New Sounds, New Society—A Review of Trevor Pinch and Frank Trocco's Analog Days: The Invention and Impact of the Moog Synthesizer

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In its broadest terms the story that Trevor Pinch and Frank Trocco tell is an extraordinary one. Here is an instrument whose journey from invention to mass market took place in less than a generation. It is an invention that threatened and affected a whole category of laborers (studio musicians) and changed our very idea of how music should sound.

Some potential readers may wonder why they should care about the design of musical instruments at all. This question is addressed in the very first words of the book's forward, by no less than Robert Moog himself. "Musical instrument design is one of the most sophisticated and specialized technologies that we humans have developed [p. v]." This is in part because in music making, both musician and listener function at the limits of their perceptual and cognitive capabilities, the music-instrument system is full of feedback loops, and musical instrument designers are not driven simply by objective performance specifications. These features combine to make musical instrument design a domain of great potential interest to designers. And rarely have researchers had the opportunity to interview as many participants in the design and development of a new instrument as we see here.

Viewing the synthesizer as a good case study of musical instrument design, the authors examine many interesting questions: Why do synthesizers have tonal keyboards? Why are they used to make familiar sounds, often reproductions of sounds created by other instruments? What accounts for a widespread reliance on factory pre-sets among synth players? And, when and how did these choices get made? Pinch and Trocco worry as much about social aspects of the instrument's development as they do about technical ones.

Analog Days is organized along historical lines, though it also reads like a journey narrative. And indeed it is something of a search—a search for "the meaning of an instrument [p. 10]." The authors contend at the outset that they see the development of the synthesizer as a social as well as a technical story. By the end of their journey they will have moved all around the U.S. and through a variety of its artistic and commercial communities to argue that many people and social phenomena must be invoked in order to explain the synthesizer's success. That aside, though, this is also a hero story, and the hero is Bob Moog.

Moog is introduced as the inveterate tinkerer; a mildly obsessive sort who would coax all sorts of interesting sounds from electronics he found at local army surplus stores. As the story of the synthesizer unfolds, he remains at its center, or perhaps at a spot just a little off center—generally a bit bemused by the rock musicians, and even the marketers, business people, and other designers who ultimately transformed his instrument into a commodity.

A continent away was Don Buchla, the anti-hero. Just three years younger than Moog, he too was an experimenter. As Pinch and Trocco tell their stories, Buchla is the counterpoint to Bob Moog; his Buchla Box its antithesis. On one level their story is the classic one of parallel inventions, followed by a horse-race in the marketplace. The two men began work on their synthesizers within months of each other. Moog's first prototype was finished in the summer of 1964, Buchla's in the fall of the next year. Both were modular, patchable, and voltage controlled. So another question to which the book attempts to provide an answer is—why did the Moog ultimately come to dominate the market?

The answer the authors propose is that Bob Moog listened to his customers, where Buchla functioned more as a member of the avant garde. Both inventions started out in support of experimental sound creation. But where Moog responded to musicians who demanded a keyboard, Buchla resisted, seeing in the synthesizer new possibilities that demanded a new interface. What Moog did, and Buchla failed to do was to "embed into his technology a piece of existing culture—the idea that music is about intervals [p. 309]."

Early synthesizer players had a problem, actually two problems. First, the ways in which circuits could be combined produced an almost infinite range of possible sounds. And second, because there was no easy way of naming the sounds, it was hard to refer to them. A Doors recording session illustrates.

"That crystalline sound," Jim [Morrison] jumped in. "I liked that sound of broken glass falling from the void into creation." "Which sound was that?" said Paul Beaver. "A couple back from where you are now," Rothchild said. "It reminded me of the Kabbalah," said Jim. "Kether, the I AM, creating duality out of the one. All crystalline…and pure. You know that sound." "Did I make a sound like that?" "Sure," Jim said. "A couple back." "Just go back to where you were," said Rothchild.

And Paul Beaver began to unplug and replug patch cords, and twist little knobs, and strike the keyboard, which emitted strange and arcane and utterly unearthly tones that sounded nothing like the Kabbalah or Kether, the crown of the Sefiroth. None of the sounds he was creating sounded pure and crystalline. And then we realized…he couldn't get back [p. 121].

Suzanne Ciani, a pioneer in shaping and creating new sounds, describes a similar scene that occurred when she was using her Buchla 200 to create the pop and pour sound used in Coke commercials.

So you come up with a sound and if you touched one knob, suddenly everything was different. And these producers who didn't know how to talk, nobody had the vocabulary for describing sound, he'd say, "No, no, go back, go back to where you were." So I'd move the knob back and he'd say, "No, no! It's not the same," because there were so many interactions—there were maybe fifty knobs contributing to one sound. The guy used to hit my hands—whenever he liked it I'd move it, he'd say, "Stop! Don't touch that, don't you touch another knob! Okay, record [pp. 166-167]."

It is this unpredictable quality that many of the early synthesists most associate with that period, and some of them look back on it longingly. As Wendy Carlos put it "That was when you really felt like you were working with an invention [p.136]." So at this stage the synthesizer was difficult to control. These were machines on which a new breed of musicians conducted searches—searches for new sounds. There was a sense of transience about those sounds. They could be there one moment and gone the next. There was an attitude that these things were organisms, not fully controllable. Each synthesist put them together in personal ways.

But with the Minimoog in particular, the synthesizer developed into a portable, keyboard-based, performance-oriented instrument. Patch chords were eliminated in favor of knobs, the number of potential sounds was reduced in favor of simplifying the interfaces, and the pitch wheel was added to provide a sense of touch.

Ironically, the forces that caused synthesizer design to move in this direction were largely the result of the success of Carlos' own mega-hit Switched-On Bach. According to Ciani, the public's attitude about the potential of the instrument was misdirected by that work. Her search for "a poetry of sound" was overwhelmed by wider cultural forces set in motion by Carlos' success. The synthesizer became associated with classical music and classic sounds.

Much that can be learned from this work relates to the role that constraints and quirkiness play in design. For example, early synthesizers had monophonic keyboards. Instrumentalists like Keith Emerson therefore thought of the Moog as like a saxophone or trumpet, playing it as a solo instrument. With the emergence later of polyphonic synthesizers, the keyboard reverted to the keyboard's more typical role in the background [p. 206]. This is particularly interesting, given that polyphonic instruments can still be played monophonically.

When one of Moog's engineers, Jon Weiss, went to visit Sun Ra, his synthesizer was not working as it was supposed to but he was using it to produce the most fabulous sounds. For Jon, this was the mark of an instrument as opposed to a machine. The authors generalize "It is departures from theoretical models of instruments—the unexpected resonances and the like—that make an instrument particularly valued [p. 223]."

For the attentive designer, there are lots of other lessons in this book. For example, through their interviews, Pinch and Trocco found that one of the things that worked best about the control panel for the Minimoog was the way in which knobs were staggered. “It turned out that having things not all in military formation made it a lot easier for someone to find a control.” Further, tactile controls like rocker switches permitted players to find their way around using feel [p.225]. And it is important in a musical instrument for the musician to be able to dynamically alter the sound in very small ways. “For many musicians, it is the pitch wheel on the Minimoog that enables them to make the instrument come alive. By bending a pitch or adding vibrato, a note can be given that special personal touch that violinists and guitarists find so important [p. 228].” These and similar lessons will, I think, have wide application in the design of instruments, even instruments that are used for purposes other than making music.

This is an easy book to recommend to anyone with an interest in instrument design. It reads like a novel, and its many insights will remain with me long after the details of its stories have faded from memory.