

Seven



EXCLUSIVE SHORT STORY

THE LADY DETECTIVE GETS A FRIGHT

Original fiction by Alexander McCall Smith



INSIDE ✻ **Upsy Daisy** who? What the Teletubbies team did next/ **Jane, Jane, go away** The great Austen debate/ **Will Fur fly?** Nicole Kidman's latest film reviewed

Your seven-day Television and Radio guide





ROCKIN' BOFFIN

SCIENCE HE WORKED WITH STEVIE WONDER, VAN MORRISON AND SANTANA BEFORE SWAPPING ROCK FOR RESEARCH. NEUROSCIENTIST DANIEL LEVITIN TALKS TO SUSAN DOMINUS ABOUT THE MEANING OF MUSIC
PORTRAIT BY POPPY DE VILLENEUVE

On a chilly morning in New York last month undergraduate students started trickling into their New York University music appreciation class – among the first, a girl with her fingernails painted black, a boy with turquoise hair, another girl with outrageously high-heeled vintage boots. It's easy to imagine what they would have made of Dr Daniel Levitin, the forty-something guest-speaker sitting at the front of the classroom wearing black jeans, a cellphone clipped to his waist, and a tie with a vaguely geeky pattern – wood grain? Or one of those supermagnified microscopic images?

Levitin's lecture – based on his new book, *This is Your Brain on Music* – began with a rather laboured metaphor, something about lakes and motor boats and bobbing cork. The neuroscientist was trying to make a point about the amazing sensitivity of the eardrums, 'nothing more than a couple of flaps of skin stretched tightly over bone, bobbing in and out'. Everything we know about the auditory world, he went on, 'has to be interpreted by the brain based on the wiggling in and out of those eardrums. How much do they wiggle, and where exactly on the membrane? That's all based on how they're hit by the sound waves, the frequency, the pitch.'

Maybe Levitin could tell he was losing them: with a quick keystone of his Mac, he cued up Stevie Wonder's *Superstition*. 'What do you hear?' he asked. 'Guitar,' a student volunteered. Actually, another chipped in, it was clavichord. 'That's right, it's Stevie Wonder playing the clavichord and making it sound like guitar,' Levitin told the class. 'Stevie' – note the first name basis – 'actually wrote the song for Jeff Beck, a guitarist who never got around to recording it. And so he got frustrated by it and played it himself – he wanted that Jeff Beck kind of sound.'

Now he had their attention. In fact, Daniel Levitin is about as close to a rock star as a scientist will ever get. He's played alongside Van Morrison and the Steve Miller Band. He's even earned the right to call Stevie by his first name, having worked closely with Wonder as he compiled his greatest hits album. Throughout the 1980s, he was a producer and sound engineer, working with The Grateful Dead, Chris Isaak, Santana, Blue Oyster Cult and (he's less proud to admit) Whitney Houston's back-up band.

But it's in his second career, as a neuroscientist, that Levitin has attracted his biggest fan base. Since writing *This is Your Brain on Music* – a *New York Times* bestseller that came out in the States last August and is published in Britain later this year – Levitin has become a sought-after public speaker. The book, a lively overview of the emerging 'neuroscience' of music, explores everything from the genetic basis of musical talent (apparently it doesn't exist) to the sex appeal of Keith Richards. It has even attracted a few celebrity groupies: after reading it, David Byrne paid a visit to McGill University in Canada, where Levitin runs the Laboratory for Music Perception, Cognition and

Expertise. And lest anyone should think that Levitin is only of interest to baby boomers, it should be noted that Byrne brought with him several members of Arcade Fire (attention boomers: that's the hottest indie band going these days).

At NYU, Levitin's academic persona was on display – convivial, curious and relaxed. Once we arrived at Barney's department store, where Levitin was searching for a jacket for his next appearance, on Fox News, his earlier persona – harassed but highly efficient music mogul – seemed to emerge as he engaged a salesman in a highly directed bout of speed-shopping, while answering his cellphone with a business-like 'Levitin'.

Understandably, Levitin is as easy talking about consumerism as he is about neuroscience. He is a regular guest speaker for Amazon and Microsoft, where he says he's nearly always asked what background music will help move merchandise. One study, he says, found that when wine stores played classical music, its clients didn't buy more alcohol, but what they bought was higher-end. Had the men's department at Barney's chosen well? 'They're going for kind of young and hip,' he says, listening to what he calls 'the sonic wallpaper', in this case a kind of easy-listening funk. 'I don't think it's quite right.'

