Department: About the Cover

Valley Viz

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As Silicon Valley evolved, so did Scott Kildall.

Kildall grew up in the 1970s surrounded by huge mainframes that most seven-year-olds never saw. His father was the computer industry pioneer and CP/M creator Gary Kildall, who imparted Scott with a math and science DNA, but the younger Kildall grew up to navigate the interstices between art, critical theory, political science, code crunching and, eventually, data physicalization. He was a generalist from an early age.

Kildall's work, *Strewn Fields* (see cover and Figure 1) emerged from an artist residency at the SETI Institute (Search for Extraterrestrial Intelligence), a legendary Silicon Valley milieu. At SETI, Kildall collaborated with the institute's scientists on an informal basis.

"These are some of the top scientists in their fields," Kildall said. "They're not just listening for messages. They're doing a lot of planetary science, because if you understand our planet and how it formed, then you can understand how life might evolve on other planets."

Astronomer Peter Jenniskens, for instance, is one of the world's foremost experts in meteorites. At SETI, Jenniskens provided Kildall with datasets from where meteorite shards broke apart at various locations on Earth, leaving specific scattering patterns. The patterns showed how rocks impacted the earth, but were not always measurable in ways laymen could relate to. Kildall then wrote his own algorithms so a high-pressure waterjet cutting machine could etch the data into slabs of stone. The idea was to mirror the meteorite impacts, capturing one-time kinetic events as static objects so viewers could see the patterns as they occurred in nature.

In presenting *Strewn Fields* to the art world, Kildall demonstrated that data could be made into art. In showing the work to nonscientists or those more aesthetically or materially oriented, he told a story viewers could understand. Whereas if he showed them a graphics program or a computer-generated data visualization, it might be a turn-off.

"What I'm looking for is a different entry point into the science than you might normally get," Kildall said. "I'm trying to show this idea, reveal these patterns in nature or human structures that you might not normally see, but do it in a way that will bring in the non-science viewers."

As he continues to work with data physicalization, Kildall still harbors gratitude for the Exploratorium in San Francisco, because it was while working on various installations and projects at the Exploratorium where all the strands of Kildall's DNA wove together with his current practice. As the museum moved from its old location at the Palace of Fine Arts to a new facility at Pier 15, it hired Kildall for a two-year contract, essentially to help move some of the exhibits, help make new exhibits, and refurbish old ones.

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Figure 1. *Strewn Fields*, stone sculpture (2016) by Scott Kildall.

In the process, Kildall worked on the coding and electronics for Charles Sowers' *Tidal Memory* installation, one of the flagship pieces of the museum's Life Sciences Exhibit. *Tidal Memory* featured 24 plexiglass columns, one for each hour, displaying tide heights for the current day using live data from the NOAA tide buoys in the bay. As the tide rose and fell, water was pumped into the columns, then as each hour of the day ended, the respective column closed off, preserving the tide height for that hour. Visitors could then see the ups and downs of the tide as the day unfolded. By seeing how data could be physicalized to tell stories, Kildall's art practice took a whole new turn.

"I worked on that piece and many others," said Kildall, who still lives in San Francisco. "And it just combined a love of objects and sculpture and art practice that I've been doing with the technology, the coding side of it, the data side of it, and that began my shift about six years ago into making mostly data driven or data related artwork."

Of course, what would a generalist do without sound? Two other Kildall projects, *Sonaqua* (see Figure 2) and *Botanic Quartet* (see Figure 3) are related. Both can be understood as a form of data physicalization.

Sonaqua also emerged from an artist residency, this time the Water Rights Residency at the Santa Fe Art Institute, where Kildall's goal was to sonify water quality. After collecting water samples from various sources over the course of a few weeks, Kildall used simple Arduino circuits to measure the water quality and convert the measurements into square waves. As a stand-alone

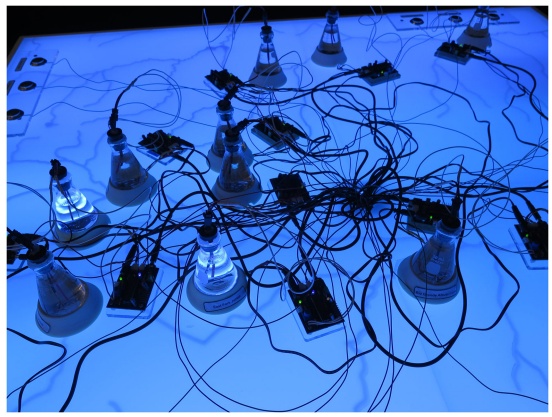

Figure 2. *Sonaqua*, electronic audio installation (2017) by Scott Kildall.

operation, *Sonaqua* could be set up to emit patterns of noise, reflecting the interconnectedness of our ecological system. In another realization of the project, Kildall created a version with push-buttons enabling users to "play" the different water samples like a keyboard. All in all, he learned that water quality was a tough nut to crack, in terms of educating the public.

"There's a lot of data about water quality, but people are not interested in it," Kildall confessed. "When you start talking about pH and dissolved oxygen and electrical conductivity or total dissolved solids, it's like their eyes glaze over and they just don't understand pH and it's a bunch of numbers that are really super boring, but it's super critical."

Plus, basic square waves did not exactly provide a complicated sonic palette to work with. As a result, Kildall expanded the idea for *Botanic*

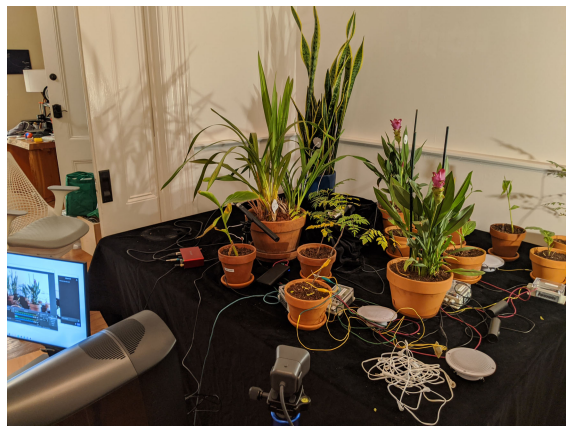

Figure 3. *Botanic Quartet*, site-specific electronic-sculptural installation (2020) by Scott Kildall.

Quartet, in which he measured the electrical and chemical activity inside plant leaves and converted the data into real-time audio. In this case, Kildall worked with a platform called Unnatural Language, a network of datapods with custom electronics wired to sensors and speakers to create the equivalent of software synthesizers from the data, in this case, plants.

"With all my work, I'm looking at what the phenomenon is, where the story is," said Kildall. "Plants are much more alive than we think they are. You can take a plant and stress it out and the voltages will start spiking in two minutes, three minutes, which is pretty fast for the real world."

Or sometimes the plants are more mellow, the sonic results of which might sound like the plants are improvising with each other. Sometimes matrix of indeterminate ambient sound might occur, depending on the situation. In one installation at Ars Electronica, Kildall installed the project on a 24/7 livestream so people could jump in to watch at any given moment.

"While it doesn't really reveal a specific data, as much as *Sonaqua* or even *Strewn Fields*, what it does show is this dynamic composition that plants can make," Kildall said.

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