About This Issue

The year 2007 marks several major anniversaries in computer music. First of all, a half-century ago twin disciplines were born: 1957 witnessed the premiere of the first musical composition created by computer algorithms and also the first algorithmically synthesized audio samples. At the University of Illinois, Lejaren Hiller and Leonard Isaacson completed the *Illiac Suite,* a composition for string quartet whose notes were determined by a computer program. And at Bell Laboratories, Max Mathews introduced Music I, the first of what came to be known as the Music N family of languages: software for generating sequences of numbers rendered through a digital-to-analog converter as audio waveforms and controlled at a higher level as musical notes.

In honor of the birth of computer-based algorithmic composition, we present an interview with one of its best-known practitioners, the one who also has probably engendered the most controversy outside the field, because of his computer emulation of historical styles. David Cope's work is well known to readers of this journal, thanks to his articles published herein and elsewhere, but especially owing to his series of books and CDs on algorithmic composition. This interview with Mr. Cope takes a decidedly nontechnical tack, largely avoiding engineering details and instead revealing the composer's perspectives on aesthetics, style emulation, creativity, authorship, and artificial intelligence. Examples of Mr. Cope's compositions appear as music notation in this interview and as audio on the DVD accompanying the next issue.

Proceeding chronologically, the year 2007 also represents the 40th anniversary of the invention of the sound-synthesis technique that eventually brought digital synthesis out of the laboratory and to the masses. In 1967, John Chowning of Stanford University, while experimenting with a version of Music IV, noticed the rich and dynamically controllable spectra produced by linear frequency modulation (FM) at audio rates (which differs from FM radio in that the carrier frequency lies in the range of hearing and the signal never gets demodulated). FM sound synthesis was subsequently employed in Jean-Claude Risset's *Mutations* (1969) and many later computer-synthesized compositions, and in time it surfaced as the engine behind Yamaha's groundbreaking digital synthesizers, notably the DX7.

Thirty years ago, John Chowning created the piece that many regard as his finest. *Stria* received its premiere in October 1977 in Paris. In a number of ways, *Stria* represents a quintessential computer music composition, being so intrinsically dependent upon a computer for its realization. Before composing *Stria,* Mr. Chowning had spent much time experimenting with the sorts of spectra that could be created by FM synthesis. For *Stria,* he sought a novel way to structure a composition so that its timbre and its tuning system would be linked, analogously to the linkage between the harmonic series and the simple-integer frequency ratios at the heart of the traditional Western scale. He realized that if he used powers of the Golden Mean (approximately 1.618:1) for his FM algorithm's carrier-to-modulator ratios, the resulting inharmonic spectra would contain frequency components related by the same interval. Therefore, pairing these spectra with a tuning system based on a Golden Mean "pseudo-octave" could yield an alignment of partials similar to that which occurs when notes having harmonic spectra are tuned to the traditional musical consonances. The Golden Mean pervades this composition, from the lowest level of sound synthesis, through the choice of pitches, to the highest level of musical form. Beyond its algorithmic use of the Golden Mean and FM synthesis, *Stria* could also be considered computer-inspired in its use of the recursive programming paradigm, which had first been introduced in the LISP programming language and which was available in the Stanford Artificial Intelligence Language (SAIL) that John Chowning employed (along with Music 10) for *Stria.* The creative and philosophical implications of recursion must have been "in the air" during that period; the visual beauty of fractals—unknown to Mr. Chowning at the time—had been discovered a few years before, and soon afterward,

Front cover. John Chowning created this time-versus-pitch diagram of his composition *Stria* from score data derived by Olivier Baudouin, Kevin Dahan, and Matteo Meneghini. The artwork also incorporates inversion calligraphy drawn in 1978 by Scott Kim (© 2007 Scott Kim, scottkim.com; used by permission).

Back cover. An excerpt from the opening pages of David Cope's Emmy-Beethoven Symphony, movement #1. (Reprinted with permission of David Cope and the publisher, Spectrum Press.)

Douglas Hofstadter (who had some conversations with the composer at Stanford around then) published his bestselling book *Gödel, Escher, Bach,* which expounded upon recursion and self-similarity along with related topics such as self-referentiality, artificial intelligence, and consciousness. Although *Stria*'s source code employs recursive programming sparingly, the integration and unification of multiple levels clearly represent a major compositional goal in this work, and the Golden Mean itself expresses a self-similar relationship.

The rest of this issue's articles form, in effect, a special issue devoted to a new understanding of *Stria.* The Summer 2000 issue of *Computer Music Journal* showcased "new implementations of electroacoustic classics," specifically, recent realizations of older works by Karlheinz Stockhausen and Iannis Xenakis. Similarly, the research described in the present issue has led to the reconstruction of *Stria* in modern computer languages. John Chowning's own brief article in this issue serves as an introduction to the other four articles, explaining how the authors, from several disciplines, came to be involved in projects related to *Stria.* Computer scientist and electrical engineer Matteo Meneghini's article (written, like the others, in close consultation with John Chowning) presents a detailed explanation of *Stria*'s compositional technique, based on the author's examination of the composer's original source code. The article by Laura Zattra, on the other hand, presents an equally fascinating study having a musicological perspective based on philology. Ms. Zattra uncovered multiple versions of the piece and traced their origins. The final two authors, composers Olivier Baudouin and Kevin Dahan, have managed to reimplement *Stria* in current programming languages—no small feat, considering that SAIL and Music 10 are obsolete languages and that part of *Stria*'s source code is lost. The annual DVD accompanying the next issue of the *Journal* will contain not only audio for the reconstructed *Stria,* but also video showing a spectrographic visualization of the piece, as well as scanned documents from the Stanford University library archives, such as the remaining original source code and the composer's notes. We thank the authors and especially John Chowning, without whose help this special issue would not have come to fruition.