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# Letters

## In Memory of Max Mathews

[Editors' note: We have solicited letters from six of Max Mathews' colleagues and friends who knew him at different points in his life (and in their lives). Though sampled from very few of the people who knew and worked with Mathews, these letters paint a more detailed picture of how his accomplishments have impacted our community, and they make it clear how much he will be missed.]

There is no doubt that computer music would have happened independently of Max, but that it happened as early as it did and in the form that it took was altogether dependent upon Max's unique, forward-looking way of thinking. In his famous 1963 article in *Science* (Mathews 1963), where he first made public his work begun six years before, he describes a music program that was elegant in its conceptual simplicity yet extensible to constructive complexity. The article showed that music, for Max, embraced the numbers behind the notes on paper, the science that explains sounds in the air and its mysterious processing in the brain. His implementation was accessible to musicians because his program was in a musical frame—note, score, orchestra—and the non-musical concepts, signal flow, control, and so on, were translatable or learnable and became part of the lexicon. Max invited, indeed encouraged, musicians to become involved, for he knew that from among them he could find those who possessed essential attributes for the field that he had launched—the capacity to compose, to create sound from the inside out, and the capacity to apply refined performance skills to his magical controllers. Max gave voice to these and many other ideas and pursued them with passion through

his lifetime—we listen and we hear, still.

John Chowning  
Stanford, California, USA

## Reference

Mathews, M. V. 1963. "The Digital Computer as a Musical Instrument." *Science* 142(3592):553–557.

Max Mathews opened the era of digital musical sound: He started computer music and nurtured it through all his life. It was a very important step—most electroacoustic music has gone from analog to digital. And the fact that Max did it was a good fortune for the whole community. Max was a scientist and an engineer of the highest caliber; he was a member of the U.S. National Academy of Science, and he directed important departments of Bell Laboratories when it was the greatest research institution in the world. Max also had a passion for music, and he showed a rare musical empathy: His exceptionally clear mind understood the desires of composers, and he generously worked to help fulfill those desires, even when he did not share them. I myself am very deeply indebted to him for my own work, and many others are, in a direct or indirect way.

With the support of John Pierce, Max ensured that computer music benefitted from his unique ability to combine scientific and technical knowledge, to understand the challenges of different types of music, and to realize effective and practical implementations. He was an extraordinary designer. His contributions evidenced a real genius of conception; the tools he forged for music are powerful and sensible, and they favorably influenced the whole domain, facilitating the exchange of knowledge and

know-how, as the *Computer Music Journal* demonstrates.

Max also searched for new ways to make musical practice easier, not only for professionals—he wished to help listeners become performers. He developed concepts and devices to provide new ways of expressive control of the music. In his "intelligent instruments," the computer helps in the literal rendering of the music, leaving the expressive control to the performer.

The word *computer* often evokes dehumanization. In a musical and imaginative way, Max strongly contributed to making our relations with digital tools more harmonious, both in the literal and the figurative sense.

Jean-Claude Risset  
Marseille, France

Max was my friend and mentor for 40 years. We met on the island of Lidingö in Sweden in 1970. Nearly every year, I stayed with Max and Marjorie in the Bay Area, and they came as often to my farm in Vermont. Max encouraged me to compose for his electric violin, the radio baton, and the phaser filters. Once, at a SEAMUS meeting in Middlebury, Vermont, we played a duet I had composed for two radio batons. Most memorable were our trips to the Instituto Superior de Arte in Havana, Cuba, and to the nascent Theremin Center at The Moscow Conservatory of Music. His early conviction that computers would change musical culture led him to inspire numerous innovators, and in this sense, his vision has been realized.

Max stood by me, as he did John Chowning and Jean-Claude Risset, both through difficult times and to celebrate our achievements. The only times he was upset with me were when I ran for Vermont Senate (he thought it a waste of my time and talent) and when I nearly married for

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a fourth time. There is nothing we did not discuss over a glass of rum, including how we might die. I miss him terribly every day and will as long as I live.

Jon Appleton  
White River Junction, Vermont, USA

Max Mathews is often called the “Father of Computer Music,” which is a wonderful and fitting tribute; it does not fully capture the essence and impact of Max, however. Max was an “engineer’s engineer,” possessed of solid skills and math, and seeming to always have the right parts and equipment to build anything he or anyone else could dream up. I would say Max was a “nerd’s nerd,” long before that was a coined expression, for Max had a witty charm about his design aesthetic and fashion, his relationship with technology, and also music. I would also say Max was a consummate Hacker (in the good “White Hat” meaning of the word) and Maker (in the sense of the recent “Make” do-it-yourself hardware culture) long before those terms were coined as well, for he would adopt and adapt any operating system, programming language, file format, computer system, mechanical device, microcontroller, acoustic sensor, nut, bolt, cable, connector, etc., to serve his purpose(s) in creating and building a huge variety of music-making devices and systems. Max would also create a vast number of his own languages, file formats, architectures, and other things that we use and emulate to this day.

