that anyone ever wanted to pursue it, but nevertheless, I did start to notice a feedback loop around 1976 or so and this kept me at it. I didn't really feel that I was getting anywhere, however, until I finished the *Campion fantasies* in 1978. [note 1] I do remember leaning back after I had finished that and feeling that I had done something good. It was not only the first computer piece I had written that I felt good about (it was my third computer piece), but it was also the first piece of any kind that I had written that I felt totally satisfied with. From then on I felt as if I had a good kind of feedback loop going, and it is what has kept me at it.

Alistair: Let's talk about the *Campion fantasies* a bit more. I have an idea that there is a 'feedback loop' of aesthetic intent here that should be examined.

One of the most striking aspects of your work for me in general, and perhaps beginning with the *Campion Fantasies*, is a musical expression that holds in balance the subjects of humanity and technology. I'm always struck by how your work with technology results in music that articulates contemporary human experiences and not simply contemporary electronic sounds. Was that something you were aware of at the time of producing the *Fantasies*? Was that part of the good feeling you had about the work?

Paul: I think that my first big realization about computer music, in the early '70s, was how pale it seemed in comparison with natural and instrumental sounds. I also never really liked electronic music, and have never even worked in any kind of analog studio. This may have had something to do with coming from a background as a performer. I couldn't get excited about Stockhausen, Berio, or Subotnick's electronic efforts, and I thought that the early Moog and Buchla synthesizers were basically cute toys. There were, however, three things that kept me interested in computers: analog-digital converters, which allowed one to sample and process real sounds; the workshop idea, that I was able to really get my hands on sounds; and the precise control computers offered. Another aspect of the situation is that I never really had a good opportunity to cut my teeth on writing for instruments, and found the whole experience more frustrating than anything else.

The rich complexity of natural and instrumental sounds, however, really fascinated me, and still does. Also, the idea that I could peer into domains which were not normally the stuff of music as we know it, such as casual speech, and world-sounds, was very exciting. I don't think that had ever been possible, and certainly not with the same degree of precision.

A big issue, however, has to do with enlivening recorded sound so that it can survive. What is the listening experience all about when it just involves canned sound and loudspeakers? How does one deal with this, and how does one compose for this?

Alistair: There are many points here to pick up on. But on your last point, for whom do you think it is a 'big issue' to enliven recorded sound? I'm not sure what that means. It strikes me that recorded sound is now the *de facto* experience. Let's assume that we are not talking about private listening, which is like reading a book, because enlivenment is, in this case, an internal matter. Enlivenment in the external case is more complex. Every DJ who spins vinyl around the planet doesn't have a problem with enlivened sound. Some of

those venues are so alive it's almost fatal. But if you look at the art music concert scene it does appear a bit flat except, perhaps, for efforts with sound diffusion systems that attempt to convince the audience that the sound they are experiencing is a unique and complex phenomenon.

What is enlivened sound? How is it achieved? Through people or technology?

Paul: What I am talking about is making recorded music lively on repeated hearings. With performed music, the music lives on because different people perform it and the results are always different. I guess this is what interpretation means. With music which lives 'only' in recording I am concerned that you can listen to the recordings many times, and each time there will be something fresh there. I noticed early in my work with computer music that my results aged very quickly. What sounded good on first hearing, sounded less and less good with successive hearings. This is probably what prompted me to turn to so-called realworld sounds because the complexity and depth of the sounds had more to do with our traditional experiences in listening to recordings. But, more than that I found myself, beginning in the early '80s, looking for ways to build in a kind of complexity and richness which *repositioned the performance in the ear of the listener*, rather than in the hands of the performer. In other words, the listener had to work just to process the sounds. This really opened up with *Idle Chatter*. There is a lot of what some might call stochastic noise in the piece. A great deal of randomness is used to create a complex texture and it takes some work on the listener's part to decode that. I think that I succeeded there since I can still listen to the piece almost fifteen years later and still enjoy it, and I've probably listened to it more than anyone else.

