

Can't get it out of my head

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A father's yearlong quest to grasp the infant musical mind

By Jeremy Eichler, Globe Staff | July 13, 2008

I've never felt so paralyzed standing before my CD collection as the day I brought my newborn son home from the hospital and decided to play him his very first music. So much was at stake. Should it be modern or Baroque? Orchestral or opera? Would Mozart make him smarter? Would Schoenberg instill in him revolutionary tendencies? Would Wagner make him loathe his Jewish roots?

I settled on Bach's "Art of Fugue" in an arrangement for string quartet. Why not begin at the summit, and what's more, I imagined, all that searching counterpoint would be like honey for the infant brain. He responded with aplomb, conveying his wise, wordless mastery of the material by slipping into an eyes-closed, meditative state. OK, he fell asleep.

But my yearlong quest to understand the infant musical mind had begun. As it turns out, my timing was good, as the cognitive and neuroscience research on music has been exploding these days, driven by technological breakthroughs in brain imaging and a newly widespread openness toward music as a legitimate field of scientific study. It's hard to miss the reverberations. Keith Lockhart has been outfitted with sensors on the podium of Symphony Hall; Oliver Sacks's "Musicophilia" has brought strange tales of musical obsession to the bestseller list; the journal Nature has been running a nine-part essay series on the science of music; and a conference this weekend at Tufts University is convening more than 100 researchers from 13 countries to discuss the subject of "Music, Language, and the Mind." The art form that Claude Lévi-Strauss once dubbed "the supreme mystery of the science of man" is, one note at a time, becoming less



A child being studied at the Auditory Development Lab at McMaster University, where a study indicated that the way adults bounce babies affects whether the kids prefer marches or waltzes. (jason jones/jason jones photography inc.)

mysterious.

These last few weeks, I've been speaking with experts to learn about the new frontiers of research, and I've been pursuing some experiments of my own, aided by my pint-size assistant, Jonah. The results suggest both that infants are much more musically savvy than you might think, and that the music we play for them may be exactly what they don't need to be hearing. What follows are some notes from the field.

Beyond the Mozart effect

Researchers have soundly debunked the so-called Mozart effect - the notion that listening to Mozart helps with the execution of certain tasks, or more generally that Mozart makes you smarter - but the baby-music industry is blocking its ears and pretending it never got that issue of *Psychological Science*. Mozart is still aggressively marketed to new parents, and hundreds of CDs with titles such as "Smart Symphonies" still trade on the implicit linkage between listening to classical music and building your intelligence. (To make matters worse, the selection offered on most compilation CDs tends toward the greatest hits of hotel lobbies, like Pachelbel's Canon.) Too bad more vulnerable new parents can't speak with Glenn Schellenberg, a professor of psychology at the University of Toronto.

Schellenberg conducted a series of experiments on undergraduates, first showing that Schubert increased performance just as well as Mozart, and then showing that a narrated story by Stephen King also did the trick. It turns out that the key to superior performance is enhancing one's mood, and that can be done by music or by sipping a strawberry milkshake. "How you feel affects your behavior and experience in a lot of different ways," said Schellenberg by phone from Amsterdam. "The Mozart effect is just one example."

But the lesson to draw is not that infants are not musically inclined or receptive. On the contrary. By using EEG recordings as well as special techniques based on behavioral response, researchers have now shown just how early the infant brain becomes musically active. By two months of age, babies can already exhibit preferences for consonant or dissonant music, and a study not yet published found

that by eight months they can grasp the structure of unfamiliar Balinese scales while adults do not. Just when I thought Jonah was little more than a cute blob listening quietly in his baby seat, he was in fact doing some serious musical heavy-lifting.

Who's got rhythm?

But there was no time for resting on parental laurels - there was serious work to do, especially once I learned of a study conducted by Erin Hannon and Sandra Trehub. They compared infants' and adults' abilities to pick up on changes in both simple and complex rhythms in Bulgarian and Serbian folk music. North American adults, with little prior exposure to this music, grasped only the changes in the simple material and fared poorly with the complex folk rhythms. As for the diapered set, the babies aced both the simple rhythms and the complex rhythms.

Speaking by phone from the University of Nevada, Las Vegas, Hannon said this meant that infants start life with the ability to perceive complex rhythms but that they lose this skill unless it is called upon in their environment. Hannon was hesitant to make sweeping generalizations based on her research, so I'll do it instead. Clearly, if we want babies to retain the ability to perceive rhythmic complexity, they should be exposed to rhythmically complex music from a very early age.

I got off the phone and scanned my son's rather feeble CD library, consisting mostly of music that had been given to us as gifts. It was heavy on simplistic toddler music, often with inane lyrics about eating burritos with Tabasco. One CD consisted exclusively of white noise, with an entire track given over to the sound of a washing machine. I told Jonah about the study published in *Science* that showed that rats who grew up with white noise alone became basically tone deaf. I could tell from the way he vigorously munched on his plastic car keys that he was horrified.

