JERRY TABOR
engaging Causey *(1996)*

engaging Causey was composed using Csound, C-language programs written for automated score file generation, and various digital editing and processing programs on an MTU Microsound Digital-Audio-Workstation. Structural concepts were borrowed from the domain of chaos theory, and in the piece are represented as sonic articulations of behavioral principles revealed in the Feigenbaum Final State Diagram. During the compositional process an abstraction of the diagram was created that eventually served as an indeterminate score. This new structure allowed the process of composing to become divorced from the final state diagram and allowed for more abstract behavioral principles to be intertwined with the concrete local articulation of the system through "composed improvisation."

Perhaps one of the most salient formal traits the final state diagram and the score have in common is the overall evolution from ordered or predictable behavior toward that of chaos or unpredictability. This aspect of the structure is particularly significant because many of the local sounds themselves evolve in the opposite manner, that is, from chaos to order (the latter of which appears in the form of periodic cycling). While sounds seem to progressively lose their contextual organization on the largest structural level of the composition, they are, in fact, slowly crystallizing into a pseudo periodicity of three distinct sound families involving various forms of (1) noise, (2) pulse, and (3) sustained sine waves.

The composition's title was inspired by the correlation Tabor found between his auditory experience of ***engaging Causey*** and his optical experience of the landscape visible while traveling south on Highway 114 toward Causey, NM, the childhood home of his father.

Jerry Tabor is a composer of acoustic and computer music, and a researcher in the areas of composition theory (a subdomain of cognitive musicology) and chaos theory and creativity theories as they apply to the compositional process. His compositions and research have been presented throughout the United States and his book on pioneering composer and cognitive musicologist Otto Laske, entitled *Otto Laske: Navigating New Musical Horizons*, is forthcoming from Greenwood Press. Tabor

is Assistant Professor of Music at Salisbury State University (Maryland) where he coordinates the composition, computer music, and theory programs in the Department of Music. He has also served on the faculties of Trinity College (Washington, DC) and the University of Maryland Baltimore County where he taught courses in composition, electronic music, interdisciplinary arts, and creativity theories. He holds D.M.A. and M.M. degrees in composition from the University of Maryland at College Park and a B.M. in theory and composition from the University of New Mexico.

JEAN-CLAUDE RISSET
Saxtractor (1995)

Saxtractor is a piece for soprano and tenor saxophone and computer-generated tape. It is a variant of the fourth part of an earlier piece, *Attracteurs étranges*, for clarinet and tape. This adaptation was realized for Daniel Kientzy, who premiered the piece at the International Computer Music Conference in Hong Kong (1996). The tape thus comprises mainly clarinet sounds processed by computer in several ways, notably spatialization and time stretching, as well as mixing. The piece stages dialogues and close encounters between the live saxophone player and the tape sounds.

Saxtractor tries to illustrate metaphorically the idea of attractors as geometrical descriptors of dynamic systems: punctual attractors, which correspond to equilibrium positions, and strange attractors (with a fractal structure) which correspond to chaotic systems whose destiny is highly sensitive to initial conditions. The saxophones occasionally resort to turbulent flows and multiphonics, which are instances of chaos. The unfolding of the piece uses polar pitches, cycles or quasi-cycles and bifurcations.

Jean-Claude Risset studied composition with Suzanne Demarquez and André Jolivet, and science at the *Ecole Normale Supérieure* where in 1967 he received his Doctorat ès-Sciences. For three years Risset worked with Max Mathews at Bell Laboratories to develop the musical resources of computer sound synthesis: imitation of real timbres (brass synthesis, 1965; and pitch paradoxes, synthesis of new timbres, and sonic development processes, 1967-1969). Risset later set up computer sound systems at Orsay (1970-1971), at the University of Marseille-Luminy (1974), and at IRCAM, where Pierre Boulez asked him to head the Computer Department (1975-1979). Risset also taught at

Dartmouth College and Stanford University. As a composer in residence at the Media Laboratory at MIT from 1987-1989, he implemented the first real-time interaction between performer and computer with acoustic piano sounds. Presently, Risset is Director of Research at CNRS and continues his work in Marseille. Risset has been awarded the *Prix du Groupement des Acousticiens de Langue Française* (1967) and the *Medaille du CNRS* (1972); his musical works have similarly been recognized at the Dartmouth College International Electronic Music Competition (1970), the *Concours International de Musique Electroacoustique, Bourges* (1980 and 1992), and the *Prix Ars Electronica* (Golden Nica, 1987). Other prestigious awards include the *Grand prix de la promotion de la musique symphonique—SACEM* (1981), the Silver Medal from the CNRS (1988), and the *Grand Prix National de la Musique* (1990).

