

HELLO MY NAME IS VOTRAX

*100 PRINT#-2, "Hello my name is Votrax"
200 A\$= "That is incorrect": PRINT #-2, A\$
— Votrax Instruction Manual*

*Through constant decay /
Uranium creates the radioactive ray
— Kraftwerk, "Uranium" (spoken through a Votrax)*

*"It's the sorest throat on record, bonecake-dry."
— Dave Tompkins, on the Votrax, *How to Wreck a Nice Beach**

A dark theater, empty save for the seats filled by myself, writer Dave Tompkins, and my partner, Bernie Brooks. It's 2014 and we're in the Anderson Theater in Dearborn, Michigan. Paul Elliman is a grey-shirted shadow onstage, hand held above his eyes to shield against the overhead can lights. He peers into the empty venue and asks, "Is there even anyone out there?" He starts up a recording of a Votrax SC-01 circuit talking itself back to life. A breathy rumble rises from the deepest surface of its chip-gut. Breathless aspirations build into layers. Then come the exasperated moans and digital drones. Next, a cycle of root phonemes and diphthong sequences: an "ehhhh" and an "eh" and an "eeee" and a "zzz" and a "schhhh." It tentatively tests its ability to string the sounds together with a quick singsong of vowels. The SC-01 then laboriously stumbles over the shapes of words as it remembers how to speak. It's the deep demon growl of a slowed-down record catching speed and stumbling across the broken segments of its first word: "aa—a—bom—in—nuh-nation..."

If time and space were to overlap, Elliman would be standing in or near the spectral shoes of Jack Morton, the engineer and manager of Bell Labs' transistor

development project. (In 1963, Morton lectured from the same stage while presenting an optical maser.) The transistor is, in fact, a key component of the integrated circuit that powers the lungs of the Votrax.

The Votrax Type 'N Talk is a text-to-speech synthesizer invented in 1970 by Richard Gagnon, a computer engineer at Federal Screw Works in Troy, Michigan. Working in his own basement laboratory, Gagnon eventually delivered a viable prototype back to his employers, who were impressed. He suddenly found himself heading the newly formed Vocal Interface Division. While his efforts earned him a promotion, Gagnon's motivation for developing the Votrax was always personal. The synthesizer could dictate words on a computer monitor, which helped ease the burden caused by his own failing vision.

Using technology, the Votrax re-humanized the human voice in a realm that was always hungry for dehumanization. Engineers like Gagnon wanted to produce smoother-sounding synthetic voices capable of realistic expression, natural slides between syllables, and the ability to convey emotion. To do this, Gagnon exploited the use of the phoneme—the most basic building block of sound, assembled together piece by piece to form human speech—and modeled the output to mimic his own vocal cadences.

Human speech resonates through frequency bands called formants. The Votrax exploits this acoustic energy with a filter that acts like a copycat for the human vocal tract. Hertz by hertz, sound and its frictions excite the Votrax circuits; the phoneme sequences are triggered and “talk back” according to pre-programmed rules. Adjusting for this kind of man-machine interface sometimes required the words to be spelled phonetically:

circuit became *cirkit*
generator became *generayter*
machine became *mosheen*
radio became *radeo*

A demo tape of the Votrax Type 'N Talk system, which is stored at the Smithsonian archives,¹ runs through sets of dull phrases, known as Harvard Sentences: “Rice is often served in round bowls. The juice of lemons makes fine punch. A box was thrown beside the parked truck. The hogs were fed chopped corn and garbage.” These neutral, nonsense sentences are essentially the equivalent of the SMPTE color bars of television broadcasting or pangrams such as “The quick brown fox jumps over the lazy dog,” which is often used to display typefaces or test keyboard equipment. Harvard Sentences are phonetically balanced phrases designed to test the range of the Votrax when transmitted over telephone lines.

In 1980, the company produced the first integrated circuit speech-synthesizing chip—the SC-01—which is present in the Votrax Type 'N Talk model. The LVM-80 model could “speak’ words and phrases with a quality that is said to be ‘virtually indistinguishable’ from that of the original speaker, whose voice is previously recorded, digitized, and stored in the form of individually addressable messages.”² Two knobs on the front allowed a user to adjust volume and frequency, and create louder and faster-speaking voices with higher and lower pitch.

¹ “Votrax International, Inc.” Smithsonian Speech Synthesis History Project (SSSHP) 1986-2002, National Museum of American History.

