A digital technology has been slow to enter the classical music mainstream, perhaps more strikingly so in chamber music than in the symphonic or operatic worlds. This is not surprising, since the intimacy of chamber music rehearsal and performance, the acoustic beauty and subtlety of traditional instruments and the treasures of the classic repertoire have been hard to match by the world of silicon, processors, cables, and loudspeakers. And integrating technology into chamber music often seems to unduly complicate an already difficult and demanding endeavor.

The time is ripe for this to change. Digital technologies are now as familiar to most of us—and certainly to kids (perhaps unfortunately)—as are the mechanical technologies of catgut and horsehair, hammers and reeds. Sophisticated software for almost any conceivable purpose is readily available, relatively inexpensive, and getting easier and easier to use. The Internet is the best medium yet invented for bringing people together around common interests, of which love of chamber music repertoire and performance is as powerful as any. And although much music technology is still designed for pop and commercial music (where the money is), it is easily adaptable to classical contexts and more and more readily available than ever from producers and performing venues.

The inventor of the Hypercello says that it’s time for ensemble musicians to explore digital technologies—which, he argues, allow composers to imagine new forms, performers to expand their expressiveness, and presenters to revolutionize relationships with audiences.

BY TOD MACOVER

DREAMING ANEW MUSIC
The Hyperbow allows players of the acoustic cello to delicately tweak the instrument’s timbre without learning any new bowing techniques.

So technology may be easier than ever to integrate into chamber music contexts, but why even consider it in the first place? Because paradoxically, although we might first think of rigidity and mechanization when we discuss technology, its real power is in its flexibility and its means.

The Hypercello is particularly well suited to help define the human-centered technology of the future. In fact, it was chamber music playing that drew me to music technology in the first place. I grew up playing the cello, but it was in my teens—when I tried to balance the cello with guitars, percussion, and voices—that I started improving ways to amplify and transform my acoustic cello. At first, I wrapped headphones around the belly of the instrument and held it on my knees like a guitar, then ran its sound through looped tape recorders and industrial filters, and finally built a little setup at home to try to match the Beatles’ studio prowess (they were then working on things like their “White Album”). By the time I made it to Juilliard to study with Elliott Carter, I was imagining strange new sounds that led me to learn FORTRAN programming to conjure them up on early digital computers, and when I went to work at Pierre Boulez’s IRCAM in Paris, I found my calling in designing new digital instruments—and writing music for them—that could respond naturally and immediately to performance gesture and nuance.

It is through the creation of such kinds of new instruments that technology can have its first influence in chamber music. Here the word “instrument” is of primary importance. As psychologist Sherry Turkle makes clear in her forthcoming book Evocative Objects, we humans have a very special relationship to our tools of expression, which we master and manipulate to communicate our deepest thoughts and feelings. No human tools are more beautifully designed for their purpose than traditional musical instruments, which no collection of buttons, wires, and sensors can replace. That’s why it is important that technology be used to augment—not replace—existing instruments. That’s the main reason we started developing what we now call “Hyperinstruments” at the MIT Media Lab in 1986. We wanted to measure the performance nuance such as bow pressure, speed, and position, or direction and intensity of breath, so that the virtuoso can evoke and control a greater palette of greater—even unlimited—range of sounds and textures by simply interpreting the music in the most natural way. To accomplish this, we have built measuring devices and special instruments, such as the Hypercello that we designed for Yo-Yo Ma. In Begin Again Again… my Hypercello piece that Yo-Yo premiered and Matt Haimovitz recorded, sonic sensors built into the cello, a wrist sensor to measure bowing technique, fingerboard sensors, and a specially designed bow sand a flow of musical data to a host computer (which these days can be as compact as a Mac Mini), allowing each accent or nuance to morph the cello into a human-sounding voice, an orchestra, or something beyond. The interesting thing is that a known, familiar interface has suddenly become the ticket to a world that can extend beyond the physical confines of a cello, giving the player access to a much wider range of sonorities and textures—both more mammal and more delicate—than previously available. Thinking back to my high school days of experimenting with complex multitrack mixing, it occurs to me that playing the Hypercello feels like controlling the most complex digital recording studio from a single, human-sized, familiar instrument—an extension of one’s body—all at once. As Joshua Bell said to Alan Alda in a 2002 public television interview, the range of the Hypercello “is only limited by our imaginations.”

