About This Issue

We begin this issue's articles with an interview by a former interviewee. Edmund Campion, who was featured in our Winter 2004 issue, converses here with noted composer Kaija Saariaho and with her spouse, the multimedia artist and composer Jean-Baptiste Barrière. The interviewees start by discussing recent work, such as Saariaho's 2015 opera *Only the Sound Remains.* She states that in earlier works the electronics were mostly an extension of the orchestration, but now the electronic part has assumed a more important role. When writing for electronics, Saariaho starts with her aural imagination, then with her technical collaborator she finds a means to realize that vision; she doesn't write with a tool's constraints in mind. The interviewees discuss the early stages of their careers in the 1980s at the Institut de Recherche et Coordination (IRCAM) in Paris, where Saariaho studied computer music composition and where Barrière directed musical research, pedagogy, and production. Comparing the current music world with those early years, Barrière finds a paradox: Everyone now uses computers in music production, but comparatively few people are pursuing the original "utopias" of computer-assisted composition and sound synthesis. In his own current work, Barrière explores the interaction between music and image, and he is intrigued by dynamic scores and "floating structure."

On a related note, Cat Hope's article surveys animated notation, which she defines as "a predominately graphic music notation that engages the dynamic characteristics of screen media." Antecedents include the "visual music" of the early 20th century, in which images were, for example, painted on film soundtracks, and the "graphic notations" of the mid 20th century, in which composers of an aleatoric bent sought a freer association between image and sound than the literal mapping of traditional music notation. Hope points out that despite all the creative possibilities offered by computer technology, nearly all of the effort in notation software has gone toward rendering conventional music notation rather than exploring new sorts of visual representations that take advantage of the dynamic, interactive affordances of software. To illustrate some fruitful directions for creative practice, she presents excerpts of her own compositions and those of others.

Next, Lauren Hayes presents an expanded version of her award-winning paper from the 2016 International Computer Music Conference (ICMC) in Utrecht, Netherlands. In this article, she describes a large-scale study on the teaching of electronic music technology to 900 Scottish schoolchildren aged eight to twelve. Using inexpensive hardware in a curriculum designed by Hayes, the students learned techniques of collaborative composition, hardware "hacking," instrument building,

field recording, and improvisation. Feedback about the experience was extremely positive, with a main logistical challenge for the future being how to train schoolteachers new to this subject matter.

Our Spring 2017 issue contained an article on the spatial perception of sounds emanating from a 20-channel icosahedral loudspeaker system known as the IKO. Whereas that article focused on psychoacoustic experiments, the article by Franz Zotter et al. in the present issue covers a broader range of topics concerning the IKO device. The authors review the literature on beamforming—i.e., the use of arrays of transducers to emit signals that are more or less focused in specific directions. They describe the IKO hardware and software, the latter including digital audio workstation (DAW) plug-ins for controlling the IKO as well as software for simulating the IKO binaurally for headphone listening. The article lays out some practical considerations for using the IKO in concerts. The second half of the article goes into the principles and mathematics behind beams produced by the IKO and similar loudspeaker arrays. The authors explain the design of filters used for configuring the IKO's DAW plug-ins. They introduce a novel criterion for limiting loudspeaker excursion, in order to operate the IKO safely, and they present a practical study with microphone measurements of radiation patterns that verified the system design.

Front cover. Two static excerpts from animated scores (originally in color), by composers Cat Hope (top) and David Kim-Boyle (bottom). See the article by Cat Hope.

Back cover. A photograph of the IKO icosahedral loudspeaker array, from the article by Zotter et al.