Notably, aside from all the technical things Max knew, invented, exploited, and passed on, the most important attribute to me was Max’s tireless enthusiasm for collaboration and sharing. His lab, and his mind and heart, were always open to those who were fortunate enough

to avail themselves. The MaxLab at CCRMA was a haven of utter fantasy and possibility for young and old, visitors, collaborators—whoever dropped in. The meticulously labeled parts drawers, the shop tools, the bones of previous interfaces, the boxes of historically epic tapes from Bell Labs, the new works in progress lying guts-open, Max’s massive personal memory and history, and the infectious twinkle in his eye, were there for all who showed interest. Max’s enthusiasm for anyone doing something new with technology and music made it possible for multiple generations to create new art, and to approach their projects with the same joy that Max felt. Max brought about an era that would redefine society’s relationship with technology and music. His support for anyone advancing our field (most of which he invented) was energetic and tireless. For me, above all, Max Mathews is the finest example of the human side of computer music.

His influence will live on in all of our work, but I will miss him greatly.

Perry R. Cook  
Applegate, Oregon, USA

I think I can speak for a younger generation of computer music researchers when I say we look up to Max as an icon, a symbol that it is possible to pursue a career and life in music and technology, if it is our passion to do so. Although he was commonly regarded as the “Father of Computer Music,” many of us thought of Max as a gentle and kind “grandfather,” who showed us new marvels with a deep and yet child-like wonder, while unfailingly and happily taking interest in everything we do. Interestingly, so much of what we do stems from what Max started more than 50 years ago. Topics such as sound synthesis, music programming languages,

physical interaction design, and the science of hearing and cognition are vibrant research areas today—which makes it that much harder for us “young’ns” to imagine what it was like for Max to be among the very first to explore them, to help establish their significance as research. Max’s work speaks (in some cases, literally) for itself, and at the same time, he had that intangible ability to instill a sense of wonder, humility, and possibility for both computer and music. Gracefully and quietly, Max set the tone for us, and made it comfortable for us to jump in and start exploring. Whether one remembers Max as “Father” or perhaps “Grandfather,” I feel encouraged to think Max is still with us, in everything we do.

Ge Wang  
Stanford, California, USA

Max Mathews has had a profound and deep impact on my research, my writing, my teaching, my music, and my life.

I met Max at MIT in the summer of 1979, but we didn’t start working together until around 1984. I had composed my *Three Chapters from the Book of Dreams* for his “electronic violin” while doing my PhD at the University of California, San Diego, and I think he liked the piece.

When I told him that I would like to write a duet for the “electronic Stradivarius” and his newest invention, the radio baton, he invited me to come and work on it with him at Bell Labs. Having begun teaching at Berklee College, I would drive from Boston to Bell Labs in Murray Hill, New Jersey, every Friday afternoon and live with Max and Marjorie Mathews pretty much every weekend.

They made me feel at home and like a part of the family. In fact, Max and Marjorie Mathews made

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everyone in computer music feel like a part of their family. After a delicious dinner prepared by Marjorie, Max and I would head off to work at the lab through the night; but to work in Bell Labs “through the night” meant that Max slept there while I worked. The padded carrying case for my DX7 synthesizer, spread out on the floor of his recording booth, usually served as his bed. At sunrise, we would take a short walk back “home” for a shower, a change of clothes, and a quick breakfast before we headed back to the lab to continue working on the systems, the hardware, and the piece.

At MIT, the premier of *Shadows* was a cutting-edge—a “bleeding-edge”—catastrophe. A “drummer” was playing the radio baton part and flipping all the wrong switches; thus producing a cloud of stuck notes for movement 1, for movement 2, and for movement 3. It was an exceedingly long piece of noise! The review in the *Boston Globe* described the experience like going to a concert to “listen to the left hand only of a two-part invention.” Given all the sacrifice and hard work that went into the project, I thought for sure that it was the end of our “collaboration”; but Max did not give up on me, and the MIT “experience” inspired me to play the radio baton myself and not to ever again leave that crucial role to another. Today, the radio baton is “my instrument” and I perform regularly on a very beautiful wireless instrument that Tom Oberheim and Max Mathews built for me and named for me: “Radio Baton #1 - The Boulanger.” Over time, my piece *Shadows* did work, and I have played it all over the world. One of the greatest performances was at the Theremin Center of The Moscow Conservatory, with Max Mathews on the violin!

Our collaboration may have started off pretty rocky, but over the

past 27 years, we developed a wonderful friendship. Max is my teacher and mentor, and I am a devout admirer and an eternally dedicated student.