So, I've come to think that the key to writing music which lives in recording is to radically reconstruct the compositional process. I think a lot of electronic pieces fail because they are using the model of traditional performance, and ultimately they end up sounding like bad performances because they don't have any of the unpredictability and randomness of real performances. Other pieces, like *Smalltalk* and a number of pieces I've done recently, are really very complicated. It is as if there are very familiar things lurking behind a dense curtain which the listener has to carefully open. One recent piece is called *For the Moment*, which is actually a listening suggestion. The listener has to concentrate on small details or the piece will fail to make any sense.

Another aspect of this has to do with my use of familiar materials, such as tonality, speech and realworld sounds, in unfamiliar ways. I think of myself as keeping some things simple so that other things can get complicated.

I really, really want people to listen to my pieces more than once, and I want them to sound even better on repeated hearings. So much of our listening to contemporary music consists of one-shot deals. OK, now I've heard 'that,' no need to listen again This is certainly not the way we treat our favorite recordings. In the old days of LP one of my favorite sights was a record jacket that was falling apart from repeated and frequent access.

Alistair: Your discussion on 'enlivening' recorded music seems to me a new dimension of contemporary composition but quite specific in its context, i.e. with recorded music. It is radical in its tangential relation to historical compositional practice. It seems born, first, out of an awareness of the place of music in the late twentieth century, and second, out of the cognitive nature of recorded music experiences.

Do you sense a uniqueness as well as a future in this mode of compositional thinking? Do you view the 'enlivenment' of music, as you have described it, as a highly personal approach to composition or something that can be formally evaluated and thus critically considered? In other words, do you see it as a compositional issue beyond your own concerns?

Paul: I'm pleased that you sense the importance of these arguments. It's really just dawned on me in recent years, and I don't think there has been much discussion about it. I think it is critically important and that many composers have been thinking about it in one way or another, although I think that the failure of a lot of contemporary music lies in its refusal or inability to consider things in the following terms:

To my mind a piece of music negotiates its terms in several senses. First it negotiates its space. A Brahms symphony, a Webern song, a film score, tape music, pop music, dance music, techno, recorded music of one sort or another, all describe a particular world-space, for want of a better term. You notice it when conditions are contradictory, like playing a Webern song in a dance club. Furthermore, a piece also consequently negotiates terms with its listeners. Sit still and listen carefully, or dance to me, or talk over me, take me seriously, or just use me as the color of your world. In a very real sense you can see that the way a piece of music goes, specifically, its tunes, words, rhythms, contours etc., are, in one way or another, the specification of its space, and its negotiating terms with its listener. Some pieces are rude, some polite, some are appropriate, some inappropriate, and all these attributes may be reasonable and appropriate, or

unreasonable and inappropriate. The space and terms I like to think of with my pieces are basically in the intimate settings of someone's home where one can take them in with the same kind of attention and devotion one would use for a good book. I don't think my music works that well as background music, there is too much detail, and I don't think it works that well as concert music. And just as you can, and often do, reread a good book, I am concerned that a piece invite imaginative reconstruction on repeated hearing. So, the compositional methods I use are specifically aimed at achieving these goals. When I write pieces for instruments the means and results are quite different. (One of the most interesting things about music for me is the way you can listen to a piece hundreds of times without feeling that you have nothing new to hear and learn.)

I think that the failure of some music lies in its inability not only to create a lively space, but also to enter into a discussion with the listener. I think it is relatively easy to tell when this happens. Just think of your average boring, dreary contemporary music concert. It often seems as if the pieces are acting like priests who have gone through a ritual once too often and are just mouthing the words. In other words, the terms of the discussion and its context are frozen. To continue the parallels: music which lives only in recording cannot depend on the fact and familiarity of recorded music to justify its existence, or it would come to sound like no more than a recording of the same bored priests.

My answer to your question, therefore, is that I do not see enlivenment as a personal compositional approach but rather as something that good composers have always programmed in one way or another. On the other hand the proliferating variety of media and spaces for music today present a lot of challenges to composition in which it is absolutely critical that these issues have a direct and palpable effect on compositional methods: the way pieces go. In as much as this view of music differs substantially from what might be called a positivist view, in which a piece has objectively defined qualities which exist in an abstract sense as well, it leads to an evaluative stance in which observations must take into account the way a piece of music threads its way through the world, the ways that it describes a listening space, as well as a way of listening. I can easily imagine a very profound analysis of a piece which focused only on these things.