So, in search of rhythmic diversity, I popped in a recording of my favorite Bulgarian clarinet player, Ivo Papasov, playing one of his exuberant, rhythmically complex wedding tunes. My son's face lit up. We were on to something.

I confirmed my hypothesis with Laurel Trainor, director of the Auditory Development Lab at McMaster University in Ontario. "We haven't done a study, but presumably if you expose an infant to a lot of complex rhythms you could make them more sensitive to those," she said. One study Trainor's lab has done showed that the infant mind often wires together musical input with motion data, so for example, the way adults bounced with their babies - in a march rhythm or in a waltz rhythm - affected whether babies preferred to listen to marches or waltzes.

Clearly, no small rhythmic cue goes undetected. In that spirit, Trainor was sympathetic to my critique of banal toddler music as potentially squandering a young mind's opportunity to grow. "We assume we should give them something simple first and build in complexity when they're older," she said, "but it's not clear, at least in the perception of music, that that's really optimal."

Baby Schoenberg

Trainor has also written about the way infants first process music independently of any system of major and minor scales. Intrigued by this finding, I pressed my luck and asked her something I had long wondered: What if a baby heard only atonal music during the formative stage of his development? Would atonality then seem like the norm and tonality like the departure? Would the child grow up finally able to realize Schoenberg's dream of having his music treated as no more exotic or challenging than that of Tchaikovsky? Would this young native speaker of atonality be inclined, as Schoenberg hoped, to casually whistle 12-tone music as he walked down the street?

"I think there are constraints," she said, rather diplomatically. "The privileged status of consonant intervals - like the octave and the perfect fifth - are built into the auditory structure." In other words, the brain processes tonal relationships more easily. OK, but has anyone actually studied this in depth? Trainor didn't think so. I ran the same question by Steven Pinker, a Harvard professor and well-known expert on the cognitive-linguistic side of the field, but he was also skeptical about my proposed atonal regimen. "I doubt it would work," he said, "but I shouldn't speak dogmatically without someone having done that experiment."

Here at last was my opportunity to do my part for the forward march of science. It was too late to eliminate all tonal music from Jonah's aural diet but we could at least do some concentrated listening. I cued up the final movement of Schoenberg's Second String Quartet, a landmark in the composer's journey toward atonality. As the soprano sang the famous line, "I feel the air of another planet," I scrutinized my son's face for a glint of recognition, and, to my shock, he actually began clapping his hands. Never mind that he claps his hands freely these days at seemingly arbitrary moments. In my view, it was a scientific slam dunk.

We expanded quickly to include Berg and Webern, but a few days later, just as Jonah was, I'm sure, beginning to digest tone rows as easily as organic baby food, I spoke with Henkjan Honing at the University of Amsterdam. He's presenting a paper this weekend at Tufts on "Musical Competence and the Role of Exposure." Honing explained that we tend to think of advanced musical training as the only way to build real musical competence, but his work has demonstrated how much the brain can learn simply through active exposure to many different kinds of music. "More and more labs are showing that people have the sensitivity for skills that we thought were only expert skills," he said. "It turns out that mere exposure makes an enormous contribution to how musical competence develops. But it's the variety that counts."

Well, back to the drawing board. Turns out Jonah needed complex and simple music. In search of a balm to soothe his weary, dissonance-addled auditory passages, I began a strict, compensatory regimen of Eastern European mystical minimalism. Judging by the state of calm that would overtake him, his favorite seemed to be Arvo Pärt's "Spiegel im Spiegel," full of hushed scales and simple broken chords.

Eclectic ears

But I also explored more widely and my son was receptive to just about everything I tried. Steve Reich's "Drumming" proved ideal for the excitement of a weekend morning. The buzzing energy and biting sarcasm of Schnittke's First Concerto Grosso seemed an obvious choice for a slow-paced rainy afternoon. And what better way to gain

exposure to the French language than through the opulent yet wistful art songs of Reynaldo Hahn? And then finally, there were the harmonically wayward 17th-century madrigals of Gesualdo, surely like calisthenics for little ears.

The more we listened through my own CD library, the more I wanted to toss Jonah's collection of "baby music" in the trash. Of course, soon enough, my son will start making musical choices of his own, and who knows what will happen. During our phone interview, Pinker cautioned me that, despite my best intentions, my son's musical tastes "might ultimately have more to do with peers and adolescence than with parents and infancy."

That may be so in matters of aesthetic preference, but after speaking with so many researchers, it also seems clear that we should never underestimate just how musically sensitive and discerning the infant brain can be. Or, as a Tanglewood usher once astutely observed as I was rushing to the parking lot after a concert with my tiny protégé wailing at the top of his lungs: "Everyone's a critic."

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