About This Issue

This issue commences with an obituary for the renowned British composer Jonathan Harvey, who died in December after a long career that produced some landmark pieces of computer music. We are grateful to Michael Clarke of the Centre for Research in New Music at the University of Huddersfield, UK, for writing this thoughtful memorial.

Following the News section, we present an extended version of the paper that won the Best Paper award at the 2012 International Computer Music Conference in Ljubljana, Slovenia. The authors examine a number of compositions that use audio feedback, going back to 20th-century microphone-based works by Cage, Tudor, Lucier, and others, and including 21st-century creations such as Toshimaru Nakamura's *No-Input Mixing Board*, in which a mixer's outputs are fed back to the inputs, with no audio source and no intermediary acoustic transmission. Analyzing a number of such works, the authors derive a typology that categorizes feedback systems according to six features: encoding (analog versus digital), information rate (audio versus control), environment (open versus closed), triggering (internal versus external), adaptivity, and absence or presence of human interaction.

Three of this issue's articles revolve around the theme announced on the front cover: challenges of timing in digitally mediated performance. The first concerns the problem of synchronization among geographically dispersed musicians who perform together over the Internet. The specific case examined is that in which an orchestral conductor directs musicians in multiple locations. Because current Internet technology necessitates a significant delay in transmission, the musicians cannot hear each other at the same moment in time, nor synchronize to the remote conductor's baton. The solution offered is a method of predicting where the conductor's baton will be at a short offset into the future, so that the musicians can follow a digitally generated visualization of the expected baton motion. The current article compares various prediction algorithms and describes a conductor's evaluation of simulated performances that used these different techniques. (A system for actual use in distributed performance remains to be implemented.)

The second article on timing in performance offers a solution to a common problem in popular music, wherein expectations set by studio recordings lead musicians to incorporate playback of pre-recorded audio into their live performances. To stay in time with the pre-recorded material, a drummer may have to wear headphones onstage to hear a click track, and the musicians are deprived of the option of expressively deviating from the studio recording's tempo and timing. The authors solve this problem by reversing the direction of synchronization: Their publicly available software controls the tempo of a sequencer by "listening" to the human drummer.

The third article on the theme of timing takes a more philosophical tack. The authors investigate how a precomposed piece of electroacoustic music can be represented in such a way that a performer can interpret it with flexible timing. They reach back to ancient Greek thinkers to find two conceptions of time: the arrow, or ordered time-line, which essentially involves a perspective from a point outside time; and the river, or time-flow, in which the observer is immersed in the present moment. In this duality, the authors see a correspondence with the duality between what they term the writing-oriented paradigm, reflected in sequencers, and the performance-oriented paradigm, reflected in real-time synthesis languages like Max. They present a formalism that joins the two paradigms, as implemented (at least in part) in the Acousmoscribe music software.

The issue's final article considers timing and pitch outside the real-time realm of performance. Instead, the problem domain is automatic (or semi-automatic) transcription, in which a recorded performance is analyzed and the musical data extracted (often for display as common music notation). Such data are particularly lacking for music in oral traditions, including the flamenco singing that is the subject of the authors' investigations. The article presents the

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Front cover. A photo from this issue's News section, showing Kirstine Elise Pedersen performing last November in Copenhagen at the digital arts festival called "re-new." (Courtesy of Iben Johansen. Photographer: Jeppe Hvirvelkjær.)

Back cover. A propos of this issue's article on feedback systems, an etching depicting literal feedback, from *De Lapide Philosophico,* published in 1625 by Lucas Jennis in Frankfurt.

authors' transcription algorithm and evaluates different pitch-detection techniques for their suitability in the context of flamenco singing.

In this issue's Reviews section, Ross Feller discusses a CD by Elizabeth Hoffman (who contributed an article to our Winter 2012 issue). A team of reviewers report on a particular session at the 2012 conference of the International Society for Music Information Retrieval (ISMIR), held in Porto, Portugal. Finally, two reviewers offer contrasting opinions of a book on early uses of computers in the arts, including the efforts of composers James Tenney and Alvin Lucier.