Since a fully equipped Hypercello is one of a kind, not readily available at the corner music store (alas), we have recently experimented with enhancing traditional instruments with a single “hyper”-accessory, such as the Hyperbow, designed by Diana Chodos, my colleague at the lab. In collaboration with the Royal Academy of Music in London, a group of young composers and string players have been creating new works for acoustic strings played with Hyperbow. In Patrick Nunn’s Gaia Sketches, for example, the timbre of the acoustic cello is delicately and beautifully tweaked by the continual modification of seven different measurements from the Hyperbow, all without the player having to learn any new bowing techniques. The results of all these compositional efforts have been musically compelling enough, and easy enough to learn and play, that there is optimism about seeing this technique enter the musical mainstream, and hopes that some of this technology will be commercially produced. In 2002, my colleagues Tristan Jehan and Mike Fabio and I used an even simpler technique (from the performance—not necessarily the inventor’s—point of view) for my orchestra piece Sparkler. Placing a small number of microphones within the orchestra, we captured the acoustic sound of all the instruments, analyzed it with a laptop, and used the acoustic performance to shape and manipulate a complex electronic “aura” that was added live to the orchestral sound. The result is like a wasp’s nest of intricate textures swirling around and through the air.
"For a chamber group, balance problems are not simple to solve, and often require the addition of a sound engineer."

at a modest volume so that the performers onstage hear the same blend that the audience in the hall hears.

Of course, technology can also offer radically new definitions of ensemble playing and the relationship among instruments. In my Bug-Mudra, the playing of a guitarist and percussionist is modified by the gestures of a conductor wearing a specially designed dataglove; and in Towards the Center, MIDI data from keyboard and percussion are combined to form a "double instrument," in which the keyboard contributes intricate pitch details, while percussion adds rapid rhythm and articulation. One of my MIT students, Gil Weinberg, has even written a Ph.D. dissertation on this exciting new field of "music interdependency," exploring the innovative kinds of music that can be made when the performance of each instrument is directly connected one to the other to produce a common result.

Digital technology can be used to enhance performances themselves. Adding an image component is relatively easy to do (most theaters have projectors, screens, and laptop attachments) and can help guide and focus listening. For a recent collaboration with the Ying Quartet at New York's Symphony Space, called "...but not simpler..." we projected brief program notes behind the quarter, interspersed with colors and textures, to give just enough information and assistance to keep the audience informed and to set the mood. These projections worked particularly well for this concert, which wove together seventy minutes of music that I assembled around a new piece I wrote for the Ying, which goes from Bach to Beethoven, Cage to Carter, high to the Beatles, all played nonstop and interconnected with special composed electronic interludes. The visuals helped tie the program together, allowing the audience to remain immersed in the music without needing to read printed program notes.

Another approach to "active information" during concerts is the Concert Companion, a specially designed handheld digital device—which provides program notes and extra information during classical music concerts. More and more venues will be equipped with such devices, and it is not inconceivable that some will make such augmented information available on one's own mobile phone or PDA.

In fact, the providing of extra information—online, via mobile devices, on kiosks at venues, etc.—about repertoire, interpretation, and the intricacies of fine music-making is one of the most potentially productive paths that any chamber music group or presenter can take. I was reminded recently of the importance of sharing and explaining such background information through discussions with specialists not from the music field, but from clothing design. On a recent visit to Milan to launch a research
“Many technologies may help re-establish the ‘creative ecology’ that has always made chamber music such a cherished activity for experts and amateurs alike.”
first digital music instrument (the Yamaha DX-7), and MIDI—the industry standard that, to this day, connects any computer with any digital music or sound device—were introduced in 1984.

It just might be that technology—which on the surface seems so foreign to the world of wood, wind, nature, and vibration—can provide the ideal tools and environments to allow everyone to fully participate in chamber music, helping composers, performers and producers reach out to audiences with invigorating new sounds and ideas, and offering the public a way back in—through listening, learning, and participating—to the magical heart of musical experience.

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