I am overflowing with so many wonderful memories and stories—traveling, performing, working in his lab, working in his home, working in my home, at Bell Labs, at Stanford, at MIT, and at Berklee. Our days would always begin with “The Mathews Breakfast”—this could well be the “secret” to his longevity and success so . . . take note!—consisting of a bowl of “Special K” cereal, topped with a healthy white mountain of home-made plain yogurt, and slices of fresh strawberries or apple (usually sliced with Max’s pocket knife), and a light sprinkling of white sugar. Then, and this is the tricky part, he would “slide in” the skim milk (powdered!) along the side of the heaping bowl so as not to make a mess of the yogurt. Finally, this is complemented by a large cup of very strong black coffee, which was usually heated over from the pot made for the previous night’s dinner; according to Max, it was “stronger” and “better” when it sat for the night.

For sure, Max Mathews was a “coffee achiever,” and so too am I; though this may have led to that one time when he accidentally poured his morning coffee onto one of my laptops. Given our best efforts through the day, it was clear that there was no way to fix the machine. At dinner that night, I remarked that he had wiped out about 20 years of our work together with this “Freudian slip,” and then I asked, “Max, are you trying to tell me something? You don’t like the new piece?” We worked incredibly hard, but we also laughed a lot. I took advantage of every minute with Max to learn all that I could from him, but there were also times where we just did great stuff together, too, like going to concerts, going to movies,

going to lectures, going to conferences, looking at the stars through his home-built telescope or through my computer-controlled telescope, or, best of all, spending the day sailing my little boat around Rhode Island or his big boat around Cape Cod.

In our all-day and all-night lessons, week after week, year after year, Max taught me how to program, how to solder, how to build a computer, how to upgrade a computer, how to repair a computer, and how to wash a computer—That’s right: how to wash a computer. One day there was a problem with my lunchbox computer crashing and restarting. We had tried everything and were both pretty frustrated. He grabbed it, brought it over to the sink, and as he filled the sink with warm water and dishwashing detergent, he asked me to go and get him a screwdriver. He took it apart and immersed the circuit board in the sudsy dishwater—“You got a spare toothbrush?” Once things had dried, it worked like new and perfectly. Max magic!

He taught me so much about synthesis and signal processing. Imagine how lucky I was to be able to hang with him, to drive back and forth to Boston, to Stanford, to San Francisco, to McGill, to Dartmouth with him. How great it was to live with him—picking his brain through every meal, every minute. I have a number of great photos of him just falling asleep in mid-sentence to protect himself from my incessant deluge of questions. There was not yet Google or YouTube; but I had Max Mathews—a source of infinite and vast knowledge on absolutely everything! Max . . . “What’s a vector?” “What’s a pointer?” “Please explain FM to me . . . so that I can teach it to my students.” “How does an oscillator really work?” “What was it like to work with Varèse? To work with Cage? To work with Boulez? To work with Chowning? To work

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with Risset? To judge the Bourges Competition? To work at IRCAM? To tune and play the GROOVE system?" "I have a student working on filters; do you have any circuits that you can share?" The answer to my every question was always detailed and deep and clear—and there were thousands and thousands of questions.

When Max was visiting me at Berklee, or spending the week in my home, I would always invite a student or two to work with him. I loved to sit quietly while he answered all of their questions and to watch and learn as, like me before, he now taught them the innermost workings of his latest code or hardware. I photographed everything. I recorded everything. I videotaped everything. I took notes and collected everything that I could, and I cherished every single minute. Max shared everything he knew, everything he wrote, everything he had—with everyone. He once told me that the best way to "protect" and "back up" your work was to "give it away." And he did.

My most recent book is dedicated to Max Mathews. In the Foreword which he wrote, he leaves us with an agenda for the next generation of computer music research; and on the DVD he leaves us working versions of his classic MUSIC V program. (Simply type "make" and it will compile for your Macintosh, PC, or Linux machine!) Also, he leaves us a working version of his latest PhaserFilters program too. His greatest and his latest are there for everyone to explore, study, and use. In fact, his "Conductor Program" is there as well. With these programs, we can all continue to learn from him, and from his code.

Max Mathews taught us all "how it works"—through his books, his published papers, and especially through his code, which he freely shared. Max Mathews taught us all "how to work"—together—like the unit generators in his MUSIC programs, he connected us to one another and showed us, by example, how to communicate, collaborate, network, learn, remember, and make

room for each other's ideas—to mix! Max Mathews taught us all "how to play"—with our variations of his software instruments and his mechanical instruments such as MUSIC V, and Groove, the electronic violin, the radio baton, and the conductor, IMPROV, and PhaserFilter Programs. Max Mathews taught us all "how to live"—until the very last days of his amazingly creative and productive life, he was programming, he was designing and building, he was composing, he was lecturing, he was jamming, he was remixing, he was sharing, connecting, and promoting, and most importantly, he was still learning—in fact, he was learning Max!

Max Mathews is the Father of Computer Music—and an amazingly great father. He listened to us. He cared about us. He inspired us. And today, tomorrow, forever, Max lives ... in me ... and in each and every one of us.

Richard Boulanger  
Boston, Massachusetts, USA