Alistair: Your comments suggest that we now must consider the contemporary listening experience from perspectives that only a decade or so ago would have been hard to appreciate even among people who thought themselves musically aware. However, today, all musicians, and of course listeners, almost intuitively comprehend the complexity, diversity and challenge of our global musical world and wrestle with the difficulties of positioning themselves in it.

So can we talk a little more about the terms of negotiation for a musical space. If we view the concert hall, the dance floor or the home living room as known listening spaces, part of the creative process of enlivenment must involve stating the terms under which the listener is to accept new or composer-determined spaces. The listener has to agree to these terms otherwise the experience fails. Yet it is not quite that simple because, if I understand you correctly, the terms are not entirely musical or even overt, and ideally require re-negotiation on each listening. How do you see the dynamics of this space? Do you feel that noise plays an important role in asserting the space into which musical ideas are to be placed? What I'm curious about is the nature of the world-space, can it be composed as a conscious act perhaps independent of the music and might such an ambition become a kind of 'music' itself, where composers search for the resonance of the space and perhaps care less about the content?

Paul: This is a very difficult question for me to answer, and perhaps I can best approach it by being evasive. It's obvious that music has many more functions than ever before. We use it in films, television, cars, as environmental color, as objects for study and scrutiny, as icons for social identification, status, protest, etc. Of course it's always been true that music has played many roles, but I don't think the variety has ever been as great as it is now. The concept of musical space, and the negotiations involved in creating and identifying it are therefore as multifarious as the functions music fulfills. What a rapper or an opera-goer does to feel comfortable and process the music smoothly will have a lot to do with their respective roles in life and their needs and expectations. It's obvious that most rappers would feel peculiar at the opera and most opera-goers would not know what to do at a rap concert. (You and I are probably rare in that we could function equally well in both spaces.) But one could imagine what each of these listeners would have to go through in order to be able to accept the opposite music as fact, and not as an absurd affront to their sensibilities. (I suspect that you and I can process these well because we are able to deal with music in more abstract ways.) Their negotiations would have a lot to do with their respective images of their places in society, and by extension, their respective musics can be seen as part of their self-images and identification. Peculiarly enough, one place where both might feel comfortable is in film, where the music plays a role which is similar, but where the viewer is able to be detached. I'm sure a lot of opera-goers would have no difficulty with the rap in the movie *Bulworth*, and a young audience nursed on rap would probably know what to do

with *Farinelli*.

I haven't really answered your question, but I hope I've recast it in an interesting way. I just can't imagine how one could generalize in these terms. Perhaps one aspect of the failure of experimental music is in the extent to which it requires an audience capable of abstraction and able to view music without regard to its larger role. Or perhaps the failure has something to do with the lack of a larger role.

Alistair: In response to your last comments, I'd like to move towards the particular, that is your music, at least the works from the late 1980s onwards, and discuss how they challenge musical spaces, often the most unlike musical spaces for a person in your position.

For instance, while you can produce a work like *Not So Heavy Metal*, as a composer don't you pursue the Metal scene as a career, ideology or culture? Yet, from one important perspective, the electric guitar, you felt compelled to address the genre in your own way. So one might view the work as something of a homage, perhaps, to the cultural impact of the instrument and your private relationship to it.

Again, in *Night Traffic*, there is an almost Hitchcockian take on road traffic. Like *Not So Heavy Metal*, *Night Traffic* critiques a musical/sonic space from a position at once subtle and intensely private. These works are like witness statements which expose a perspective we were unaware existed but which ultimately casts the whole musical space in a new light.

I'm reminded of Charles Ives' music here with the difference that one has to transcend his musical/world position to feel that one is able to appreciate the subject of his work. In your works mentioned above, one immediately understands the context and subsequently ponders the musical interpretation.