Daniel Kientzy holds a doctorate in aesthetics, science and technology of art, and is an international artist dedicated to the creation of contemporary music (electronic music in particular), for whom more than 300 works have been written. Kientzy is the only person in the world who has played the entire family of saxophones—seven different ones. He is the author of the important treatise on the instrumental technique of the saxophone entitled *Saxology*.

OTTO LASKE
Furies and Voices (1990)

Furies and Voices comprises three movements, entitled *Prelude*, *Scherzo*, and *Song*, each lasting about three minutes. It owes its title to the progression from an anonymous, and at times furious, sound stream* to the intimation of human song, intoned in counterpoint with relentlessly moving sound masses. (The *human sound* is derived by way of digitally sampling computer sound taken from his earlier composition *In Memory* (1987/88), for trombone and tape.) The piece was commissioned by the Centre for the Arts, Simon Fraser University, Burnaby, B.C., Canada, and is dedicated to Barry Truax. *Furies and Voices* received its premiere performance at the 10th Anniversary Concert of NEW-COMP (the New England Computer Music Association founded by Laske and Curtis Roads), in Boston, MA, in April of 1991. A description of the compositional process underlying the piece can be

found in *Otto Laske: Navigating New Musical Horizons* (Jerry Tabor, ed., forthcoming from Greenwood Press).

* Note: Some sounds are highly demanding of some speaker systems.

Otto Laske is a composer, poet, cognitive musicologist, and psychologist. His musical work comprises 65 compositions, nearly evenly divided between vocal/instrumental and tape pieces. Laske's German and English poetry consists of seven collections, the most inclusive of which are *Becoming What I See* (1985-95) and *Brunnentür des Wunsches* (1955-1995; Munich, Germany: Rind and Schlegel, 1998). Most of his musical works are based on computer-assisted score composition, a way of working that has informed his composition theory and cognitive musicology generally. In his recent musical work, Laske combines his poetic and musical talents, using computer sound synthesis to "stage" his lyric poetry. His music has been widely performed, nationally and internationally. Today, he is considered one of the pioneers of cognitive musicology and his work is celebrated by the international Festschrift *Otto Laske: Navigating New Musical Horizons*. In the seventies, Laske taught music in Canada, The Netherlands, and the USA, and since the eighties, has been an independent composer. Laske is presently working as a clinical psychologist in Boston, MA, with an emphasis in neuropsychology.

AGOSTINO DI SCIPIO
5 Piccoli Ritmi (1996)
computer-processed guitar sounds and voice on tape

Each of the five sections in **5 Piccoli Ritmi** is announced by the Spanish speaking voice of a friend, Celia Pereyra. In the last section Celia also reads five lines from a poem by the Chilean scientist Humberto Maturana (who himself describes these lines as "juvenile, not very good poetry").

What is death for that who sees it? / What is death for that who feels it? / Unknown pain, unconceivable / pain brought about by egotism, for the one / silence, or even void nothing, for the other

The compositional process behind **5 Piccoli Ritmi** consisted of three main steps, the second and third of which were performed in real time:

1) The sound of scraping and scratching against a guitar's bronze wound E-string was recorded into a computer sound file (some harmonics and slapped D-string were also featured).
2) Short excerpts were selected, isolated and then mixed together in a different arrangement driven by iterated nonlinear functions (from the mathematics of chaos theory). This allowed for interesting repetitions and variations of pre-recorded chunks, the timing of which was dependent on the amplitude of sounds as generated by the system, diffused through loudspeakers, and fed back into the computer via microphones.
3) The excerpts were then processed with granulation algorithms; the amplitude shape of these recycled sounds was used to modulate the granulation parameters (density, grain, pitch and duration). Accordingly, a kind of self-modifying system was established through the process described in the latter part of step two. The emergence of gestural events resulting from contact with ambient sound is analogous to the emergence of life in what Maturana calls "autopoietic" systems. In section five, the morphing of some of the guitar sounds was added with Celia's reading of Maturana's poem.

5 Piccoli Ritmi was created by programming the KYMA/Capybara computer music workstation, at Laboratorio Musica e Sonologia (L'Aquila). It was awarded second prize in the "experimental music" category of the *Concours International de Musique Electroacoustique, Bourges* (1996).