So far no one's actually hired him to tackle this head-on (Barney's might want to consider it) but Nissan Motor Company recently employed him as a consultant. 'It's interesting,' says Levitin. 'They want to make the driving experience as fun and safe as possible, and they were wondering if there's a certain kind of music that people could listen to that would help them maintain alertness.'

Nissan paid him handsomely to learn what most people might have guessed, which is that the answer would vary from person to person. But Levitin is still working with them to develop a research tool that would quickly determine, based on biographical details and someone's reaction to a few snippets of music, what that music might be for individual car buyers. So, off the top of his head, what would he recommend to keep someone like me – a thirty-something mum who drives a Subaru and likes to read – alert on my occasional rush-hour commute to Manhattan? Levitin thinks for a moment. 'Someone like Ry Cooder, whose music has a good beat but isn't overbearing. It also has an intellectual component.'

It turns out that long before Nissan hired him, Levitin was trying to solve a variation on the problem – how to predict what kind of music a particular person might like – as an intellectual exercise, one of dozens that his fertile mind is constantly juggling. Some of those intellectual exercises have made major contributions to neuroscience, including the very first one he executed as a cognitive psychology undergraduate at Stanford University (where he re-enrolled in 1992, having dropped out 14 years earlier to pursue his career in music). Levitin recruited people from around campus and asked them to sing their favourite songs for him in his lab. To his amazement – and theirs – the vast majority accurately hit the opening note of the actual recording and sang it with precisely the same tempo. When he played a recording of their singing alongside the actual song (*Like a Virgin* was a popular choice), the two were practically in synch.

For years, cognitive scientists had thought that memory worked by remembering the gist of something that's occurred, but not the specifics (and that logic filled in the rest); Levitin's study forced the field to reconsider the once-discredited 'tape recorder theory', which holds that memory encodes experiences with near-perfect fidelity.

'If you've heard a song a thousand times, no one experience of the song has to capture all the detail,' Levitin says. 'But if you have heard it a thousand times, every part of the song will have been remembered and set down a trace in your memory. And when you're asked to recall a song you've heard a thousand times, it's like a loud chorus of people all singing in the real world, with all those thousand times coming to life at the same time. So it's hard to lose the fidelity.'

Much of Levitin's research revolves around why music moves us – and why, exactly, we love the music we love. It was Levitin who conducted the first study to prove that listening to music increases the amount of

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dopamine in the nucleus accumbens, a brain structure involved in feelings of pleasure and reward. 'You might say "big deal";' says Levitin, 'but what it's telling us is that there's a neuroanatomical corroboration – when people say that they like music and it's pleasurable, it really is. Pleasurable music activates the same brain region as drugs like heroin and opium.'

For Levitin, his research is a way to explore the hold that music has had on him ever since he was a child listening to Simon and Garfunkel and Tchaikovsky. 'For me, music was a window onto an exotic world,' he says. 'I was a middle-class white kid in the suburbs, so when I heard Johnny Cash singing, *I Walk the Line*, it sounded like that shit came from outer space. I was hearing the soundtrack of some other world.'

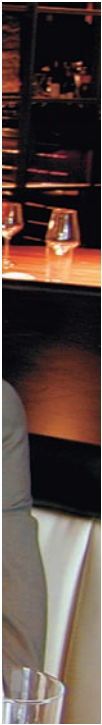
Levitin always wanted to play electric guitar, but his parents were convinced that if he took it up, 'within a week, Satan would be sitting on my lap and feeding me heroin – and I might start voting Democrat. All of which were intolerable.' As a result, it wasn't until he was 21 that he started seriously playing guitar, at which point he had dropped out of Stanford and was temporarily estranged from his parents. 'In my family,' he jokes, 'a foetus isn't viable until it graduates from medical school.'

Levitin started auditioning for bands and made it into a rock group, The Mortals, who had a following in San Francisco. When they got to the studio, they couldn't afford to hire a producer, and none of the other band members could be bothered to work on shaping and polishing the sound (Levitin was also the only one, he says, who wasn't too stoned to get it right).

