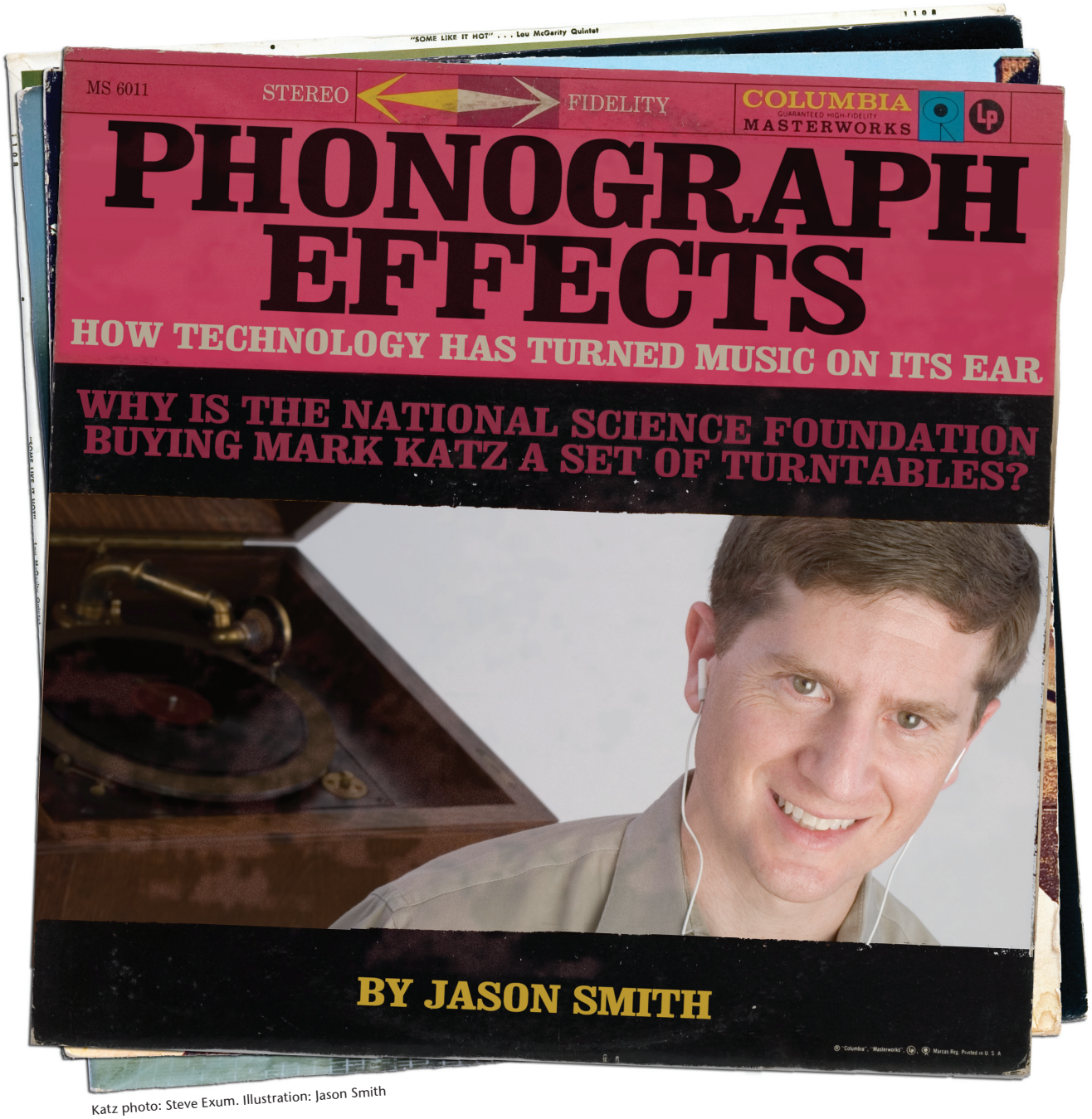


Katz photo: Steve Exum. Illustration: Jason Smith

WHAT'S MORE MIND-BLOWING?