Agostino Di Scipio

lives and works in L'Aquila, Italy. He holds degrees in composition, electroacoustic music and aesthetics of music. His compositional output includes tape music and works for live instrumentalists and interactive computer systems. He has received awards for his work in competitions such as *Concours International de Musique Electroacoustique, Bourges* (1991 and 1996), and *Prix Ars Electronica* (1995). Recently, he has been involved in the creation of audio-video installations. Di Scipio, composer-in-residence at Centro di Sonologia Computazionale (University of Padova) since 1987, has also been Visiting Composer at Simon Fraser University (1993) and at Sibelius Academy (1995). He is presently a professor of Electronic Music at the Conservatory of Bari. His research includes unconventional sound synthesis techniques and various issues in the history and methods of art, technology and science. His writings have been published in numerous international music periodicals. Having served as Editor of the anthology *Teoria e prassi della musica nell'era dell'informatica* (Bari: G. Laterza), and of the Italian translation of Gottfried Michael Koenig's

Genesi e forma (Rome: Semar), Di Scipio is currently editing the Italian translation of Michael Eldred's *Heidegger, Hölderlin and John Cage*.

MICHAEL HAMMAN
replâtrage (1993/1995)

The bassoon is made from wood and metal parts. Together these form a resonant tube, a collection of precisely placed remote-control switches, and a lip-controller. These components collectively generate particular acoustic behaviors. ***replâtrage*** concerns a framework for the differentiation of the instrument's technologies while urgently attempting to cancel its "literature."

All synthesized sounds are the result of computer-assisted transformations of recorded bassoon sounds using a software system based on phase vocoder analysis/resynthesis written by the composer. This recording of *replatrage* was made at the Krannert Center for the Performing Arts, Jon Schoenoff audio engineer.

Michael Hamman composes works for solo instruments, instrumental ensemble, tape, and computer. His writings appear in *Interface, Computer Music Journal, Sonus, The Music of Morton Feldman* (Thomas DeLio, ed., Greenwood Press), and in *Otto Laske: Navigating New Musical Horizons* (Jerry Tabor, ed., forthcoming from Greenwood Press). His work has been presented at ICMC (1991, 1994, 1997), "Technology and the Composer" conferences in Luxembourg and College Park, MD (1994), ICAD (1997), the Society of Composers Conference (1993), and the Contemporary Music Festival in Seoul (1991), among others. His music is recorded on the Neuma label.

Hamman studied composition and theory at the New England Conservatory of Music, the University of Maryland at College Park, and the University of Illinois at Urbana-Champaign where he received his doctorate in music composition. In his research, he investigates the consequences that data structures, technological metaphors, and other epistemological frameworks have on the performance of music composition and other problem-posing activities. He makes texts, software systems, and compositions that trace this investigation. He also develops music and audio technologies and conducts research at the National Center for Supercomputing Applications at the University of Illinois Urbana-Champaign.

Charles Lipp, composer-bassoonist, studied composition with Herbert Brün and Bogoslav Schaffer, and studied bassoon with Leonard Sharrow and Milan Turkovic. He holds a doctorate in composition. Lipp composes for various instrumental groups and performs with the improvisation ensemble "Walleye" and as a soloist.

MARK SULLIVAN
thirty-two prose segments: a computer sound in child's speech
(1995,1997)

Using a sound editing program, I analyzed a number of selected segments of speech, calculating the sequence of temporal proportions formed by the words. I devised a set of transformations from the proportions in one sequence, through some stages, to the proportions in another. Each sequence, except the first, serves as a point of arrival, then becomes the next point of departure for the next set of transformations (i.e., one with different rules and characteristics from its predecessor), until finally one is reached, dangling, with a loose end, pointing to some goal not yet reached.

The speech segments provided structural models for the temporal proportions that nest both speech and computer sound. The lengths of the segments vary, and the boundaries between one segment and another are often blurred: some segments have little speech, some none, some have sequences of many speech fragments and others relatively long segments of speech, and so it goes for the computer generated sound and the combinations of the two as well.

I did not try to create any relationship between the meanings of the speech fragments (heard in English and Spanish) and the computer sound. Not wanting any narrative continuity, the speech sounds were preserved as speech fragments, left on their own, in terms of sound and meaning, and in terms of the rough recording quality and varying ambient environments. They are deliberately preserved to heighten their contrast with the digitally generated sounds, leaving audible scars of the production process in the work.

I chose to explore the musical consequences of a small set of timbres, and used three granular synthesis programs to generate the computer sound. The distinct design of each program's data format,

conceptual framework, and constraints made it a seductive experiment to work with each on one composition.

<div align="right">—MS</div>

Mark Sullivan received his doctorate in music composition from the University of Illinois at Urbana-Champaign. Since 1985, he has taught composition, computer music, and courses dealing with the relation between art and society at Michigan State University where he is an Associate Professor and Director of the Computer Music Studios. He has written a book on musical gesture and has done research on the relationship between music, language, and movement. He is currently developing a set of computer programs that assist the composer in the process of composition. He has been invited to speak at national and international conferences on the relationship between art, technology and society. His compositions for acoustic instruments and for computer-generated sounds have been performed throughout the United States, in Europe, and Asia.

