A Software Interface between Human and Computer Virtual Players for Music Performance in Concert

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ALEJANDRO VIÑAO: THE ARTIST’S PERSPECTIVE

Over the years, I have written a number of “mixed” compositions (with parts for both computer and live players performing on conventional instruments). This typically involves creating large numbers of complex sound files that must be arranged so that a computer can play them in concert. In my music the predominance of complex polyrhythms as well as irrational rhythms—hocketed or interlocked between the computer part and the live players—requires a degree of synchrony between the electroacoustic part and the live performer that is—by any standards—extreme. Another common feature of my compositions is the creation of the perceptual illusion that a “live” sound produced by a performer on stage is transformed from within in a continuous and gradual fashion until it develops a different, new timbre. Although this process usually does not involve a rhythmic figuration, applying mostly to sustained notes, it also requires extreme accuracy in the time domain so that the “seams” of the transformation are not revealed to the listener.

For decades the most common way of tackling this type of problem was to play the electroacoustic part from a tape recorder to which the performers synchronized via a pre-recorded click track. More recently, simple computer interfaces have been employed to enable players to “trigger” sound files as the music unfolds, allowing for increased flexibility. However, these interfaces are generally hard-wired for specific pieces, hence existing in almost as many “flavors” as there are mixed compositions. This lack of generality requires considerable computational sophistication on the part of the performer.

Furthermore, I have been particularly concerned that many of the mixed works I have written over the years are still far from portable and require my personal attention—or that of a specialist—for every performance. This problem is not confined to my own mixed compositions, but is more or less universal and represents a historical anomaly. I believe that if reliable and portable tools existed, mixed electroacoustic compositions would be much more generally accessible and welcomed by a wide range of players and ensembles.

In light of this, the goal of our research project was to design a reliable, portable and flexible software interface that would allow performers with no more than basic computer skills to manipulate sound files for performance in concert. We also required that all these changes may be saved (and recalled reliably) as separate files, in light of both our artistic and scientific priorities.

A research project that involves scientists and artists and seeks to produce a specific outcome in a relatively short period of time will face tensions and stresses along the way that are inherent in the dynamic of the situation itself. To put it simply, artists must “show” something to the world and therefore tend to gravitate toward specific goals: their works of art. However, scientists seem happy to research the viability of a concept or procedure to the point where it may be shown to work, even if only theoretically or under laboratory conditions. One of the important things I have learned in this project is that scientists and artists collaborating together must be aware of these perceived differences, not only in a conceptual, general sense but on a day-to-day basis, in order to make the best choices for a project.

For the development of our interface—RALPH—the program MAX was chosen for its wide user base, even though it lacks certain features, which limits the extent to which a user can set up the interface for any particular project. At a certain point a fundamental decision had to be taken: either spend a large amount of time developing a database function for MAX from scratch or hard-wire some of RALPH’s functions. This decision-point brings into focus the tension between artistic goals and scientific research. However, it is important to point out that the tension was not simply between the artist and the scientist, but also within myself. I wanted not only a “100%-reliable-in-concert” product (from which perspective developing a new database was extremely risky) but also a certain editing flexibility, which indeed required a new database. Crucially, we all wanted to see RALPH developed further over the
years by a community of users. This expectation made the development of a comprehensive database inevitable. By the end, RALPH was developed to a prototype state, where it may be used as stand-alone application or opened from MAX/MSP as a patch for further development.

At present, however, RALPH does not have the robustness necessary for a public concert. Although the initial intention was to produce an application that would be concert-ready, as we progressed in its design it became apparent that, to achieve this within the period of 1 year, it would be necessary to hard-wire some of the interface’s functions. We decided that it was preferable to have an interface that, while not completely robust, was “open” enough that it could be further developed in the future, rather than one that might have been reliable in concert but was neither general nor user-friendly enough to entice composers and performers to use it.

I have learned from this collaboration that, even when an artist is involved in the making of software, it is extremely difficult to consistently prioritize the complex needs of the intended users, since at some point in time those needs are likely to come into conflict with the technical possibilities, requirements and time constraints of the project. I think it is important that artists should be part of projects such as this in order that their perspectives may inform and help to direct the inevitable compromises that will take place.