<http://amhistory.si.edu/archives/speechsynthesis/ss_votr.htm>. Accessed 26 September 2017.

² Scott, B L. “Voice Recognition Systems and Strategies,” *Computer Design* (Boston, Mass: Computer Design Pub. Corp., January 1983), 67-70.

Video games owe much to the SC-01 chip. The Midway and Gottlieb companies used it to create sound effects for the pop bumpers and drop targets on the playfield of pinball machines like Black Hole, as well as arcade games like Wizard of Wor, Gorf, and Reaktor. When Q*Bert (known in its earliest phase as “Snots & Boogers”) lets loose with a foul-mouthed curse of “@!#?@!,” those synthesized swears are Votrax-powered.

The Votrax even found its way onto prime-time television with a commercial for the Parker Brothers board game of Q*Bert. A friendly rapping female voiceover runs alongside live-action clips of full-grown humans stuffed into Q*Bert, Coily, and Slick costumes as they bounce around an Escheresque pyramid of cubes: “The card game’s sold separately, that’s a fact—so is the board game, that’s a rap!” By 1983, the year the oversaturated video game industry suffered a brief swan song, Gagnon could be found commuting to Vocal Division HQ in a car marked with a Michigan “VOTRAX” vanity plate.³

The Votrax also talked its way into Atari 1400-series computers, which sold poorly, as well as the TRS-80 and other off-brands by RadioShack and IBM. Programmers who didn’t have the stamina to read their programs in monochrome all day used the Votrax to narrate their screens. Companies licensed the SC-01 chip and made their own Votrax knockoffs: Audibraille, the Real Talker, Digitalker, Total Talk, Handy Voice, the Mockingboard, and the Alien Group Voice Box. The Heathkit build-it-

³ Elliman, Paul. “Detroit as Refrain.” *The Serving Library*, Bulletins of The Serving Library, no. 8 (2014). <www.servinglibrary.org/journal/8/detroit-as-refrain>. Accessed 5 March 2016.

yourself electronics company, based in Saint Joseph, Michigan, gave their HERO 1 and Hero Jr edutainment robots a voice by using the SCo1 chip. HERO could guard its master's bedroom door, and if its motion sensors were activated, it might utter "SOME-THING-MOVE" in a monotone, in the night. During the day, if no commands were programmed, the robot would default to roaming the house looking for humans, keeping its own company while chatting away in "Roblish."

It wasn't all frivolous robots and teenagers tapping keys in dark spaces with the Votrax. In 1974, at Michigan State University's Artificial Language Laboratory, a Control Data 6500 computer nicknamed "Alexander" was paired with a Votrax synthesizer module.⁴ The goal of MSU's unit was to create computer speech aids for people with vocal paralysis and communication issues. One such person was Donald Sherman, who suffered from Moebius syndrome, a rare neurological disorder that causes facial paralysis.

In early December, using Alexander as a sympathetic vocal tract to lean on, Sherman dialed Domino's Pizza. But the call-taker assumed they were being pranked, and hung up twice. The now-defunct Mr. Mike's Pizza was a success on the second try, as Sherman phonetically typed his message on the keyboard, and the Votrax made his demands:

"I am YOO-sing a special de-VICE to help me to com-MYOO-nicate. ... PLEASE be PA-tient while I pre-PARE my re-SPON-ses."

"O.K., we didn't understand what was going on here, it's just—"

[Alexander cuts him off]

"I'd LIKE to OR-der a PEE-tza."

⁴ "Donald Sherman orders a pizza using a talking computer, Dec 4, 1974," YouTube, <https://www.youtube.com/watch?v=q4d_h_t2QAA&t=18s>. Accessed 23 September 2017.

Forty-five minutes, seven dollars, two pizzerias, and four calls later, Mr. Mike came through with a pepperoni, mushroom, ham, and sausage pizza. This moment goes down in the books as the first time a computer speech synthesizer was used in to assist in a commercial transaction. Hoping to seek forgiveness for their earlier rudeness, Domino's apparently caters events at the MSU Artificial Language Lab today.⁵