INSOOK CHOI
The frog in a machine (1997)

As long as the frog does not turn into a prince I can play with the frog. If it turns into a prince I may play with the prince, too. But I don't know which one is better.

In the last few years I have been cultivating four frogs in a machine. The present frog is called an experimental frog. *The frog in a machine* is a study of enharmonic changes with the Chua's circuit. The series of experiments and documentations were aimed at achieving enharmonic shifts from one phase trajectory to another in the system. The method set for the experiments often presented stressful engagements. These engagements appeared when walking along monodic sequences, facing the walls of chaos, and frolicking in the unwanted intermittent regions.

One of the compositional tasks was to unstress them without changing the face of the frog. When they were allowed to be fully played out within the boundary conditions that were specified, they disarmed the description of what was wanted and not wanted. In this study the method for enharmonic changes

does not often coincide with the perception of the enharmonicity. Shamelessly this problem is left unresolved. I wished to compose the tonalities that are particular to the experimental systems.

This work involves a chaotic circuit and its simulation in a real-time interactive software sound-synthesis environment. The Chua's circuit is an experimental and numerical paradigm for conducting research with chaotic systems. It was devised by Prof. Leon Chua (University of California Berkeley) as the simplest class of electronic circuits able to exhibit chaotic behavior. Sound was synthesized both in circuit hardware and in a computational simulation installed as a plug-in to the National Center for Supercomputing Applications (NCSA) Sound Server, an interactive software environment. The composition was computed and mixed in real-time using parallel synthesis processes distributed and synchronized across a number of workstations.

—IC

Insook Choi currently serves as composer-in-residence at the NCSA and as a Research Specialist in Human Computer Intelligent Interaction at the Beckman Institute at the University of Illinois Urbana-Champaign. She has created numerous interdisciplinary projects across music performance, cognitive science and engineering. Her creative life has been a dialectical process between art and technology. This is reflected in her pioneering work on human-machine performance issues with new technology. All of her research projects are composition-driven; her publications are closely coupled with compositions and can be found in various proceedings and research journals in the fields of engineering (e.g., IEEE, HICS, and SMC, and the *Journal of the Franklin Institute*) and music (e.g., the AIMI, the ICMA and the *Journal of New Music Research*). Choi's music has been performed and broadcast in Europe, Asia and the United States. Her composition, *lit.*, appears on Centuar Record's CDCM vol. 23.

THOMAS DELIO
m,nce (1997) and *plinh,h* (1997)

m,nce and *plinh,h* are typical of my recent compositions in that they are constructed from discrete segments of music which, though they co-exist as a group, never become fixed with respect to one another through hierarchical relationships. To achieve this end I avoid transitions linking individ-

ual events as well as anything that might convey a sense of continuity and connection and, instead, try to make every aspect of the music seem segmented and separated. My goal is to isolate and emphasize the direct experience of each moment. As such, I am always more concerned with presentation than development and the identification of junctures between apparently unrelated sonic events. Such unrelatedness, I believe, forces the listener to confront each gesture—each sound—as if heard for the first time and adds a heightened sense of immediacy to the musical experience. In *m,nce* I've created a series of four sonic events of very different design and color, which I believe resonate with one another in exceptional and unexpected ways. In contrast, in *plinh,h* I use the more neutral and austere shades of white noise and sine waves, highlighted with one very brief moment of color at the end. Though these works are quite short, in no way are they intended as sketches or miniatures. Rather, they are full scale works each of which consists of a few highly compressed sound events stripped to their essentials. These events are, in turn, surrounded by a silence that is activated by their presence. Finally, I should note that, as is the case with many of my tape pieces, *m,nce* and *plinh,h* were written specifically for the recorded medium and are not intended for presentation in the concert hall. The titles of these works are borrowed from the poetry of P. Inman, a constant source of pleasure and insight.

—TD

Thomas DeLio is a composer and theorist. His compositions are published by Smith Publications (Baltimore, Maryland, USA) and Editore Semar (Rome). His works are performed throughout the world and are recorded on Wergo, Spectrum, Neuma, 3D Classics and Capstone. Articles about his music have appeared in *Perspectives of New Music*, *Interface*, and *Leonardo*. As a theorist, DeLio has published several books including *The Music of Morton Feldman*, *Circumscribing the Open Universe*, *Contiguous Lines: Issues and Ideas in the Music of the '60's and '70's*, as well as numerous essays in such journals as *The Musical Quarterly*, *MusikText*, *Interface*, *The Journal of Music Theory*, *Perspectives of New Music*, *Contemporary Music Review*, *Revue d'Esthetique* and *Artforum*. DeLio is also the recipient of numerous grants, awards and commissions.

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