If you agree with my observations, do you think that it is, in part, a way in which you have made music function for you? Rather than being solely about the presentation of composed sounds in a contemporary manner, your music may be read as a commentary on your immediate world, where you are saying, 'this is how I see it,' and the seeing is in the listener's visualizing of the sounds.

Paul: At the risk of peering inwardly a little too deeply, let me ruminate a bit on coming of age in the '60s and '70s and see how it led to the situation you characterize.

My original compositional training was in a hothouse atmosphere where virtue and value was measured in invention and abstraction. A good composer was someone who took you to utterly new places which were described in totally new and original terms. I don't want to dwell too much on this positivist environment, except to say that I was completely swept up in it, and anybody who wants to see a testimony to persistence can consult my dissertation, 'Affine Music,'^[note 2] which is a derivation of a system of multidimensional cyclic arrays using linear algebra. I still think this is very interesting stuff, and that there is a lot of musical potential there. It's related to George Perle's *Twelve-Tone Tonality*,^[note 3] and I worked closely with George for several years on developing this. He's still using it and writing great music. But, fortunately, I discovered that there was a mismatch between my musical personality and this way of thinking. I'm just not cut out for this way of operating.

My fundamental and original relation to music is that of an omnivore. If it's music, I love it. I have a much harder time thinking of music I don't like than music I like. And, almost Zelig-like, I want to own and become the music I love.

This realization and a real breakthrough came in the early '80s with *Guy's Harp* which is a portrait of a blues harmonica player. With this piece I really felt as if I was able to occupy a new seat at the table and engage in compositional activity that was closer to the relation I had with music in general. (I flip every time I hear good blues harmonica playing, for example, and even fantasize about learning to play/ tried and playing in blues bands and clubs on weekends.) But since I also want to do a million other kinds of music-making, the limitations of a life-span intrude. So, I happily discovered that the computer is a way to glom ^[note 4] my musical loves onto my compositional life. A motivation for the *Idle Chatter* pieces, for example (*Idle Chatter*, *just_more_idle_chatter*, and *Notjustmoreidlechatter*) comes from a fascination with rap, and with backup girl-singers in bands. *Not So Heavy Metal* is like *Guy's Harp* but in relation to rock.

These things led to a relation between me and the computer and composing in which I think I'm essentially strumming world sounds, and perhaps even strumming other people's music. In a sense, the atomic units of my pieces are not 'pitch-classes' and 'temporal divisions' but rather sonic objects, musical and otherwise. The rather traditional and often tonal characteristics of many of my pieces are probably motivated by similar

concerns: to own a lot of the music of the past that I love.

I'm pleased that you perceive a particular world-view in pieces like *Night Traffic*, because it leads me to hope that I'm succeeding in doing what a composer should do, create an individual view of the world. I think that *Night Traffic* borrows a lot from opera and film, and even Strauss. (My colleague Ken Levy described it as '*Tod and Verklaerung* on Wheels.')

I think that the expression of this world-view is particularly enabled, and perhaps even created by technology. The terms of the discussion are new and you can consequently say new things.

Another way of looking at this stance is that it depends heavily on external reference, while the positivist background I describe emphasized internal reference. It's hard for me to really construct an objective position about my own music. I can think of a lot of pieces which don't fit the above description so neatly but in general there is usually some sort of view from this angle.

Alistair: What would you have done without the computer? The composer you are now seems radically different from the composer associated with George Perle and the theories of twelve tones in the 1970s. It would appear that the computer is somehow responsible for a significant shift in your ideas on music and sound. Would you have been that interested in electronic music without the computer's presence? In your notes to the *Smalltalk* CD, you make the point that you changed direction in computer music from the search for 'new sounds' and 'unknown soundworlds' to one of 'human sounds and the noise of the world around us.' This seems to me one of the important distinctions between computer and electronic music, although one easily blurred; what are your thoughts on it now?

