

Glimmer: Lights, Orchestral Performance, and Audience Participation

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Figure 1. The audience and orchestra collaborate to perform *Glimmer* at the Hamabada Art Center in Jerusalem, Israel, March 25, 2006
(Photo © J. Freeman)

Keywords

Music, audience, participation, algorithmic composition, orchestra

Abstract

Glimmer, a composition for chamber orchestra and audience participation created by the author, uses novelty light sticks, video cameras, computer software, multi-colored stand lights, and projected video animation to create a continuous feedback loop in which audience activities, software algorithms, and orchestral performance together create the music.

In most orchestral performances, the audience sits quietly in their seats, watching a conductor whose back is turned towards them. They have little interaction with the musicians, the composer, or each other; they are afraid even to cough or sneeze lest they disturb the performance. *Glimmer* (Figure 1), a composition for chamber orchestra and audience, seeks to transform the audience from passive spectators into active participants. It uses novelty light sticks, video cameras, computer software, multi-colored stand lights, and projected video animation to create a continuous feedback loop in which audience activities, software algorithms, and orchestral performance together create the music.

Glimmer's audience input interfaces consist of 4-inch red and blue battery-operated Buzline LED light sticks [1] coupled with four consumer-grade camcorders. The camcorders capture video of the 200-600 audience members as they wave the sticks back and forth and switch them on and off. A computer running Max/MSP/Jitter extracts analysis data from their activities, pre-processing each frame with color plane extraction, image masking, and threshold noise reduction. The software then

assigns a single data value to each of several audience groups to describe their activities; it calculates the relative amount of light stick motion for each group, using a feedback filter to add motion trails to the image and summing the pixels.

The data values describing each audience group influence the music played by a corresponding group of three or four musicians in the orchestra. On a basic level, the larger the data value, the louder the corresponding musicians play and the faster notes pass from one player in the group to the next. On a higher level, a comparative analysis rewards groups whose data values have faster rates of change (i.e. larger derivatives): their musicians tend to play more often, tend to play at a higher dynamic, and tend to change pitches more frequently. Each group is assigned a simple algorithmic texture of crossfading notes or clusters based on their rank in the comparative analysis. These mappings from ranking to texture algorithm change gradually over the course of the piece, giving the music a large-scale arch-form structure.

Like the audience input interfaces, *Glimmer's* output interface to the orchestra relies on LED lights, but of a significantly different kind. Each player's music stand holds a 1-foot Color Kinetics iAccent light tube [2] housing 43 LEDs and a microprocessor. These outdoor-grade, waterproof, virtually unbreakable lights are daisy-chained to power/data supplies, which receive independent 24-bit RGB color values for each musician, sent over an Ethernet/UDP network from the computer software.

Each musician's written part explains how to interpret this dynamic color-based score. The color family of a musician's light — brown, green, blue, or pink— indicates which of four pitches to play. The brightness of the light indicates the dynamic at which to play, and short flashes of light give time to prepare for note changes and accents.

The choice of these input and output interfaces was initially motivated by practical concerns; they needed to meet formidable requirements for scalability, reliability, usability, and cost, and the system needed to work with just a few hours of setup, calibration, and rehearsal due to budget limitation and union restrictions. There was no opportunity to rehearse the piece with a large audience before the premiere.

While the technology behind the audience light sticks is incredibly simple, the Buzline stirrer was the only commercial product offering the right combination of brightness, ease of use, silent on-off operation, and low price. (It would have been cost and time prohibitive to build 600 lights from scratch.) And the robustness and reliability of the Color Kinetics computer-controlled lights for the orchestra, along with their reliance on standard communication protocols and their rapid on-stage setup, made them a far more appealing choice than a custom-built interface.

But while light-based interfaces were used for largely practical reasons, they eventually became an integral aesthetic component of the work. The dark space of the concert hall, punctuated by points of light, helped to create the sense of community necessary to encourage the audience's participation. And the mild glow cast by both the audience and musicians' lights [3] complemented the sparse, slowly shifting harmonic landscapes of the music.

Acknowledgement

Glimmer was commissioned by the American Composers Orchestra and premiered by them at Zankel Hall at Carnegie Hall. It was funded in part by the Composer Assistance Program of the American Music Center and Meet the Composer's Creative Connections program.

References and Notes

[1] Buzline Light-up Stirrers, catalog numbers 1040650 (red) and 1040651 (blue), available at <www.buzline.com>. These products are marketed as novelty light-up cocktail stirrers.

[2] Color Kinetics 1-foot iColor Accent lights (catalog number 101-000008-00) and PDS-500e power supply (catalog number 109-000009-00), available at <www.colorkinetics.com>.

[3] Video files documenting these aspects of *Glimmer* are available at <www.jasonfreeman.net/glimmer/>.

Author Biography

Jason Freeman's music breaks down conventional barriers between composers, performers, and listeners. He has received commissions from the American Composers Orchestra, Carnival Center, Rhizome, Turbulence, and Speculum Musicae, grants from Meet the Composer, the American Music Center, and ASCAP, and fellowships from Akademie Schloss Solitude and Columbia University. His interactive media art has been exhibited at the Lincoln Center Festival, the Boston CyberArt Festival, the Transmediale Festival, and the NTT InterCommunication Center, and his works have also been featured in the *New York Times*, *Billboard*, and *USA Today*, and on National Public Radio. Freeman received his B.A. from Yale University, which also awarded him the Louis Sudler Prize, its highest honor in the arts, and an M.A. and D.M.A. in composition from Columbia University. He is currently an assistant professor of music at Georgia Tech in Atlanta, where he teaches music technology and directs Sonic Generator, the university's ensemble in residence.

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