The fact that I can now carry ten thousand songs around in my pocket and listen to one any time I want? Or the fact that just four or five generations ago, people could only hear music live and in person? Let that sink in for a minute: *recorded music did not exist.*

This is the kind of stuff that gets Mark Katz going. Katz is part music professor, part music junkie, part technology geek. He's a long-time violinist and a budding turntablist (more on that later). He wrote his dissertation on how recording has affected classical music. But when he decided to write a book, he realized that classical alone wouldn't cut it. "If you're going to talk about recording," he says, "how could you not talk about pop?" He'd been hooked since 1983, when he was thirteen and the Herbie Hancock song "Rockit" scratched its way into America's living rooms. So professor Katz let his inner thirteen-year-old help write the book.

The result was *Capturing Sound*, a book about how and why recordings, from Schubert to Public Enemy, influence musical life, and how technology, from the phonograph to the MP3, has turned the musical world on its ear.

Katz calls these things phonograph effects, and over the years they've changed the way we listen to music and the way performers create it. They've even pushed new genres of music into existence. And they all started with Edison's simple little machine.

THE WAY WE LISTEN

Back in, say, 1905, the family who cued up a record for the first time heard "performers they could not see and music they could not normally bring into their homes," Katz says. They could listen to that music over and over again. And *they* were the ones to decide what they wanted to hear, when they wanted to hear it, and who they wanted to hear it with.

A record was tangible—sound frozen into shellac, Katz says. People started collecting them (there are more than I care to mention in my attic). They were portable—it's hard to move an orchestra around, but records made it easy.

And once they became popular, records shook up the social status quo: in 1923, Katz says, British writer Orlo Williams argued that it should be perfectly acceptable to listen to recorded music any time of the day. It was a radical, indecent suggestion: *Music at breakfast?* But some ideas—say, listening to music with no one else around—were too far-out for even Orlo. He described how it would feel to walk in on a friend who was listening alone: "You would think it odd, would you not? You would look twice to see whether some other person were not hidden in some corner of the room, and if you found no such one would painfully blush, as if you had discovered your friend sniffing cocaine, emptying a bottle of whisky, or plaiting straws in his hair."

Katz says that at first, the performers' invisibility—the disembodied voice—was a problem. People were more than a little freaked out to hear someone singing or playing while having nothing to look at but a spinning disc on a box. So inventors came up with machines that, when attached to a phonograph, would rotate images in time to the music. One British listener created elaborate sets, characters, and costumes to look at while listening to his favorite operas, and he would change them all for every new scene. (And I thought I was a music geek.) Listeners who were used to getting cues from a live performer's gestures and movements no longer got those cues from records. In 1925, after seeing violinist Jascha Heifetz play live, one critic called him "cold, calm, dispassionate," and yearned for "less mastery and more humanity." But after listening to Heifetz's recordings, the same critic called him passionate and tender. "With the visual channel off," Katz says, "Heifetz no longer seemed emotionless."

Records artificially delimited music into little chunks. For more than seventy years, one side of any given record could hold no more than about four and a half minutes of music. Anything longer had to be broken up onto multiple discs. So listening to Beethoven's Ninth at home was an exercise in, well, exercise, as it meant getting up around fifteen times to turn your records over. Newer technologies have still tended to play fast and loose with listeners: eight-track tapes rudely interrupted songs to clunk over to the next track and pick up where they left off, and cassette tapes often had a puzzling few minutes of silence at the end of one side, intended, as the liner notes put it, "to preserve the album continuity."

INSTANT REPLAY

But the most resounding effect of records, Katz says, has been their repeatability. He uses a simple example: sing a note. Then sing it again, and try to recreate the first one exactly. You can't. The sound you just made has far more qualities—pitch, volume, length, intensity, timbre, attack, decay—than a human can precisely duplicate. And there's no way a band or orchestra can play a whole song or symphony twice in exactly the same way. But that's precisely what records do. And that, Katz says, has had consequences.

We come to expect things based on the recordings we hear: for instance, "Satisfaction" by the Rolling Stones will always begin with that same riff. Katz sometimes plays a snippet of "Satisfaction" to his students. "I don't even

play the entirety of the first note," he says. "But the students can identify the song because that particular note has been repeated in exactly that form so many times that it's instantly recognizable."