I A N  C R O S S :  T H E  S C I E N T I S T ’ S  P E R S P E C T I V E

The collaboration with Alejandro Viñao took advantage of the resources in the Music Faculty’s newly constructed Centre for Music & Science. Initially, it was intended that the project would involve members of the Digital Signal Processing group in the Department of Engineering, taking advantage of their research on real-time audio analysis and tracking; however, after intensive discussion it became apparent that the types of analytic and tracking processes that were viable in engineering terms could not be incorporated into a performance interface in the time available and would not, in any case, be able to deal with an appropriate degree of musical complexity.

These discussions led to the collaborative specification of an interface (taking as a starting point an interface produced at IRCAM for a specific piece by Viñao), and in conjunction with Shigeto Wada (now of the Dublin Institute of Technology) we quickly constructed the basic shell of a flexible system. The bulk of the project time was devoted to enhancing the file-handling facilities of the programming language used, MAX/MSP. The resulting program, RALPH (Figs 1

Fig. 1. RALPH front page, showing available options. (© Alejandro Viñao and Ian Cross)
and 2), was developed to a prototype state by the end-date of the project and is publicly accessible on the Faculty’s web site [1].

These initial discussions made very clear for both Viñao and me the gap that exists between the types of musical information that is of most interest to electroacoustic composers and the abilities of present-day software engineering tools to manage and represent real-time musical information. In essence, most of the musical problems that confront a composer who wishes to use mixed electroacoustic and live resources appear to be bound up with achieving a balance between being constrained by the powers of computational representations of music and being liberated by them to explore new domains of composition and performance. In order to realize the latter possibility, it will be necessary for software that can handle music in real time to be grounded in understandings of the cognitive and behavioral processes that are evidenced in human musical performance. It is not that the software needs to model these processes, simply that it should, ideally, perform as though it were taking account of them. However, “what is known” of these cognitive and behavioral processes at present is still in a state of flux; while more is understood than 20, or even 10, years ago, our comprehension of the nature of music in cognition remains radically incomplete. Indeed, the processes involved in tackling the problems of music representation on computer are contributing significantly to our understanding of how much remains to be known.

In spite of the problems referred to above, the project was successful in following through from the original idea to a working piece of software. Moreover, the open-ended structure of the fellowship enabled Viñao to play an active role in the Centre that extended well beyond the bounds of the project—participating in seminars, interacting with student composers and other researchers, and offering advice on practical matters concerned with the development of the Centre. While the Centre was established specifically to facilitate cross-disciplinary research focused on music, Viñao’s presence and contribution to its activities made evident the benefits of a creative and artistic perspective for the conduct of scientific research programs, not least in raising questions impelled by artistic considerations that oblige scientists to re-imagine foundational aspects of their disciplines. The collaboration also led to the generation of new research questions (concerning music with multiple simultaneous tempi and sound interpolations between inharmonic sounds) that are the subject of research proposals that have been submitted or are under development, including coordinated programs of scientific research and artistic creation focused on common problems.

Reference

1. See <www.mus.cam.ac.uk/~cross>.

CALL FOR PAPERS

Live Art and Science on the Internet

The Internet has become a venue and medium for art as a means to broadcast ideas to a worldwide audience. Leonardo and Guest Editor Martha Wilson seek texts on the subject “Live Art and Science on the Internet” for a series of special sections in the international journal Leonardo, both in print and online.

As artists and others produce live art on the Internet, liveness, presence, mediatization, on-line activism, surveillance and identity/gender, among other issues, are being explored. We seek texts documenting such work, as well as texts on the history of this field of practice and on the vocabulary being used to describe it. We also seek texts from scientists who have used the Internet to conduct science investigations live on-line.

Wilson and her peer review committee seek statements (500 words plus one image describing one work), notes (2,500 words plus six images describing a body of work), galleries (750-word curator’s introduction plus up to 10 images by individual artists, each with a 200-word caption) and articles (5,000 words plus 12 images). Texts describing the work of a living artist or scientist must be written by the artist or scientist him/herself, with a co-author if necessary.

This call for papers is open through 2006.

Please send an initial statement of interest with a brief explanation of your project to Martha Wilson: <Leonardo@franklinfurnace.org>. For author guidelines, follow the link “Info for Authors” on Leonardo On-Line <www.leonardo.info>.