In 1985, if you dialed a phone number in two-thirds of the United States and found yourself stalled in directory-assistance hell, chances are your earpiece would deliver the Votraxified voice of Kathleen O'Brien,⁶ parked somewhere in telecommunications limbo on the Votrax Incorporated Audio Response System. Her mechanized woman-machine cadence, an early example of "phonecasting," would reassemble single digits into information: telephone numbers, bus schedules, stock reports, lottery numbers. O'Brien fell into the job while working as a copywriter at an agency that also happened to have Votrax as a client. A former model with flawless diction and vocal modulation, she had the perfect voice for computerization. Four other voices—including two male voices—were considered for the ARS device, but O'Brien's was so popular, it might as well have been the only one. John Lauder, the owner of Votrax, mused, "Female voices, for whatever reason, are preferred over male voices."⁷

⁵ "Laughter, tears, and pepperoni: MSU's Artificial Language Lab celebrates 35 years," Citypulse, 24 March 2010, <<http://lansingcitypulse.com/article-4118-Laughter-tears-and-pepperoni.html>>. Accessed 23 September 2017.

⁶ Cook, Joan. "For Giving Numbers, Her Voice Is Perfect," *New York Times*, June 2 1985, , <<http://www.nytimes.com/1985/06/02/nyregion/for-giving-numbers-her-voice-is-perfect.html>>. Accessed 23 September 2017.

⁷ Ibid.

Case in point: Advertisements for text-to-speech synthesizers in the 1970s & 80s (Votrax or otherwise) amplify dreams of technologized gender, using full, feminine lips and perfect toothy grins, as if to deny to the reality of the guttural, mechanical talkback of computer voices at the time. Two back-to-back films released in 1979 and 1980 depict women as omniscient radio goddesses. Lips on full frame, voices pressed into microphones. In Walter Hill's *The Warriors*, an unnamed female DJ (Lynne Thigpen), who is filmed from the nose down, smooth-talks "boppers" through the night and antagonizes the anti-heroes all the way home to Coney Island. In *The Fog*, DJ Stevie Wayne (Adrienne Barbeau) owns her lighthouse radio station outright, playing smooth jazz for night fishermen. When the ghost ship *Elizabeth Dane* arrives with its leprous zombie-sailors in a luminescent green cloud, Wayne is marooned in the tower and hunkers down to guide townspeople to safety over the airwaves.

The Digital Equipment Corporation produced the DECtalk system in 1984. This text-to-speech synthesizer functioned in a similar way as the Votrax. A user phonetically spells out words and the machine reassembles them into passable speech, based on its bank of internal phonemes. An added bonus was that you could control the enunciation inflections of the machine and force it to sing. Also of note: The DEC was the same company that created the PDP-8, which appeared as the techno-protagonist in Nigel Kneale's 1972 television play *The Stone Tape*. And the bones of a modified DECtalk and a Speech Plus (model CallText 5010) module have each been in use for years by theoretical physicist Stephen Hawking.⁸ In the early years, Hawking's voice was filtered

⁸ Hawking, Stephen. "My Computer," Stephen Hawking. <<http://www.hawking.org.uk/the-computer.html>>. Accessed 23 September 2017.

through the Gagnon bandpass—Hawking’s voice was Votraxified too, for a time. After seeing Hawking give a speech through an amplified Votrax, the author Allucquère Rosanne Stone wondered “Where does he stop? Where are his edges?”⁹

The DECTalk gave users the option of nine built-in voices, including Beautiful Betty, Huge Harry, Kit the Kid, Rough Rita, Perfect Paul, and Whispering Wendy. On closer consideration, this device is perhaps a readymade study in the sonic spaces of gender politics, meshed with techno-optimism. Some of the female voices were formed by simply scaling up the frequencies of the male root voice.

- *I am the standard male voice, Perfect Paul.*
- *I am Beautiful Betty, the standard female voice. Some people think I sound a bit like a man.*
- *I am Huge Harry, a very large person with a deep voice. I can serve as an authority figure.*
- *My name is Kit the Kid and I am about 10 years old. Do I sound like a boy, or like a girl?*
- *I am Whispering Wendy, and have a very breathy voice quality. Can you understand me even though I am whispering?*

In the early 1980s, the first round of “speaking” video games were released, including Stratovox (“Help me!” “Lucky!”) and Space Spartans (“The battle is over!). But these claims were false advertising, because the games were using the craggy *impressions* of the human voice via speech synthesizers like the Votrax and DECTalk, which formed phonemes into words, rather than using the human voice itself.

⁹ Stone, Allucquère R. *The War of Desire and Technology at the Close of the Mechanical Age* (Cambridge, MA: MIT Press, 1995), 4.

