

deactivate the computer's circuitry.²⁴

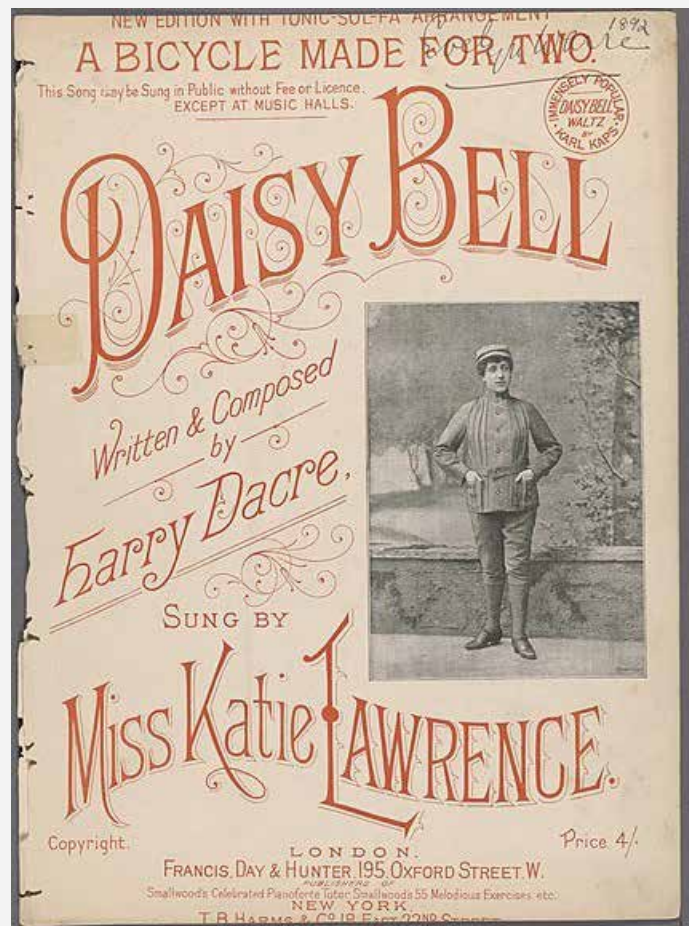
The reappearance of “Daisy Bell” in the 1968 movie has inspired subsequent composers to adapt the old song as well. Hiroshi Tamawari (b. 1971) created an [arrangement](#) in 2016 that is, in essence, an overview of developing types of musical synthesis: a journey through time, so to speak. He opens the song with a (wordless) statement of the chorus melody, performed monophonically and using the timbre of the IBM 704. Tamawari did not have an actual IBM computer to use, so he employed “chipspeech” software that emulates synthetic sounds from the past.²⁵ The IBM 704 then immediately repeats the chorus, this time with a simple accompaniment of pulses on beats two and three.

Various sorts of “non-human voices” are interwoven in the subsequent verses of “Daisy Bell”: besides the synthesized IBM 704, Tamawari uses a **vocoder** and a Cyber Diva. The first verse features a **duet** of two “voices” in unison. The more prominent timbre is the vocoder, an electronic device developed by Bell Labs in 1937 that compresses and synthesizes the voice of an actual person.²⁶ Virtual singing software—“Vocaloid4 Cyber Diva”—was used to generate the second “voice” that quietly doubles the vocoder’s melody. The vocaloid software is fifty years newer than the IBM 704 and offers far more options in its programming.²⁷

Tamawari returns to the IBM 704 timbre for the remaining choruses, but he uses its 1961 “words” each time. The chorus at **1:39** is performed by the IBM 704 alone, and it then sings in unison with the Cyber Diva for the chorus at **2:41**. (In this chorus, Tamawari engineered the vocaloid to sound mechanical.²⁸) In the final chorus, the IBM 704 sings the melody, while a more-lyrical Cyber Diva sings in harmony. They both sustain the last syllable with a device called a **fermata**, during which the steady beat comes to a halt. (In notated music, the symbol  is used to indicate that the sound—or silence—should be prolonged while the metric pulse stops.)

Tamawari employed various tone colors and techniques for the subsequent verses, too. The Cyber Diva sings without the vocoder in Verse 2, and **vibrato** is added to the final syllable, “bell”; this effect is a small oscillation of the “voice” that makes it sound a bit more human. In Verse 3, the Cyber Diva is programmed to sound even more like a human singing voice.

There is another vocal technique in Verse 3 that elevates its “human” qualities. As is true for the overall song, the majority of the text in this verse is set **syllabically**, meaning that there is one note per syllable. Occasionally, though, Tamawari employs **melismatic text setting**, meaning that one syllable of the poetry is set to multiple pitches in the melody. (A well-known example of a long **melisma** appears in the Christmas carol “[Angels We Have Heard on High](#).” In the refrain, “Gloria in excelsis,” the syllable “Glo-” flexes its



When singer Katie Lawrence's performances skyrocketed the popularity of “Daisy Bell (Bicycle Built for Two),” her photograph was added to the sheet music.

Source: NYPL