These expectations are so strong that we sometimes expect qualities unique to a specific recorded performance to be the same when we hear the work live or on another record—even if those original qualities were mistakes. Katz says that whenever he hears *Zigeunerweisen*, a violin piece by Pablo de Sarasate, he expects to hear the violinist pluck his open E string thirty-four seconds into the music. But that's because as a youngster, Katz "listened obsessively" to Jascha Heifetz's 1951 recording of the piece. Heifetz goofed when he plucked the E. Even though Katz knows that, part of him still expects to hear that goof every time anyone performs *Zigeunerweisen*. And part of him is still a little surprised and disappointed when he doesn't. "Though I know better," he says, "on a certain level I regard that wayward note to be a part of the piece."

Back in recording's early days, Katz says, the goal of capturing any work on shellac was to make it sound as close as possible to the live performance of that work. After all, for thousands of years, that's the only way people had experienced music.Now, after only a little more than a century of recorded music, we've completely flip-flopped: we expect the live concert to live up to the recording. The recording now comes first; it's the ideal, the reference, the prototype. Live music is just a subsequent interpretation. Touring bands hire extra musicians so they can make their live performances sound as full and fleshed-out as they do on record. But when performers feel the need to adhere too closely to note-perfect recordings, Katz says, something suffers. One critic blasted the Chicago Symphony for playing this way, saying that they were "machine-like" and that "they sounded like a phonograph record."

THE WAY WE PLAY

Once records came along, musicians, both virtuoso and amateur, could listen to and learn from other artists. They could emulate what they heard, for better—the study of recordings has been crucial to the development of jazz, Katz says—or for worse (no "Stairway to Heaven," please). But musicians can also listen to and evaluate their *own* recordings. Katz says that's had humdrum results—if a performer hears an error, she can correct it for the next performance—as well as booming consequences: after hearing themselves on record, early twentieth-century classical players actually began to change the way they approached rhythm.

Composer and pianist Camille Saint-Saëns said that he "at once saw, or rather heard, two grave mistakes" upon listening to his first recorded performance. One involved tempo, the other, rhythm. "But what was Saint-Saëns really hearing?" Katz asks. He points out that countless recordings of the era are full of the same kind of rhythmic inflections Saint-Saëns regarded as mistakes. Katz feels that as classical performers got used to making and hearing records, they gradually shunned little fluctuations in tempo, and they all but cut out the once-common practice of altering the length and placement of notes. Recordings, Katz believes, have "led to a striking change in the way modern classical performers approach musical time."

Recording affected musicians' *playing* time, too. Because of the limited amount of time on a record, Katz says, many early twentieth-century performers simply chose to record shorter works. Concert programs, on the other hand, continued to feature longer works. But concert audiences began to demand what they had been listening to on record at home.

Composers from Elgar to Stravinsky wrote works specifically with records' time limitations in mind, and were sometimes even commissioned to do so by phonograph companies. In general, some composers saw records as an advantage, since they helped the music be heard by more people. Others saw a down side, as records sometimes immortalized inferior concert performances that composers would rather forget. And some seemed to simply regret the technology: Aaron Copland wrote that the "unpredictable element, so essential in keeping music truly alive…dies with the second playing of a record."

Modern pop has been subject to its share of phonograph effects, too. Musicians from early blues singers to Duke Ellington wrote to fit the playing time of the 78. Then, in the late 1940s, Columbia Records developed the long-playing 33⅓-rpm record, or LP, which held about 23 minutes per side. To compete, RCA Victor introduced the 45-rpm record. Even though the 45 didn't hold much

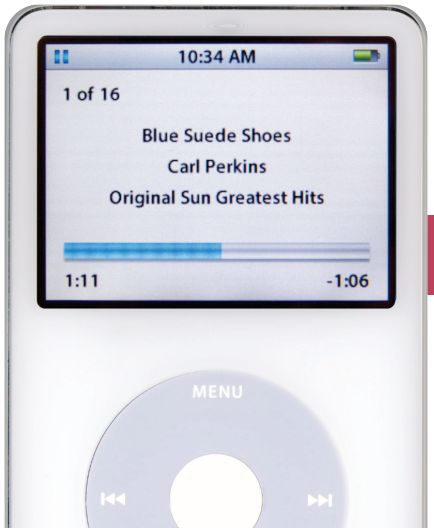
more music than a 78, it quickly became the standard for pop singles when jukeboxes and radio stations started using it. In fact, the typical length of today's pop songs—usually about three minutes—is a phonograph effect of the original 45-rpm record.