A different kind of demanding female voice emerged with Suzanne Ciani's work on the 1980 pinball machine *Xenon*. This is one of the earliest moments when the feminine voice was fully sexualized onto a silicon chip for a mass audience. Using her "Voice Box" synthesizer, Ciani played up the trope of the immodest orgasm and became the first female voice in game history.¹⁰ The original *PinBot*'s husky call invited players to "enter *Xenon*" and "try tube shot." It emitted satisfied "ohs" and "ahhs" as quarters were dropped in. (She also downshifted her voice to become the male voice in the game.)

Ciani milked all she could of the mere seconds of memory available on the ROMS plugged into the game's Sounds Plus Card and the Vocalizer circuit board (later replaced by a "Squawk and Talk" module). One pinball collector in a YouTube review proclaimed *Xenon* "the greatest ass in pinball" and the "trophy wife of pinball games." "You don't want to play too much," he continued, "you just want to show her off and give her drinks so long as she keeps laughing at your jokes." Apparently, the Gamergate attitude also applies to pinball.

Circling back to the *Votrax*, this device evokes the original wavelengths of Gagnon's zombie vocal folds perpetually opening and closing, the real man himself now anonymous and forgotten. The full vocalprint and nasal resonance of Gagnon's speech is trapped inside various *Votrax* technologies—a readymade haunting of formant energy, waiting to holler back at us, over four decades removed from its source.

Decades later, the *Votrax*-obsessive Paul Elliman tracked down Gagnon's daughter. She wrote about the appearance of her father's voice in the music of Kraftwerk: "I can recognize it immediately. ... I have an ear for his voice. ... The *Votrax* is my father, if that

¹⁰ *A Life in Waves*, Directed by Brett Whitcomb, performances by Suzanne Ciani, Window Pictures, 2017.

makes any sense.”¹¹ Gagnon’s voice lingers as what Erik Davis would call an “analog doppelgänger, spectral distortion, or a vocal ghost lingering in imaginal space.”¹²

The true story goes that Florian Schneider, a founding member of Kraftwerk, discovered the Votrax in Detroit in the mid-1970s while on tour for *Autobahn*. Schneider, a “collector of artificial voices,” and his bandmates were the first to harness the robotic drawl of the vocoder.¹³ And the Votrax became one more filter in the archive. Gagnon could be an honorary member of Kraftwerk, as their German VS6.G2 version of the Votrax—sometimes filtered through a vocoder—staggered its way through “Uranium” and chants out multilingual “Numbers” on the 1981 album *Computer World*. It can be heard on “It’s More Fun To Compute,” “Musique Non-Stop,” and “Techno Pop,” as well.

The fragments of Gagnon’s voice appeared not just on Düsseldorf electro tracks, but spilled into techno and early hip-hop, as well. They were cemented into the sonic landscape of Detroit radio by Electrifying Mojo, and captured in a grainy but beloved YouTube clip salvaged from the Detroit cable TV program *The New Dance Show*. In the clip, recorded at Club Studio III in 1991, a woman opens the dancefloor with an impressive launch off a stage, landing in full splits (in heels, no less); the Detroiters form a regimented dance line, then bust out and take turns vamping down the aisle to Kraftwerk’s “Numbers.” Kraftwerk’s impact on Detroit native Rik Davis, one half of the proto-techno duo Cybotron, is undeniable. However, when asked if he was aware of the

¹¹ Elliman, Paul. “Detroit as Refrain.” *The Serving Library*, Bulletins of The Serving Library, no. 8 (2014). <www.servinglibrary.org/journal/8/detroit-as-refrain> Accessed 5 March 2016.

¹² Davis, Erik. “Roots and Wires Remix.” *Sound Unbound: Sampling Digital Music and Culture*, edited by Paul D. Miller, (Cambridge, MA: MIT Press, 2010), 63.

¹³ Tompkins, Dave. *How to Wreck a Nice Beach: The Vocoder from World War II to Hip-Hop, the Machine Speaks* (Chicago, IL/Brooklyn, NY: Stop Smiling Books/Melville House Publishing, 2010), 185.

device while recording the classic 1983 record *Enter*, Davis responded, “Votrax is a no-no.”

If you powered your computer down before turning off the Votrax, it would scream a death knell of “AAAA—RRRR-GGGhhhh...” But this faux sonified death gasp is all smoke and mirrors because the Votrax always comes back to life. It’s a loosely defined testament to the Votrax’s breakout desire to sing. As the advertisement for the Votrax goes, “Now You’re Talkin’!”