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The Tsar Bell

The largest bell in the world sits in a courtyard at the Kremlin as a 200-ton tourist attraction. It has never been heard—until now, using digital tools.

By Zachary Slobig

The Tsar Bell. (Photo: Kremlin.ru/Wikimedia Commons)

Greg Niemeyer is sitting in his studio on a tree-lined side street in Berkeley, California, peeling an orange with great care. He separates each section, cleans each of any dangling strands of pith, and lays them out in a neat row on his plate. Behind him on the wall is a large print of a black-and-white pattern that's strange and familiar at the same time—a magnified barcode from an airline boarding pass he used to get onto a flight to Denmark years ago. He recalls sitting on the plane, somewhere over the Atlantic, staring at the pattern,

beginning to doze off, and then, in a transcendent moment, feeling transported by the beauty of data. “I suddenly started seeing through it to another space,” he says. “Now I think about data as a gateway.”

In the years since he slipped down that rabbit hole, Swiss-born Niemeyer, an associate professor for new media at the University of California–Berkeley, has made a career of turning opaque data into experimental art pieces that make the invisible visible and the silent audible. In *Tomato Quintet* he sonified the ripening process of a batch of tomatoes by translating cycles of rising ethylene and CO_2 levels to amplitude and frequency. In *Polar Tide*, he created a real-time sonic marker to track sea-level readings in coastal cities. His *Black Cloud* project began as an alternate-reality game with high school students in South Central Los Angeles using sensors to measure air quality and evolved into Aclima, a San Francisco-based start-up partnered with the Environmental Protection Agency and Google Streetview to gather real-time air-pollution data in locations across the world.

At the moment, Niemeyer is preoccupied with something more esoteric: the Tsar Bell, the largest bell in the world. It sits in a courtyard at the Kremlin as a 200-ton tourist attraction. Amid its casting and ornamentation in 1737, it cracked in a fire that swept the foundry and lost an 11-ton wedge, leaving a gap like an enormous lost tooth. At least two efforts failed to lift the bell from its casting pit over the next century. The bell, commissioned by the niece of Peter the Great, was never rung.

Niemeyer could imagine its sound, but he needed to experience it.

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A faint whirring trickles from an adjacent room where Niemeyer’s MakerBot Replicator 2X 3-D printer is conjuring a three-inch-tall scale model of the Tsar Bell with the precise deformation—the term for the physical response a bell has to its clapper—that would produce a tone at 1202 hertz. “Would you like to see the bell?” he asks, as he pulls up a screen of columns and rows full of figures on his computer. “It’s a spreadsheet,” he says, smiling. “A very long spreadsheet.”

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While the bells in *Polar Tide* were an alarm, the Tsar Bell rings the sound of a shift in worldview. Niemeyer believes that the sound is so unlike any familiar sonic experience that it has the potential to jar the listener into a deeper level of experience in the natural world. It's a symbol of the mode of thinking people need to adopt in order to take meaningful action on climate change. "When people sit and listen to the bell they start tuning into subtleties of our environment," he says. "We need to be more sensitive to the things that we don't notice." For Niemeyer, the bell is also an allegory of hubris—a reminder to examine the most outsized human aspirations and the relentless march of progress.

"What we're trying to do with these projects is shift the mindset, so we don't just think about the largest bell ever cast without thinking about how it broke," Niemeyer says. "We could laugh at those Russian [tsars], but look what we're doing with climate change. We just haven't seen the crack in our bell yet."

The Tsar Bell—insofar as Niemeyer has recreated it through high-fidelity digital simulation—will travel to museums, galleries, and arts festivals globally, including a planned stop in Moscow at the Garage Museum of Contemporary Art. It will also be installed in the bell tower of the Ospedale Degli Innocenti, an early Renaissance orphanage in Florence. "A bell used to ring whenever a baby was left at the front door," Niemeyer says. "That bell is gone, but ours will ring for orphans of a different kind—orphans of climate change."

On a Friday evening, as the sun set over the Golden Gate Bridge, Niemeyer, his collaborators, and a collection of the curious gather beneath the campanile on the UC–Berkeley campus. With the help of local audio whiz Perrin Meyer, a tower of 12 speakers is hooked up to the digital sound of the Tsar Bell for the first time, sending it out in full 360-degree orientation across the East Bay in the form of three new compositions—one by Jeff Davis, the carillonist (bell ringer) of UC–Berkeley, another by Stanford University composer Chris Chafe, and the last by experimental hip-hop musician DJ Spooky.

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The first piece is a contemporary take on traditional Russian bell ringing, the second a riff on the conversation between maritime bells in the fog, and the third an interpretation of Indonesian gamelan ringing, with its emphasis on community and rhythm.

The familiar, cheery tones of the physical bells high up in the campanile begin to tumble down just as the sun slips into the Pacific; they're accompanied by the first tones of the Tsar Bell booming from the speakers some 200 feet below. The fundamental tone of the Tsar Bell is around 81 hertz—speakers in a smartphone or laptop are incapable of producing it. It's like the low rumble of a far-off thunderstorm—it rattles the bones. You become a tuning fork.

Nearby, a toddler sitting on his mother's lap looks confused and mildly concerned. A man with long white hair and a flowing white beard stands just below the center of the speaker array holding a carton of takeout Chinese, a single noodle dangling from his lower lip, eyes wide. We meet each other's gaze, and he mouths one word: "Wow."