Paul: It is certainly clear to me that had I not met the computer, I would now be somewhere else entirely. I think, however, that the computer melded well with my basic personality and that I probably would have sought it out had it not presented itself so conveniently at Princeton. When I was young I always enjoyed building things with my hands, doing pottery, and in general being occupied by tasks which had some physical component to them. My favorite toys were the kits with blocks to build houses etc. (I would have loved Lego), and a fascinating toy called an Erector Set. The computer satisfied these needs in several senses. First, I took very easily to programming. It seemed a lot like building kits. You construct components which then interact. Second, the whole working process satisfied my workshop mentality. Again, you're putting lots of bits and pieces together to make a finished product (which you really don't do when writing for instruments). Finally, I've learned over the years that I have a very particular social failing: I 'hate' asking anyone to do anything. I love it when players perform my instrumental music, but asking them to do it is very difficult for me. The whole world that one has to engage to be a successful instrumental composer is one that I find very awkward, embarrassing and repugnant.

In retrospect, my turn to 'realworld sounds' was part of a process I described earlier: to deepen the listening experience of music on tape. I think that more and more composers are moving in this direction these days. I've just finished judging two competitions, and listened to about a hundred electroacoustic pieces. I can't remember any that didn't use recorded sounds in one way or another. (The era of those ghastly DX7-type pieces we had in the late '80s is over, thank god.) I suppose that composers are beginning to realize that the computer is not very good (yet) when acting as an ersatz instrument, but is superb at processing sounds. Perhaps it's also true that our tendency to listen through the memories of physical processes argues in favor of this approach. On the other hand, it's becoming a lot easier to develop interactive computer instruments these days, where physical activity has a direct and obvious sonic consequence. It's anyone's guess where this will lead.

Alistair: We've somehow managed to avoid talking about technology. Can you describe the technology you use, how you work with it and why you like to work that way? I realize that today, what technology a composer uses can be a private thing and often difficult to explain to other composers, but I still feel that it is at the heart of the kind of sound the composer produces.

Paul: Right now, my studio consists simply of an SGI Indy workstation, with a MIDI keyboard attached, and good DACs in a DAT player, which is connected to the SGI through digital i/o. That's it! (If I were a young composer at this point I'd probably buy a Mac G3 and use programs like ProTools, Max, Supercollider, etc.) I got here, as I described earlier, by deciding that the best way to work would be to maximize the number of experts available to help me, and since I was working pretty much alone, and the only real expertise available was in the engineering school where people knew Unix and digital signal processing, my best bet was to be in a position to be able to take advantage of that, which meant learning to program, and working in a flexible environment. I really think that one learns more by trying to do something, and asking questions when you reach a brick wall, than by taking a course. I have done an extraordinary amount of low-level

programming, which was necessary only because there was no other way to get anything done. Once I even wrote a short program in HP binary-not assembler, but rather the code that assembler produces-since I needed to do something on a machine (an HP 2116) that we were running without an operating system! I also spent a semester writing an i/o driver in PDP assembler for a set of custom DACs on a PDP11/34 in RSX11. Since nobody was around to help me with RSX11 I wrote the whole thing in kernel mode (below the operating system), which meant that I had to write my own terminal, keyboard, and tape drivers as well. I'm very proud of it, but it's a testament to stubborn persistence. (I learned PDP11 assembler sitting on the beach in Manly, Australia, in 1982, in fact, when I was visiting the Sydney Conservatorium.)

I subsequently wrote or adapted four Unix i/o drivers, and was the first one to write a Unix driver for a fancy DMA card that DEC produced. Engineers at DEC started referring people to me, which was embarrassing since my coding was so sloppy. You've been in the same position and have also done low-level work, actually even lower since you've worked at the chip level! If I seem to be bragging, I am. I guess I'm proud to have been able to do things which allowed me to make music, and which are considered daunting tasks. I really don't think that I have any unusual intelligence, just a lot of stubborn patience. (In the early days on the IBM mainframe, my account subid was 'patience' and my password was 'tryagain.')

The nice thing about computers is that there is (usually) a right and a wrong answer to any programming question. If you get the wrong answer, you just wander around until you find the right one, and you usually do. In fact, I don't think I've ever made an intelligent mistake. Errors are usually just the result of your own stupidity.