From there, his career as a recording engineer and record producer took off. He worked with Stevie Wonder et al. He played pool with Tori Amos at the studio when she was still unknown, and managed to make it out safely the day Rick James showed up with dynamite strapped to his body, threatening to blow the place up if he didn't get back his master tapes (the studio obliged). Levitin was making good money, and had a high profile in the industry, eventually serving as director of A&R for 415/Columbia Records. But even at the peak of his producing career, he and Sandy Pearlman, the manager behind The Clash and Blue Oyster Cult, used to drive to Stanford and Berkeley to sit in on morning neuroscience classes, then drive back to Los Angeles in time for the recording sessions to start at midday. 'I just wanted to understand how the world works,' he says. He chose neuroscience somewhat randomly: he knew one of the professors who taught the subject, and figured he'd let him and Pearlman sit in.

When the record business started to change and multinationals began running the show in the late 1980s, Levitin decided to finish his undergraduate degree at Stanford, where he conducted his study of people's memory of their favourites songs. From there, he went to the University of Oregon, where he got his PhD in psychology, eager to pursue his research into how the mind experiences music. 'It's fun being around smart people,' he says. 'You can find really smart people in business. But there's a lot more of them in academia.'

When David Byrne came to visit him, Levitin showed the musician one of his more intriguing experiments, in which a pianist performed a Chopin nocturne on a Disklavier, a piano that can record what's been played on it and play it back note for note. Using a computer, he was able to strip away



On song Levitin (far left) attracts musicians such as David Byrne with his theories on music and the brain. Left: the young producer

what he considers the 'expressivity' of the performance, eliminating the small distinctive variables in velocity and the volume, as well as the use of the pedal, so that the final result sounded robotic. He's also able to put some of that expressivity back in varying degrees, and even exaggerate it.

It turns out that every person for whom Levitin played different versions of the piece could rank them accurately in order, from least expressive to most expressive. The result is highly counterintuitive: who would have thought that the emotional component of a piece of music has no subjectivity to it whatsoever? What's more, says Levitin, it's fascinating that 'changing the timing of a note in the physical world – sometimes by as little as less than a millisecond – actually affects your emotional reaction in the brain. Why should timing be so powerfully associated with emotions?'

And the answer? 'I don't know!' says Levitin, who's not afraid to admit that there's still much about music that's a mystery to him, including the most basic of questions: where does music come from, and why? Some researchers, such as the cognitive scientist Steven Pinker, have argued that music is no more than a frivolous byproduct of neural developments intended for language. But Levitin is convinced musicality is no cognitive fluke.

'We don't know that music is encoded in the genes, but if it is, that suggests it serves some very important biological and evolutionary function,' says Levitin. He points out that in most languages the word for 'dance' and the word for 'music' are the same. And dancing and music can become, as Levitin puts it, a proxy for how men perform on the hunt. 'Around the campfire, a man could demonstrate physical and sexual fitness, and cognitive flexibility,' he says, 'by dancing and singing for hours on end.'


Alternatively, musical prowess could serve the same purpose as the peacock's tail, a flourish that serves no real function except to demonstrate its owner's capacity for extravagance. 'It's like saying: I have so much in terms of food resources that I can waste all this metabolic energy on this show display,' he says. 'So choose me.'

For anyone who finds it unlikely that musicality could confer sexual advantage, Levitin points to Keith Richards as case study number one. 'This guy looks like death on two legs but is perceived by many women to be the epitome of sexy. When you see this behaviour, as a biologist, you know this isn't just culture and society. There's something deeper here.'

Levitin once had ambitions of achieving Richards's levels of celebrity. He woke up in the middle of the night with a song perfectly formed in his head, along with lyrics; he jumped out of bed to write it down, convinced he'd finally had his musical breakthrough. It took him another few hours to realise he hadn't written a great American masterpiece – Bob Dylan had. The song was *Tangled up in Blue*. 'The part of your brain that evaluates novelty isn't necessarily functioning during sleep,' he says mournfully.

It hasn't stopped Levitin from playing – he was a session musician for years, and still plays with a band in Montreal (a group of academics who call themselves The Diminished Faculties).

Asked what question about music he'd like to answer in his lifetime, Levitin responds from an artist's point of view. 'How can I write a song that's as good as the songs that people love and sing for generations – how do I find that right balance of melody and rhythm?'

And the scientific question about music he'd most like to see answered? 'Why can a sequence of noises evoke such an emotional reaction in people? Why does music do it while cats fighting and cars horns don't? Why does some music do it and other music doesn't?' For all his research, and studies, and labworkers, Levitin admits, 'I don't know that it's knowable.' Fortunately, that won't stop him from trying. 

'This is Your Brain on Music' will be published by Grove Atlantic in the autumn



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