

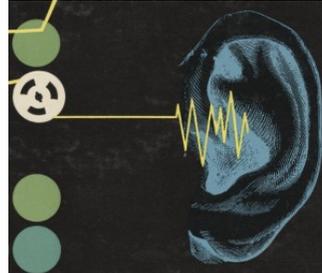
“Daisy Bell (Bicycle Built for Two)”—Max Mathews, John L. Kelly, Jr., and Carol Lochbaum (1961)

Added to the National Registry: 2009

Essay by Cary O'Dell



Max Mathews



*Sleeve for 45rpm
“Computer Speech”*



*“2001: A Space Odyssey”
film poster*

The song “Daisy Bell” (often more popularly referred to as “A Bicycle Built for Two”) was written in 1892 by an Englishman, Harry Dacre.

Legend has it that Dacre (nee Henry Decker) came upon the idea for the song during a visit to America. On his trip from the other side of the Atlantic, Dacre had brought with him his bicycle and, when he docked, much to his chagrin, he was promptly charged a duty on it by US customs. Later, bemoaning the fee to fellow songwriter William Jerome, Jerome stated it was a good thing Dacre didn’t bring with him a “bicycle built for two” as he’d be charged a twin duty.

Smitten with the phrase “a bicycle built for two,” Dacre decided it would work well in a song.

And so “Daisy Bell” was born.

“Daisy” was first made famous by British music hall performer Katie (Kate) Lawrence. Since being introduced into the musical vernacular, the song has been endlessly revived, recorded, expanded, lyrically rewritten, parodied, and translated. One of “Daisy Bell’s” most radical and interesting uses of course arrived in 1961 via IBM and a team of visionary computer programmers.

That year, in Bell Labs in Murray Hill, New Jersey, computer programmers John Kelly and Carol Lochbaum (who together programmed the machine’s “vocal”), and an innovative techie-cum-music composer named Max Mathews, made, for the first time, an artificial device “sing.” And the song it sang was the turn of the century ditty “Daisy Bell.”

John L. Kelly (1923-1965), described as a “Texas-born, gun-toting physicist” by one author, spent four years in the Navy during WWII before earning a Ph.D. in Physics from the University of Texas at Austin. At Bell Labs, he worked extensively with the Vocoder (voice encoder), a device, as its name suggests, designed to encode the human voice. Later, Kelly became interested in game theory and probability. In concert with Bell Labs associate Claude Shannon, he developed the Kelly Criterion, an information theory that can be applied, often quite profitably, to Las Vegas betting and the New York stock exchange.

Max Mathews (1926-2011) had studied electrical engineering at the California Institute of Technology and earned a doctorate from the Massachusetts Institute of Technology before going

to work for Bell Labs in 1955. There, he was mentored by John R. Pierce and worked with composer James Tenney on issues related to voice synthesis and computer music. Early in his tenure, Mathews became interested in converting analog information into digital forms. In 1957, he wrote the first version of MUSIC, the first popular computer program developed for generating sound. In order to test it out, he hooked up his violin (Mathews was an amateur violinist) to an IBM 704 computer and became the first to capture and synthesize sound from a live instrument into a computer for playback.

Though by that time computers had already been used to play music, Mathews would be the first person known to write a computer music program. At the time, however, due to technical limitations, it took one hour to play back 17 seconds of melody. “Real time” listening was not yet possible, so Mathews had to record his computer-created output to audiotape and then speed up the tape to get to the correct tempo.

Mathews’ eventual refinements of the program—which proceeded in stages and incarnations from MUSIC I to MUSIC V—eventually became the type of music and sound software we know today, allowing, in Mathews’s own words, for a “musician...to make his own instruments.”

Along with MUSIC, Mathews would also go on to create Generated Real-time Output Operations on Voltage-controlled Equipment (GROOVE), a computer system for live performance which allows a composer/conductor to manipulate sound in real time via two 12-bit digital-to-analog converters and various input devices including a keyboard and a joystick.

Later still, Mathews pioneered the Radio Baton, two devices, able to be handled like drumsticks, which via antennas allowed the user to manipulate digitized music. It was the forerunner of the technology now used in the controllers of Nintendo’s Wii games.

Mathews’s various advances not only earned him the moniker the “Father of Computer Music,” it would also inspire a multimedia program package that is named in his honor. MAX software, in some ways a descendent of MUSIC, is a programming language for music and multimedia developed by the Cycling ’74 company. It debuted in the mid 1980s. Today, MAX is the most utilized tool for all types of computer-aided sound manipulation.

For Bell Labs, once the “Daisy Bell” “performance” was achieved, it laid the groundwork for a host of breakthroughs both mechanical and musical. It was the harbinger not only of digital recording (which accounts for almost all audio recording today) but also of a plethora of now common functionalities including everything from avante garde music to movie sound effects to even the karaoke machine at your local neighborhood bar.

The breakthrough of “Daisy Bell” shouldn’t be undervalued; one online posting even goes so far as to say, “The advent of our information technology catalyzing our music was a harnessing of metaphor every bit as important to our collective history as the splitting of the atom.”

Along with its long-reaching technological influence, “Daisy Bell,” as delivered by computer, was also just amusing and interesting. For years the demonstration was part of the formal tour of Bell Labs. In the early 1960s, when science fiction writer Arthur C. Clarke visited his friend John Pierce at the Labs, he took special note of this singing and talking computer. Later, as the author of the seminal science fiction work “2001: A Space Odyssey,” Clarke incorporated it into its screenplay. In the 1968 film, when the talking, malfunctioning, slightly malevolent computer HAL (whose anagram coincidentally is just one letter alphabetically away from IBM) is switched off (essentially killed), “he” (the voice of actor Douglas Rain) sings “Daisy Bell” as power ebbs out of his circuits. The sequence of HAL’s demise and his increasingly groggy musical performance has become one of the most famous in the history of science fiction films.

Though not as well known, “Daisy Bell” and its IBM origins have also been tributed in other ways over the years. In 1999, the intelligent software agent (or computer “office assistant”) BonziBUDDY, depicted in the form of a purple monkey on your computer screen, could be made to sing “Daisy Bell” if he was asked. The Japanese video game “R.U.R.U.R.” uses “Daisy Bell” as a refrain during its ending theme. And in the TV series “Mystery Science Theater 3000,” one of its robot characters, Tom Servo, sings the song when he is having his voice reprogrammed at the start of the show’s second season. Then, in 2009, nearly coming full circle, artists Aaron Koblin and Daniel Massey created their online work “Bicycle Built for Two Thousand.” “Two Thousand” is comprised of 2,088 recorded voices each singing “Daisy Bell.” They were gathered from around the world via the internet (using Amazon’s Mechanical Turk web service, to be exact) and then synched up on the web. One artistic interpretation of the work is how it uses computer technology not to replace humanity (as the IBM originally did) but, instead, to successfully unite it.

By today’s standards, the 704’s rendition of “Daisy Bell” sounds quite primitive. The sound is a flat as a dial tone; it is, after all, literally, the voice of a robot. Later, when HAL sang it in “2001,” the producers were able to give him a little bit more rhythm and musicianship—but that was science fiction. Nevertheless, the original “Daisy Bell” as relayed via an IBM computer--this meeting of music and machine--remains a bold and singular achievement, a profound leap into a brave new world.

Cary O’Dell is with the Motion Picture, Broadcast and Recorded Sound division of the Library of Congress. He is the author of the books “June Cleaver Was a Feminist!” (2014) and “Women Pioneers in Television” (1997). He also served as assistant editor of “The Concise Encyclopedia of American Radio” (2009) and “The Biographical Encyclopedia of American Radio” (2010).