At any rate, to cut to the chase, I'm now only dependent on a C compiler to get anything done, and I can do pretty much anything I can figure out how to program. I'm still using the same basic software that I was using fifteen years ago, Cmix, and a variety of other homebrew programs. I don't think I use much commercial software, although I think it has reached a much more powerful and mature level than it was at, even five years ago. Still, whenever I look at someone else's software, even powerful programs like MAX, I have the feeling that someone is trying to tell me how music is supposed to go. I'm sure that Cmix has a similar bias, even though I try to deny it, but at least it tells me how 'I' think music should go.

Over the years I've resisted special purpose hardware. I predicted, and I seem to be proven right recently, that processors would get fast enough to do everything in software. Also, you don't want to be put into reset-mode in a learning loop every two years when your hardware becomes obsolete. Everything should be done in software. And the software should be portable. I'm still using some software that was written in 1969, in fact, although I had to translate it from Fortran to C.

One basic question which arises in all this concerns the interface. You wrote your dissertation on this,^[note 5] so you know a lot more about it than most people do. I don't think I want to extemporize on it here to any extent, but I do want to say that I think that there are some serious conceptual limitations imposed by highly graphical interfaces. To me they often seem to have a real effect on the inner workings of your imagination. They seem to be telling you how to think, in addition to what to think. Working at a more abstract level, may sometimes be harder, but your brain engages the task with a much more complicated kind of mechanism. More work is being done by your imagination and less by the interface. You think harder, in other words. This view has led me to develop software which relies much more on a text-based level of communication than on a graphical one.

This is not just because it is easier, which it is (I just learned how to use a backing-store, the hard way), but because again, it is less biased. In short I feel that the more work your brain does and the less work the computer does, the more you are put in a position where imagination is the most powerful tool at your disposal. It is certainly true that images can portray things in ways that words cannot, but I worry about their power, precisely in this respect, particularly when it comes to manipulating sound.

The real advances come, to my mind, with simple advances in computing power. The fact that Cmix can do things in real time, and that my mixer, RT, can mix and process about twenty 44k stereo files in real time, has had a profound effect on my music and my working methods. When I listen to my older pieces, I can really hear myself struggling with the machinery, trying very hard to turn great big wheels and knobs. More recent pieces, however, sound much more fluent and pliable, to me at least, and I think this has a lot to do with the power of today's hardware.

Alistair: It is evident in your music that technology facilitates composition across musical times and styles. To some extent, technology apparently functions as a means for you to think through what music will be manifest as part of your creative efforts. This has come about through your work over two decades bringing computer technology to the powerful creative state that you now access. In other words, this is a significant intellectual investment that you combine with your knowledge of music every time you compose. This is, of

course, an experience shared by many composers using technology and strikes me as historically unique to musical practice at the end of the twentieth century.

In the future of music technology as you understand it, as you have invested in it, what is important to you and why? Do you ever contemplate a future compositional context that isn't based on advances in computing and audio technology? Do you feel that the technical evolution in any form will impact on your creative aspirations?

Paul: If I understand your question correctly, you are asking me about the use of specific kinds and types of music in my computer music, that is, other music, such as blues, jazz, folk music etc. I think that this is new only with respect to the modernist tendencies of the '60s and '70s which encouraged a more abstract approach and dismissed notions of style and genre as relics of music appreciation. On the other hand, in the eighteenth century it was not at all unusual for composers to think in these terms. Bach and Mozart definitely thought of themselves as composing in an 'Italian' or 'French' style on occasions, and Brahms certainly composed with folk music. When I first started to work with folk music on the computer, in the early '80s, I did approach it with a certain amount of mischief in mind. It seemed to be a violation of the new music context, and my feeling at the time was that, in addition, this was the only way I could, in fact, play with folk music. If I were to write it for instruments, none of the new music groups who normally played my music would touch it with a ten-foot pole. I also was interested in seeing if I could simply get the computer to do a reasonable job with it. This was, and still is, a very difficult task.