BRINGING IT UP TO SCRATCH

By the late 1970s, DJs had learned to "cut" at parties: they'd use two turntables and two copies of the same record to isolate and repeat the catchiest few seconds of a song over and over again, in order to form a "loop" that people could dance to. But no one really considered DJs to be musicians. Not until a thirteen-year-old Bronx kid figured out that a record player could be an instrument.

One day in 1977, Theodore Livingston was playing records in his bedroom. "My moms came and banged on the door, you know, *boom boom boom*," Livingston said in the documentary film *Scratch*. "She said, 'If you don't cut that music down, you're gonna have to cut it off.'" Theodore didn't want to lose his place, so he left the needle down and pulled the record back. He let the record spin, then pulled it back, let it spin, and pulled it back.

He had just discovered scratching, one of modern music's most recognizable—and indescribable—sounds. "When she left," Theodore said, "I was like, 'hmmm, that's a pretty good idea.'" He experimented, perfected his technique, and unleashed it at parties. Scratching took off fast and far: whether art form or hi-fi abuse, it's considered one of hip-hop's four fundamental elements. Young Theodore came to be known as GrandWizzard Theodore and was a marquee name at the Rock and Roll Hall of Fame's 1999 conference on hip-hop. Nowadays, you can enroll in a DJ academy to learn how to scratch, as Katz did. Each time a new technology—from cassettes to digital downloads—sounded the turntable's death knell, scratching helped keep the phonograph alive. And it gave birth to a new form of music—something called turntablism.



NEEDLES TO SAY

Turntablism isn't using records to listen to music; it's using records to *make* music. As hip-hop grew, rappers gradually stole the spotlight from their own DJs. But by the mid-90s, hip-hop was so popular that there was room to focus again on the DJ, or turntablist. These guys are true vinyl junkies: they sniff out, covet, and collect obscure records, looking for catchy instrumental passages, offbeat vocal snippets, and anything else that they can combine into new routines—live, in front of a club crowd, using two turntables and a mixer, often in a head-to-head battle to see who's got the sharpest skills. Good turntablists are hip-hop's virtuosos—Paganinis with needles; the Jimi Hendrixes of scratch. Their hands are a blur. Their music can be funky, abrasive, bombastic, bewildering. If you're over, say, age thirty-five, listening to this stuff may make your fillings hurt.

In *Capturing Sound*, the professor in Katz analyzes a battle routine by DJ I.Emerge: "Every time there is a snare, I.Emerge uses the crossfader to switch from the turntable with the word 'that' to the one with the drums. In doing so, he creates a seamless flow of sixteenth notes."

Katz the technology geek informs us that "the next set of scratches consists of a combination three-click forward and four-tear reverse."

And Katz's inner thirteen-year old basically tells us that this particular DJ's competitors just got served—that I.Emerge's routine would please any crowd but would also cause his competitors to give up all hope.

Turntablists come in all colors—black, white, Latino, Asian—but most of them are men, Katz says, and he wants to find out why. "What makes this such a guy thing?" he asks. "There's no overt misogyny, as far as I can tell." He also wants to figure out if and how the cultural aesthetics of DJing have changed as the phenomenon has spread beyond its origins in the African American community.

The National Science Foundation, as part of its program on the history and philosophy of science, engineering, and technology, gave Katz a grant to study turntablism and to write a book he's calling *Groove Music*. "It's probably pocket change for them," he jokes, "but it's enough for me. I'm going to go shopping for turntables soon.

"The things I like to study are things I started out just enjoying, for their own sake—not really caring whether they were particularly deep or not—but then finding that the more I got into them, the more I could engage in them as a scholar and as a teacher," Katz says. Often, when he's dazzled by something he's listening to for pleasure, the academic side of his brain kicks in and he's got a new assignment for his students.

"That's why it's fun to be a music professor," he says. "I just like music, and now people are paying me to talk about it." e

Katz is an assistant professor of music in the College of Arts and Sciences. His book Capturing Sound: How Technology Has Changed Music, *is available from University of California Press.*