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Music of the hemispheres

The Chicago Symphony Orchestra's Katinka Kleijn premieres a duet for cello and brain waves

By Peter Margasak @pmarg



Katinka Kleijn

ANDREA BAUER

This Sunday evening at the Cultural Center's Yates Gallery, Chicago Symphony Orchestra cellist Katinka Kleijn will play more than her usual instrument—she'll be wearing an EPOC Neuroheadset, an electroencephalography (EEG) device whose 14 sensors connect with the scalp and pick up brain waves. Retailing for \$299, it's designed largely for gamers, but Kleijn will use it to give the world premiere of *Intelligence in the Human-Machine*, a new duet for cello and brain waves composed by Daniel R. Dehaan in collaboration with Ryan Ingebritsen. (It's a commission by art duo Industry of the Ordinary, aka Adam Brooks and Matthew Wilson, for an ongoing retrospective at the Cultural Center called *Sic Transit Gloria Mundi*.) With the headset on, Kleijn may look like she's indulging in Jetsons-style retrofuturism, but the piece is no joke—and neither is the EPOC. It might get laughed out of a laboratory, but it does work.

In December I sat down with Dehaan and Ingebritsen at a Columbia College sound lab and tried out the device. By willing myself into a calm, meditative state, I was able to transform a processed recording of Ingebritsen's brain waves, slowing down its rhythms and lowering its pitch; after trying to set my mind racing with stressful thoughts, I could make it accelerate and send its pitch zooming upward. The headset is a toy

compared to state-of-the-art EEG equipment, but it quickly translated my brain wave output into modifications of the filter parameters to which Dehaan and Ingebritsen had connected it. And what Kleijn, Dehaan, and Ingebritsen are doing with this system is far more sophisticated than my little experiment. More important, it's not just about sound—it's an attempt to generate a sonic map of the mind in the midst of the creative process.

This is by no means the first music to use brain waves. In 1965 American composer Alvin Lucier premiered his classic *Music for Solo Performer*, for which his alpha waves were picked up by electrodes and channeled through an oscillator, then amplified and fed into loudspeakers, whose vibrations "played" an array of percussion instruments throughout the performance space. Since then composers including David Rosenboom, Richard Teitelbaum, and Masaki Batoh of Japanese rock band Ghost have experimented with brain wave music. But *Intelligence in the Human-Machine* is among the first duets involving brain waves and conventional instruments, and almost certainly the first in which one musician is responsible for both components.

Since late 2011, when Brooks and Wilson of Industry of the Ordinary first approached Kleijn about commissioning a composition for their current retrospective, the concept of the piece has steadily evolved. As Brooks told me via e-mail, "We were interested in the relationship between conductor and musician, but this proved to be a difficult relationship to translate into a workable fashion for us."

The earliest discussions were about trying to use a lie detector. "We got into the idea of trust and sincerity," says Kleijn. "Do the musicians really trust the conductor? Is there really something meaningful and real, or is it just show? We wanted to document some kind of communication." In January 2012 Kleijn enlisted the help of sound designer and composer Ingebritsen and, later, composer Dehaan. As it turned out, they could neither afford a proper lie detector nor find a good way to manipulate one musically; Ingebritsen recalled that under certain circumstances electroencephalography could be pressed into service for the same purpose, so the team switched gears.

Ingebritsen knew someone who had an EEG device from the 80s, but a short in the wiring prevented it from serving their needs. "We started doing some research," he says, "and came up with this thing," indicating the EPOC headset. "It started out as 'Let's make art out of a lie detector,' and it turned into 'Well, here's what we have, let's make art out of this.'"

"[The EPOC] is essentially a glorified game controller, which is what they market it as," says Dehaan. "But it does give us quite a bit of feedback as to what's going on. We have separate data flows from all of these little electrodes, and the software that comes with it gives us some analysis of states in the brain." From there Dehaan and Ingebritsen began manipulating the software, writing patches to transform the streams of data from the brain into something more audible and useful. "The brain fires electrical impulses, but at rates well below what we can hear—and on top of that there's a ton of noise from muscles and the air that's part of the stream," says Dehaan. "The first thing I did was to record it as raw data—which is just a bunch of pips and pops—and then shift it up into the audible range and manipulate the playback rate. That's been most of the process for me, figuring out how I can translate this into something that will come through speakers and hopefully in counterpoint nicely with the cello."

Most brain wave music has either used EEG data to control conventional instruments or as a sound source in itself, but Kleijn, Dehaan, and Ingebritsen have developed an elevated conceptual framework that makes the content of their thoughts—not just their brain wave data—an important part of the project. In other words, they're trying to capture the sound of the creative impulse at work. Kleijn won't be feeding the sound of her brain waves directly into the performance but rather using the EPOC headset much as I did—to control recordings of brain waves that all three collaborators made earlier. "There are recordings of my brain [while I was] sitting at home thinking of what kind of sounds this project can make," says Dehaan. "There are recordings of Katinka's brain while we were sitting around talking about the project, and then there are recordings of Ryan while listening to the results. The final stage will be Katinka's brain controlling them while she's performing. So it's all about the sounds of the process."

Dehaan's score consists of 20 musical gestures—long tones or pizzicato movement, for example, indicated by two- or three-bar snippets of conventional notation—along with 100 words, each of which asks Kleijn to "find" something, whether focus or randomness or balance or life, within whatever gesture she's playing. The cellist will use a pair of foot pedals to progress through the score, one controlling advancement to the next gesture, the other advancement to the next word; the order of both is determined on the fly by a program Dehaan has written, so Kleijn will be surprised by each new page of the digital score. The headset will feed the mental activity each task generates into a computer, which will control the prerecorded brain wave sounds—mental states the team calls "meditation," "excitement," "engagement," and "frustration" will be mapped onto playback speed, pitch, and other parameters.

Kleijn has been trying to sharpen her control of those mental states through

meditation. "I've been practicing every day, and even though it's only for about ten minutes, it has helped," she says. "One thing we've discovered that's really interesting is that if I play something extremely difficult, the 'meditation' line goes up. I think it could be that the music was so difficult that I could only think of one thing, playing the music."

"We're trying to shed light or bring sound to this interaction between external and performer," says Dehaan. "We'll be hearing not only Katinka trying to express [things] musically, but also the result of her brain state in trying to achieve that—or her initial reaction while being in a moment of, say, tranquility, and then one of destruction."

"It all boils down to the activity of playing the cello," adds Ingebritsen. "It all stems from the activity, the point of engagement. Essentially the one thing we've been unified by is looking for ways to capture that point of engagement and have it do something to itself. I think we're not just developing a piece of music, but we're developing a working method for future pieces or projects. I think we're laying a lot of groundwork."

Kleijn will perform *Intelligence in the Human-Machine* on Sun 1/13 at 7:30 PM in the Sidney R. Yates Gallery on the fourth floor of the Chicago Cultural Center, 78 E. Washington. The concert is all ages and admission is free. The main exhibit of *Sic Transit Gloria Mundi: Industry of the Ordinary* occupies the main hall on the same floor and runs through February 17.

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