But, there is a more interesting and perhaps deeper consideration lurking: that the roles of producer and composer are merging, and that the computer would become the center of recording technology. I felt at the time that this would happen, and I am gratified to see that it has. In a way then, I am positioning myself, metaphorically, in a recording studio when I sit in front of the computer, and rather than thinking of the computer as an experimental sound-generating machine, I think of it as an all-around sound-handler. In this respect it is not surprising that my most heavily used piece of software is RT, a real-time mixer. The illusion of the recording studio still exists in the industry today, but a lot of CDs these days are created in people's home studios and living rooms. I like this a lot, and it resonates well with much of the work I've done over the past twenty years. A long time ago I said that I liked to view the computer as an 'aural camera' on the sounds of the world. Doing a piece like *Guy's Harp* allowed me to detach myself from usual compositional responsibilities, and become something more like a documentary film maker. I found it quite refreshing to shed some traditional responsibilities and take on some new ones. There is a lot of chatter in popular music these days about the power and creativity of the producer, in addition to the composer and performer, and a sophisticated command of a computer puts one in a position to move seamlessly between these roles, merging, overlapping, combining them.

I think that it is inevitable that technological evolution will affect my compositional aspirations. On the other hand, I like to point out the relatively slow rate at which art evolves, particularly as compared to the extremely rapid evolution of technology. Art that responds quickly to technology is always going to be immature, in my opinion. There is an awful amount of junk in recent years which passes as art but is nothing more than a weak demonstration of someone's new hardware or software. Technological brilliance, which we are seeing in abundance these days, is a different kind of thing than artistic or intellectual brilliance, and I don't think that there are necessarily clear lanes of interaction between the two, although they undoubtedly are mutually influential to some extent. In fact I think that there is often a confusion of the two, and they frequently masquerade as one another. It is certainly possible to harness brilliant technology in the service of art, but for the art to be successful, in my view, the technology has to be invisible.

Endnotes

1 *Six Fantasies on a Poem by Thomas Campion*. See Discography for details of recording of this and all other works mentioned in the interview.

2 'Affine Music,' PhD diss., Princeton U, 1973.

3 *Twelve-Tone Tonality* (Berkeley: U of California P, 1977).

4 'glom:' American slang for take, steal.

5 See Alistair Riddell, 'Composing the Interface,' PhD diss., Princeton U, 1993.

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Discography

Solo Albums

For the Moment, Chords, Now That You Mention It, Same Scene Nine Years Later, Andalusia and Shadows. Conversation Pieces, with Paul Lansky, keyboards & computer, Bridge Records, CD9083, 1998.
Things She Carried, Bridge Records, CD 9076, 1997.
Strut, Tender Ladies, Delia, Ash Grove, Hammer, Barbara Allen, Howl, Pine Ridge, Wayfaring Stranger, Pretty Polly, Blue Wine and Motherless Child. Folk Images, Bridge Records, CD 9060, 1995.
Idle Chatter, Word Color, just_more_idle_chatter, The Lesson, Notjustmoreidlechatter and Memory Pages. More Than Idle Chatter, Bridge Records, CD 9050, 1994.
Six Fantasies on a Poem by Thomas Campion and Still Time. Fantasies and Tableaux, CRI, CD 683, 1994.
Table's Clear, Night Traffic, Now and Then, Quakerbridge and The Sound of Two Hands. Homebrew, Bridge Records, CD 9035, 1992.
Smalltalk, Guy's Harp, Late August and (with Steve Mackey) *Not So Heavy Metal. Smalltalk*, New Albion Records, NA030CD, 1990.

In Collections

Crooked Courante [gtr]. On *Newdance*, with David Starobin, Bridge Records, 9084.
With Steve Mackey, *Dancetracks* [gtr & computer]. On *Lost and Found*, Bridge Records, 9065.
Hop [marimba & vn]. On *Combo Platter*, Marimolin BMG/Catalyst, 62667-2.
Stroll [chamb ens & computer]. On *Composer in the Computer Age* vol.3, Centaur, CRC 2213.
As If [str trio and computer]. On *Virtuoso in the Computer Age* vol.1, Centaur, CRC 2110.
With Brad Garton and Andy Milburn, *Wasting*. On *Inner Voices*, Centaur, CRC 2076.
As It Grew Dark. On *Computer Music Currents* vol.11, Wergo, 2031-2.